

IUCN Directory of Afrotropical Protected Areas



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IUCN (International Union for Conservation of Nature and Natural Resources) is a network of governments, non-governmental organizations (NGOs), scientists and other conservation experts, joined together to promote the protection and sustainable use of living resources.

Founded in 1948, IUCN has more than 500 member governments and NGOs in over 100 countries. Its six Commissions consist of more than 3000 experts on threatened species, protected areas, ecology, environmental planning, environmental policy, law and administration and environmental education.

IUCN

- monitors the status of ecosystems and species throughout the world;
- plans conservation action, both at the strategic level through the World Conservation Strategy and the programme level through its programme of conservation for sustainable development;
- promotes such action by governments, intergovernmental bodies and nongovernmental organizations; and
- provides assistance and advice necessary for the achievement of such action.

UNEP, the United Nations Environment Programme is a Secretariat within the United Nations which was established to serve as a focal point for environmental action and co-ordination within the UN system.

GEMS, the Global Environment Monitoring System, co-ordinated by UNEP, is a collective effort of the world community to acquire through global monitoring, the data which are needed for rational management of the environment. Monitoring activities fall into five major programmes: climate related monitoring, long range transport of air pollutants, health related monitoring, oceans and terrestrial renewable resources.

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

UNITED NATIONS ENVIRONMENT PROGRAMME

IUCN Directory of Afrotropical Protected Areas

IUCN Conservation Monitoring Centre

IUCN Commission on National Parks and Protected Areas

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A contribution to GEMS - the GLOBAL ENVIRONMENT MONITORING SYSTEM.



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FOREWORD

The *World Conservation Strategy* defines conservation as "the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations". Conservation of living resources must therefore have three specific objectives: to maintain essential ecological processes and life-support systems; to preserve genetic diversity; and to ensure that utilization of species and ecosystems is sustainable. To achieve these goals large areas of the land and sea must be managed in such a way that conservation of nature is a key management and planning issue.

At the World National Parks Congress, held in Bali, Indonesia, 11-22 October 1982, discussion of future directions in protected area management was wide ranging, and emphasised the expanding role of conservation land managers in the planning, development and management of the areas under their control. The recognition of protected area managers as a professional body of men doing a vital job was seen as being of particular importance.

It is gradually being realised that the world must have protected areas which are designed, planned, and managed to bring immediate and long-term benefits to people. Parks and reserves protect the water supply of many towns and agricultural regions and, in many cases, major industrial regions; they provide important sources of foreign exchange in many third world countries and a livelihood for many people. They are also vital sources of natural raw materials such as food and thatching grass and contain 'genetic resources' such as crop relatives, medicinal plants and natural predators for biological control of pests.

The *IUCN Directory of Afrotropical Protected Areas* contains details of many of the parks, reserves and other protected areas of the Afrotropical Realm, providing information on the very significant conservation efforts that are being made in Africa. The Directory is a product of the Protected Areas Data Unit (part of the IUCN Conservation Monitoring Centre which is based in the UK) working through IUCN's Commission on National Parks and Protected Areas.

This book is the second in a series of protected areas directories launched in 1982 with the publication of the *IUCN Directory of Neotropical Protected Areas*, and it is expected that additional directories will be produced at the rate of approximately one per year, with work currently under way on the Indomalayan region, and shortly to begin on Oceania.

The information presented here is part of a much larger database which covers not only protected areas, but also plant and animal species of conservation concern, and wildlife trade. Using this database, the IUCN Conservation Monitoring Centre is able to provide information in a variety of configurations to members of the conservation and development communities including national park managers, scientists and planning agencies. By making such information readily available in a useful form, IUCN will to be able to help ensure that development decisions will lead to a sustainable improvement in the standard of living of all people, and that protected areas will make their important contributions to society.

Kenton R. Miller
Director General
International Union for Conservation of
Nature and Natural Resources

INTRODUCTION

The rapid changes in economic and social development which have taken place in recent years have led to a number of new approaches to the protection of our natural environment. Over much of the world, the urgency to link the protection of natural areas to development through research, base-line monitoring, environmental assessment, maintenance of biological diversity, watershed management, environmental education, and the like, has led to a shift in management of natural areas. National parks are as important as ever, but there are now a number of additional categories of protected areas which are managed with different objectives for bringing benefits to society.

With greatly increased responsibilities for helping ensure that social and economic development meets the real needs of society, protected areas are now beginning to receive greater support from governments, international development agencies, and local people. No longer just 'playgrounds for the rich', and protected purely for their big game and aesthetic qualities, more attention is being paid to the value of conservation areas to other long term needs of mankind.

The *IUCN Directory of Afrotropical Protected Areas* is the second in a series of directories which aims to document the protected areas of the world. It builds on the foundations of the *United Nations List of National Parks and Equivalent Reserves* (first published in 1961 and up-dated periodically since then) and the *World Directory of National Parks and Other Protected Areas* (1975, 1977).

The objectives of this series, and of the database from which it is produced, include:

- continual assessment of what is protected and how;
- promotion of the effective management of protected areas; and
- stimulation of increased interest in protected areas on the part of students, scientists, researchers, land-use planners, government officials, and the general public.

The *Afrotropical Directory* was compiled and edited by staff of the Protected Areas Data Unit, part of the IUCN Conservation Monitoring Centre (CMC). Much of the information used has been provided by members and consultants of IUCN's Commission on National Parks and Protected Areas (CNPPA), and further information has been supplied by many other scientists and land managers working in Africa. Draft information sheets were presented for many of the areas at the 22nd Working Session of CNPPA, held in Victoria Falls, Zimbabwe, from 22-27 May 1983. The information was discussed and revised, and additional material solicited to make coverage as complete as possible. Information which had been collected by Unesco for it's Man and the Biosphere programme (Project 8; Biosphere Reserves), and also information submitted as nomination of sites for inscription under the World Heritage Convention was also used. Further information was taken from published sources, gleaned from IUCN/WWF files and collected by Sally Austin in Kenya and Tanzania during early 1984.

A list of all those people significantly involved in development of the information base is given at the end of the introductory section, however the editors accept responsibility for any errors of fact or omission. Also, the information contained in the book for any one country has been compiled from a number of sources and does not necessarily represent the view of any one individual. Corrections or additional information would be appreciated and should be communicated to:

*Protected Areas Data Unit
IUCN Conservation Monitoring Centre
219c Huntingdon Road
Cambridge CB3 0DL
United Kingdom*

INFORMATION COLLECTION AND MANAGEMENT

IUCN's Commission on National Parks and Protected Areas (CNPPA) has been collecting information for many years - a practice which has developed with the greater regionalization of the Commission. By 1981 working sessions in Costa Rica, Scotland, Cameroon and Peru had all provided detailed information on many sites. Combined with CNPPA files, and publications such as the *1980 UN List* and the *World Directory of National Parks and Other Protected Areas*, a good backbone of data already existed, and was continually being added to. It was the need to analyse and handle this increasing flow of information more efficiently that prompted CNPPA to initiate the establishment of the Protected Areas Data Unit in that year.

The information base which had been developed was centred around lists of sites and a two page information sheet for each site provided by principle contacts in each country or region. Other materials such as management plans, published papers, maps, species lists and brochures, and details of the conservation and protected area systems within each country had also been collected. In July 1981, when the unit was established, the Commission had just held a regional working session in Lima, Peru, where one of the main tasks had been the review of the information available on protected areas within the region. As a result, information on the neotropics was perhaps more complete than on any other region, and it was decided that PADU's initial emphasis would be to prepare an *IUCN Directory of Neotropical Protected Areas*. This was published in October 1982, to coincide with the World National Parks Congress in Bali.

Meanwhile other regions were not neglected, and much information on sites was amassed from correspondence, project reports, and published papers. This led to modification of the information sheets already available, and addition of many new sheets. This work continues. However, development of information sheets on each of the areas is only one part of the unit's work. All of these information sheets are stored as text files on the computer, but as anyone familiar with computers will appreciate such files cannot be easily used for processing and extracting data. Summaries of information are therefore coded into data-processing files, which facilitates the selection, sorting and reproduction of information relevant to a variety of conservation problems. The *1985* and *1982 United Nations List of National Parks and Protected Areas* are two of the outputs that were prepared by using these data files.

Although created by CNPPA, PADU is now part of the IUCN Conservation Monitoring Centre (CMC). However, the unit still works very closely with the Commission and at each of the Commission working sessions the first item on the agenda is the monitoring of protected areas, where information held by PADU for the region can be reviewed. Working sessions since the World National parks Congress in Bali, Indonesia, have been convened in Zimbabwe, the Soviet Union, Spain, India, Western Samoa and Argentina. As it is initially intended to produce directories covering the three main tropical regions, the Zimbabwe meeting was a particularly useful step in the development of a directory of protected areas for the Afrotropical Realm. Work is already well under way on development of directories covering the protected areas of the Indomalayan region and islands of the Southern Pacific Ocean.

With the improvement of the protected area information base, and development of the data files, the ability to summarise and analyse data improves. By carefully assessing the coverage by protected areas of each biogeographical province on land or at sea, PADU is able to help CNPPA to identify gaps or weaknesses in the world-wide system of reserves. It is thus much easier to chart the development of new areas year by year, and to focus attention where it is most required. Recently, PADU and CNPPA have worked together with CNPPA consultants John and Kathy MacKinnon to produce a much more detailed analysis of protected areas in Africa, using much of the information made available to PADU by those listed in the acknowledgement section below. Their report *Review of the Protected Areas System in the Afrotropical Realm* is being published by IUCN simultaneously with this directory, and it is hoped that these two products will together help provide IUCN with the necessary tools for the development of a fully integrated conservation plan for Africa.

WHAT THE DATA SHEETS CONTAIN

a) INFORMATION ON THE COUNTRY'S PROTECTED AREA SYSTEM

Each country section begins with a map of the country indicating the location of each of the areas. This is followed by a series of notes under standard headings which aim to provide background information on the whole system of protected areas within the country.

Country Area The area of the country, or political unit, as given in the *Times Atlas of the World*, Sixth Edition (1980).

Population The population of the country or political unit as given in the 1985-1986 *Statesman's Year-Book* (122nd edition), unless more recent information is available. The date of the estimate is given in parentheses, unless a census is involved where this is specifically mentioned.

Parks and Reserves Legislation Basic details of the legislation dealing with the conservation units, and with the department or office responsible for running those units. Whenever possible the numbers of the laws or decrees and their dates are given. Information is also given on how new areas are established and on the definitions given for each category of protected area.

Parks and Reserves Administration Details of how the above laws are applied, who is responsible for enforcing them, and how the different categories of protected area are managed.

Address Offices responsible for administration of the protected area system.

Additional Information Background information on nature conservation within the country where relevant to protected areas issues, including details of major conservation issues, systems reviews, national conservation strategies, etc. Particular note is also made of general threats and problems affecting protected areas.

References Key references on the country's system of protected areas and on nature conservation in general within the country.

Protected Areas List of the protected areas within the country with their sizes, in the order in which the individual data sheets will follow. There will not necessarily be a data sheet for every conservation unit listed. No qualitative judgement goes into the production of this list, and sites are listed as they are defined within the country. The individual sheets which follow go into the actual situation in more detail.

b) INFORMATION ON INDIVIDUAL AREAS

Name of the Protected Area The name given by the management authority.

Management Category This is the type of protected area, following the scheme of the IUCN (1982) paper, "Categories, Objectives, and Criteria for Protected Areas", a revised and edited version of a paper first produced in 1978. This paper divides the 140 or so names that have been provided for various sorts of protected area into 10 categories, as follows:

- Category I (*Scientific Reserve/Strict Nature Reserve*)

These areas possess some outstanding ecosystems, features and/or species of flora and fauna of national scientific importance or are representative of particular natural areas; they often contain fragile ecosystems or life forms, areas of important biological or geological diversity or areas of particular importance to the conservation of genetic resources. Size is determined by the area required to ensure the integrity of the area to accomplish the scientific management objective and provide for the protection of the area.

Natural processes are allowed to take place in the absence of any direct human interference; tourism, recreation, and public access are generally proscribed. Ecological processes may include natural acts that alter the ecological system or physiographic features, such as naturally-occurring fires, natural succession, insect or disease outbreaks, storms, earthquakes and the like, but necessarily exclude man-made disturbances. The educational function of the site is to serve as resource for studying and obtaining scientific knowledge.

Use of the reserve should in most cases be controlled by central government. Exceptions may be made where adequate safeguards and controls for long-term protection are ensured and where the central government concurs.

- *Category II (National Park)*

National parks are relatively large areas which contain representative samples of major natural regions, features or scenery where plant and animal species, geomorphological sites, and habitats are of special scientific, educational, and recreational interest. They contain one or several entire ecosystems that are not materially altered by human exploitation and occupation. The highest competent authority of the country having jurisdiction over the area has taken steps to prevent or eliminate as soon as possible exploitation or occupation in the area and to enforce effectively the respect of ecological, geomorphological, or aesthetic features which have led to its establishment.

The resource is managed and developed so as to sustain recreation and education activities on a controlled basis. The area is managed in a natural or near-natural state. Visitors enter under special conditions for inspirational, educational, cultural, and recreational purposes; sport hunting is not a compatible use, but culling for management purposes sometimes is required.

- *Category III (Natural Monument/Natural Landmark)*

This category normally contains one or more of several specific natural features of outstanding national significance which, because of uniqueness or rarity, should be protected. The specific feature to be protected ideally has little or no evidence of man's activities. These features are not of the size nor do they contain a diversity of features or representative ecosystems which would justify their inclusion as a national park. Size is not a significant factor; the area only needs to be large enough to protect the integrity of the site.

Although Category III areas may have recreational and touristic value, they should be managed to remain relatively free of human disturbance. These areas may be owned and managed by either central or other government agencies or non-profit trusts or corporations as long as there is assurance that they will be managed to protect their inherent features for the long term.

- *Category IV (Managed Nature Reserve/Wildlife Sanctuary)*

A Category IV area is desirable when protection of specific sites or habitats is essential to the continued well-being of resident or migratory fauna of national or global significance. Although a variety of areas fall within this category, each would have as its primary purpose the protection of nature; the production of harvestable, renewable resources may play a secondary role in the management of a particular area. The size of the area is dependent upon the habitat requirements of the species to be protected; these areas could be relatively small, consisting of nesting areas, marshes, or lakes, estuaries, forest, or grassland habitats, or fish spawning areas, or seagrass feeding beds for marine mammals.

The area may require habitat manipulation to provide optimum conditions for the species, vegetative community, or feature according to individual circumstances. For example, a particular grassland or heath community may be protected and perpetuated through a limited amount of livestock grazing; a marsh for wintering waterfowl may require continual removal of excess reeds and supplementary planting of waterfowl food; or a reserve for an endangered animal may need protection against predators.

Limited areas may be developed for public education and appreciation of the work of wildlife management.

Ownership may be by the central government or, with adequate safeguards and controls, by lower levels of government, non-profit trusts or corporations or private individuals or groups.

- *Category V (Protected Landscape or Seascape)*

The scope of areas that fall within this category is necessarily broad because of the wide variety of semi-natural and cultural landscapes that occur within various nations. This may be reflected in two types of areas: those whose landscapes possess special aesthetic qualities which are a result of the interaction of man and land; and those that are primarily natural areas managed intensively by man for recreational and tourism uses.

In the former case, these landscapes may demonstrate certain cultural manifestations such as: customs, beliefs, social organization, or material traits as reflected in land use patterns. These landscapes are characterized by either aesthetically attractive or unique patterns of human settlement. Traditional land use practices associated with agriculture, grazing, and fishing are dominant. The area is large enough to ensure the integrity of the landscape pattern.

The latter case often includes natural or scenic areas found along coastlines and lake shores, in hilly or mountainous terrain, or along the shores of rivers, often adjacent to tourist highways or population centres; many will have the potential to be developed for a variety of outdoor recreational uses with national significance.

In some cases the area may be privately held and the use of either central or delegated planning control would be necessary to ensure the perpetuation of both the land use and life style. Means of government assistance might be required to improve the standard of living while maintaining the natural quality of the site through appropriate management practices. In other instances, the areas are established and managed under public ownership, or a combination of public and private ownership.

- *Category VI (Resource Reserve)*

Category VI areas will normally comprise an extensive and relatively isolated and uninhabited area having difficult access, or regions that are lightly populated yet may be under considerable pressure for colonization and greater utilization. In many cases, there has been little study or evaluation of these areas, so the consequences of converting these areas to agriculture, mineral or timber extraction, the construction of roads, or intensive fishing, dredging or mariculture is unclear. Similarly, use of the resources may not be appropriate because of the lack of technology, human or financial resource restrictions, or alternative national priorities. Consequently, natural, social, and economic values are not sufficiently identified to permit the area to be managed for specific objectives or to justify its conversion to other uses. On land, restricted access is implied so areas will normally require control, depending upon the pressures to enter and utilize the area. Areas may be owned or administered by government or public corporations.

Maintenance of existing conditions to allow for studies on the potential use for the designated areas is a prerequisite. No exploitation should occur with the exception of use of resources by indigenous inhabitants; ongoing ecologically sound activities are acceptable.

This category has also been used within the CMC database for those areas which are protected by legislation, but where, for various reasons, there is no infrastructure and protection is reportedly inadequate. The area should still be ecologically viable.

- *Category VII (Natural Biotic Area/Anthropological Reserve)*

Category VII areas are characterized by natural areas where the influence or technology of modern man has not significantly interfered with or been absorbed by the traditional ways of life of the inhabitants. These areas may be remote and isolated and their inaccessibility may be maintained for a considerable period of time. The societies are of particular significance to the maintenance of cultural diversity; there is a strong dependence of man upon the natural environment for food, shelter, and other basic material to sustain life.

Extensive cultivation or other major modifications of the vegetation and animal life is not permitted.

Management is oriented towards the maintenance of habitat for traditional societies so as to provide for their continuance within their own cultural mores.

- *Category VIII (Multiple Use Management Areas/Managed Resource Areas)*

A Category VIII area is large, containing considerable territory suitable for production of wood products, water, pasture, wildlife, marine products and outdoor recreation; parts of the area may be settled and may have been altered by man. The area may possess nationally unique or exceptional natural features, or may as a whole represent a feature or area of international or national significance.

Planning programmes to ensure the area is managed on a sustained yield basis is a prerequisite. Land ownership is under government control. Through proper zoning, significant areas can be given specific additional protection. For instance, the establishment of wilderness-type areas is consistent with the purpose of these areas as would be establishing nature reserves. Multiple use, in the context of Category VIII, is considered to be the management of all renewable resources, utilized in some combination to best meet the needs of the country. The major premise in the management of these areas is that they will be managed to maintain the overall productivity of the areas and their resources in perpetuity.

- *Category IX (Biosphere Reserves)*

One focus of the Unesco Man and the Biosphere Programme, initiated in 1970, is to conserve representative natural areas throughout the world through the establishment of a network of biosphere reserves.

Management objectives are: to conserve for present and future use the diversity and integrity of biotic communities of plants and animals within natural ecosystems, and to safeguard the genetic diversity of species on which their continuing evolution depends. Biosphere reserves provide opportunities for ecological research, particularly baseline studies, both within natural and altered environments. These reserves have particular value as benchmarks or standards for measurement of long-term changes in the biosphere as a whole and are consequently important sites for environmental monitoring. They are also particularly important for study of the relationships between man and nature in different ecosystems.

Each biosphere reserve is therefore likely to include one or more of the following: representative examples of natural biomes; areas where research, particularly on ecosystem function and management, is well developed; examples of harmonious landscapes resulting from traditional patterns of land use; and examples of modified or degraded ecosystems capable of being restored to more natural conditions.

A biosphere reserve must have adequate long-term legal protection. Each biosphere reserve is large enough to be an effective conservation unit, and to accommodate different uses without conflict. Each reserve must be approved by the Man and the Biosphere International Co-ordinating Council before it can receive designation as a biosphere reserve.

- *Category X (Natural World Heritage Sites)*

The International Convention concerning the Protection of the World Cultural and Natural Heritage (Unesco, 1972) provides for the designation of areas of "outstanding universal value" as World Heritage Sites. These exceptional areas must be recommended by the signatory nation responsible for the site for declaration by the international World Heritage Committee. The sites include many previously designated protected areas.

Management objectives of World Heritage Sites are: to protect the natural features for which the area was considered to be of world heritage quality; to provide information for world-wide public enlightenment; and to provide for research and environmental monitoring.

Areas to be considered under the Convention will be restricted to those which are truly of international significance. Natural sites must represent one or more of the following criteria:

- i) be outstanding examples representing the major stages of the earth's evolutionary history;
- ii) be outstanding examples representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment;
- iii) contain unique, rare or superlative natural phenomena, formations or features or areas of exceptional natural beauty; and
- iv) be habitats where populations of rare or endangered species of plants and animals still survive.

Natural Heritage Sites must also fulfil conditions on the integrity of the site. Management of these sites stresses the maintenance of the heritage values, ensures the continuation of legal protection, and promotes the significance of each site to the country, its people and the world.

All sites have strict legal protection and are owned by government or non-profit corporation or trust for the long term. While recreation and on-site interpretation will generally be developed, some sites may be of such significance that public use will either be strictly controlled or prohibited.

- *No Category Assigned*

This has been used for those areas which are protected by legislation, but where, for various reasons, there is no infrastructure and protection is reportedly inadequate, and where the environment may be irreversibly degraded.

Biogeographical Province The Afrotropical Realm, according to Udvardy (1975) in his paper *A classification of the Biogeographical Provinces of the World* (IUCN Occasional Paper No. 18), covers the whole of Africa south of the Sahara. The realm is further divided into *Provinces*, defined by significant differences in flora, fauna, and vegetation structure. These provinces are assigned geographic, ecological, or historically established names as appropriate; the provinces are presented on Map 1. Each of the provinces is characterised by one of the world's 12 *Biomes*, major regional ecological communities of plants and animals extending over a large natural area. Based on this system, each of the 29 Afrotropical Provinces is given a three-number code, with the first number corresponding to the realm, the second to the province, and the third to the biome; 3.2.1, for example, is *Tropical Humid Forest* (biome 1) in the *Congo Rainforest* Province (province 2) in the *Afrotropical* Realm (realm 3). This code allows each protected area to be assigned a biogeographical context, and facilitates comparison of data on biomes, provinces, and realms.

Legal Protection The degree of legal protection and special protection afforded to certain elements within the area. To qualify for the Directory a protected area should enjoy statutory legal protection establishing it as a permanently protected area and providing sufficiently strict safeguards to achieve the objectives of conservation of natural or of man-made landscapes. However, some proposed areas have been included due to their immediate need for protection, as have other important areas not currently receiving adequate protection.

Date Established Date and identification of the establishing decree or legislation, and the dates and identification of previous legislation relating to the area.

Geographical Location General location within the country, including province, region, proximity to major towns or landscape features and latitude and longitude.

Altitude Altitudinal range, highest point or mean altitude depending on availability of data

Area The area, expressed in hectares, included within the establishing legislation, plus any subsequent additions. The minimum surface area for inclusion in the Directory is generally 1,000 hectares (of zones in which protection of nature takes precedence). Exceptions have been made for islands, and a few other areas of particular interest.

Land Tenure Government, state or province, freehold, private, etc.

Physical Features Topography, geology, soils, hydrology, climate, and other physical features, particularly as they affect management of the area.

Vegetation Dominant vegetation formations (such as tropical rainforest), and secondary formations are listed or described, and percentage coverage of each formation is included when possible. Dominant species are listed, along with any threatened and endemic species or species of particular economic importance.

Fauna Species of mammals, birds, reptiles, amphibians, fish, and invertebrates which are of particular importance due to their dominance in the ecosystem, rarity, presence of important populations, etc. Where known, populations of the key species are provided. In each case species which are included within the CMC database and publications as threatened or of concern, are marked (E), (R), (V), or (I), depending on whether they are classified as Endangered, Rare, Vulnerable or "Insufficiently Known", or (T) where the species is known to be threatened, but where actual classification was still under review when this text was completed. Species "Out of Danger" and "Of Special Concern" are also included as (O) and (Of special concern). South African sheets also list "endangered species" which refer to fauna endangered, vulnerable or rare in South Africa according to the references on the Country information sheet.

Cultural Heritage Archaeological features, cultural monuments, ethnic groups and their traditions etc. (If this heading is not relevant it is dropped in the interest of saving space.)

Conservation Management Status of implementation of the management plan, or if none exists proposals for the development of such a plan. Also includes details of *major* management activities, such as control burning or culling. Interpretation programmes may also be described.

Zoning The system of zoning, where present, is described, with areas included in each zone.

Disturbances or Deficiencies The major management problems are described, including such things as poaching, fires, agricultural encroachment, etc.

Visitor Facilities Accommodation, access, interpretation programmes, and average number of visitors. South African sheets also include the reserve's potential for number of visitors. (If this heading is not relevant it is dropped in the interest of saving space.)

Scientific Research Major research which either has been or is being conducted in the area.

Special Scientific Facilities Presence of laboratories, study plots, housing for scientists, etc.

Principal Reference Material Major documents on the area, including the management plan, scientific monographs, popular books or articles, bibliographies, etc.

Staff The numbers of individuals regularly working in the area, with job classification (e.g. superintendent, ranger, guard, clerk).

Budget Annual budget, with year, in local currency and in US dollars (for ease of comparison). Other subventions, as from Unesco or WWF/IUCN, are also mentioned when relevant.

Figures for staff and budget are often projected only. Staff numbers are often changed in response to circumstances, and budgets can be cut drastically (with only limited funds for nature conservation being available in most countries).

Local Park or Reserve Administration The name and address of the local administrative entity for the area.

Date The date on which the *whole sheet* was last updated or checked.

THE NEXT STEPS

This directory will never be "complete". Many of the sheets contain only sparse data, the available literature has not been fully screened and integrated, information has seldom been completely field-checked, and areas administered by provincial or regional governments have not been included in most cases. Further, much of the data, such as on personnel, budget, and management problems, is "perishable" and needs regular up-dating. It is also expected that the protected area networks in the Afrotropical Realm will continue to develop in the coming years.

A procedure has been developed for bringing the Directory up-to-date on a regular basis. Approximately every three years, CNPPA will hold a meeting somewhere in the Afrotropical Realm; in advance of the meeting, the existing data sheets held by CMC will be sent to the principal contacts for each country with a request to ensure that all information is accurate and up-to-date and to provide additional data on specific areas where such data would be useful and pertinent (for example, presence of wild species of plants which are related to domestic plants). Efforts will be made to fill any blanks in the data, integrate new findings from field projects, and collect information from new areas, ensuring that the second edition of the *Directory of Afrotropical Protected Areas* will be a major step forward.

In the meantime, staff at the Protected Areas Data Unit will be collecting additional published information, receiving comments and suggestions on the basis of the information contained in the directory, and assisting IUCN and CNPPA in using this information to the best advantage in helping conservation efforts in Africa. Any contribution would be very welcome.

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Notwithstanding the significant input to the directory by all those mentioned above, the editors accept responsibility for any errors of fact or omission. Also, the information contained in the book for any one country has been compiled from a number of sources and does not necessarily represent the view of any one individual.

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All staff of the Protected Areas Data Unit at IUCN's Conservation Monitoring Centre both past and present have been involved in the development of this information, and hence in the compilation of the directory. The first draft, which was prepared early 1983, was compiled by Jeremy Harrison. This was subsequently extensively revised and edited by Sally Austin, with the assistance of Sally Ward, and presented as a draft publication at the 16th General Assembly of IUCN in Madrid (November 1984). Subsequently parts of the text have been revised by Heather Macleod, Hilary Tye, Michael Green, Zbig Karpowicz and Jeremy Harrison. During this time secretarial assistance has been provided by Clare Billington, Eileen Egginton, Wendy Garcia and Anthea McKinlay. The final text was prepared by Clare Billington and Jo Taylor, with the assistance of computer programs developed by Duncan Mackinder.

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Within the IUCN Conservation Monitoring Centre, coordination of publications is carried out by Lissie Wright, with the assistance of Barbara Lambert and Jo Taylor. Jeremy Harrison, Head of the Protected Areas Data Unit, is responsible for the management of the protected areas information base. Within CNPPA, the overall flow of the data collection programme was controlled by Kenton Miller and Harold Eidsvik, and administered by Jeff McNeely and Jim Thorsell. CNPPA's regional vice-chairman for the Afrotropical Realm is Walter Lusigi.

PHOTO CREDITS

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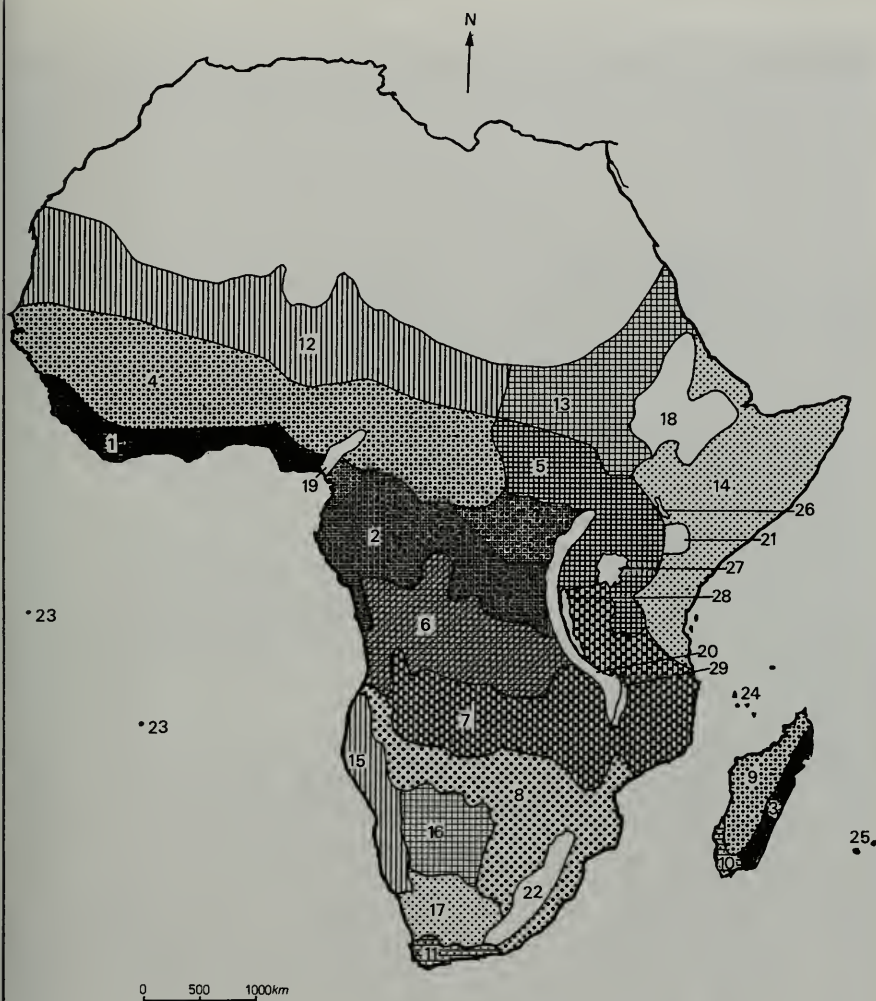
POLITICAL MAP OF THE AFROTROPICAL REALM

Biogeographical Provinces of the Afrotropical Realm

(After Udvardy, 1975)

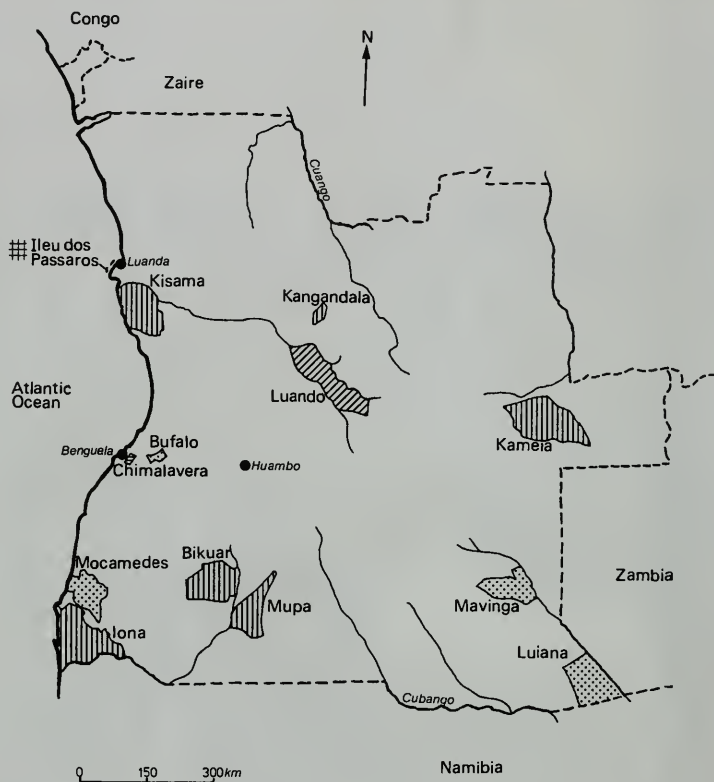
1. Guinean Rain Forest
2. Congo Rain Forest
3. Malagasy Rain Forest
4. West African Woodland/savanna
5. East African Woodland/savanna
6. Congo Woodland/savanna
7. Miombo Woodland/savanna
8. South African Woodland/savanna
9. Malagasy Woodland/savanna
10. Malagasy Thorn Forest
11. Cape Sclerophyll
12. Western Sahel
13. Eastern Sahel
14. Somalian
15. Namib
16. Kalahari
17. Karroo
18. Ethiopian Highlands
19. Guinean Highlands
20. Central African Highlands
21. East African Highlands
22. South African Highlands
23. Ascension and St. Helena Islands
24. Comores and Aldabra
25. Mascarene Islands
26. Lake Rudolf
27. Lake Ukerewe (Victoria)
28. Lake Tanganyika
29. Lake Malawi (Nyasa)

The Seychelles (apart from Aldabra) are in the Indomalayan realm of Udvardy (1975), and the Prince Edward Islands in the Antarctic Realm.



BIOGEOGRAPHICAL MAP OF THE AFROTROPICAL REALM





Angola

ANGOLA

Area 1,246,694 sq.km

Population 7,110,000 (1983)

Parks and Reserves Legislation Decree No. 43/77 of 5 May 1977 (revoking Decree No. 40,040 of 20 January 1955) approved the statute of the Ministry of Agriculture and supported creation of the National Directorate of Nature Conservation (Direcção Nacional da Conservação da Natureza). The national legislation provides for five categories of conservation area: National Park; Strict Nature Reserve; Partial Reserve; Regional Nature Park; and Special Reserve; although in many cases these do not conform to international standards. Protected areas are established under individual laws. In 1980 there were 18 forest reserves covering some 18,560 sq.km (which had been established before independence), though it would seem that they have received little specific attention beyond delimitation.

Parks and Reserves Administration The major functions of the Direcção Nacional da Conservação da Natureza (DNACO) are the training of technical staff, public education (in urban, rural and reserve areas) and management of the protected areas. When Angola was still a province of Portugal, administration was the responsibility of the Provincial Department of Veterinary Services (Technical Division for Fauna Protection).

Address

* Direcção Nacional da Conservação da Natureza, Ministerio da Agricultura, CP 74, Luanda.

Additional Information Prior to independence in 1976, reserves were primarily established in areas considered to be of little economic value. In 1982 a survey of natural resource protection was initiated (Horsten, 1982) which determined that there was little or no protection in either the areas of relict montane forest or the 'Anharas do Alto' (Huambo and Benguela provinces). This is still the case. There is also a serious lack of staff, resources, support and the necessary infrastructure for the existing reserves, let alone the establishment of future areas. The survey recommends the establishment of a system of protected areas at both the regional and national level, ideally covering some 10% of Angola's land area. It also recommends that nature conservation be considered in land-use planning. In addition, the laws and regulations governing hunting, protected species and protected areas have been recommended for revision (Estes, 1982). The probability of implementation of any of these recommendations is difficult to assess due to the current political difficulties within the country.

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- * Estes, R.D. (1982). The Giant Sable and wildlife conservation in Angola. Report to the IUCN/SSC Antelope Specialist Group.
- * Herrick, A.B., Bastos, A.J., Eisele, F.R., Harrison, S.A., John, H.J. and Wielad (1967). Area handbook for Angola. U.S. Government Printing Office, Washington D.C.
- * Horsten, F. (1982). Os Parques Nacionais e os Outros Zonas de Protecção da Natureza de Angola. Report (in Portuguese) for the National Department for Nature Conservation, Ministry of Agriculture. Luanda.
- * Huntley, B.J. (1974). Ecosystem Conservation priorities in Angola. Report No. 28, Serviços de Veterinária, Luanda.
- * Huntley, B.J. and Ellis, S. (1983). Conservation status of terrestrial ecosystems in southern Africa. Working document prepared by CSIR, Pretoria.

Protected Areas

	(hectares)
<i>National Parks</i>	
Bikuar	790,000
Iona	1,515,000
Kameia	1,445,000

IUCN Directory of Afrotropical Protected Areas

Kangandala	60,000
Kisama	996,000
Mupa	660,000
Subtotal	5,466,000
<i>Integral Nature Reserves</i>	
Ilheu dos Passaros	1,700
<i>Integral Reserves</i>	
Luando	828,000
<i>Partial Reserves</i>	
Bufalo	40,000
Luiana	840,000
Mavinga	595,000
Mocamedes	445,000
Subtotal	1,920,000
<i>Regional Nature Parks</i>	
Chimalavera	15,000

BIKUAR NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established Established as a National Park by Legislative Diploma 3527 of 26 December 1964 (B.O. I Série No. 52). First protected as a hunting reserve (Bikuar) by Government Decree 2620 of 16 April 1938 (B.O. I Série No. 16) with boundary alteration by Decree 4880 of 6 September 1944 (B.O. I Série No. 35), subsequently given partial reserve status by Legislative Diploma 2873 of 11 December 1957 (B.O. I Série No. 50). The Boundaries were redefined by Decree 384 of 13 June 1972 (B.O. I Série 137).

Geographical Location 135km east-south-east of Lubango in the province of Huila. 14°55'-15°36'S, 14°14'-15°19'E.

Altitude 1,150 to 1,350m

Area 790,000ha

Land Tenure Government

Physical Features A gently undulating plain drained by the Kunene River and the intermittent Bikuar River. No lagoons, but extensive 'dambos' are found in the river basins. The nearest meteorological station is Lubango, where a mean annual temperature of 18.7°C is recorded. The coldest month is June, averaging 15.6°C and the warmest is September/October, averaging 20.8°C. The mean annual precipitation of 960mm falls on an average of 101 days. The mean annual humidity recorded is 50%.

Vegetation There is a regular pattern of open grass plains on the seasonally waterlogged depressions and a variety of savanna, deciduous woodland and high forest at medium altitudes with *Baikiaea*, *Brachystegia spiciformis*, *Julbernardia*, and *Ricinodendron*. A few areas of *Baikiaea plurijuga* miomba woodland remain.

Fauna Mammals include: cheetah *Acinonyx jubatus* (T), spotted hyena *Crocuta crocuta*, African wild dog *Lycaon pictus* (T), honey badger *Mellivora capensis*, lion *Panthera leo*, leopard *P. pardus* (T), elephant *Loxodonta africana* (T), bushbuck *Tragelaphus scriptus*, kudu *T. strepsiceros*, reedbuck *Redunca arundinum*, impala *Aepyceros melampus melampus*, common duiker *Sylvicapra grimmia*, oribi *Ourebia ourebi*, steenbok *Raphicerus campestris*, zebra *Equus burchelli*, eland *Taurotragus oryx*, roan antelope *Hippotragus equinus*, wildebeest *Connochaetes taurinus*, warthog *Phacochoerus aethiopicus*, bushpig *Potamochoerus porcus*. The presence of buffalo *Syncerus caffer caffer* and wattled crane *Bugeranus carunculatus* (of special concern) is particularly noteworthy.

Zoning No information

Disturbances or Deficiencies There are few inhabitants in the park. Areas of *Baikiaea plurijuga*, which takes several years to regenerate, were logged for the Serpa Pinto railway several years ago. Damage to tourism infrastructure due to the current political situation has been reported.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Teixeira, J.B. (1968). *Parque Nacional do Bicuari. Carte da Vegetação e Memoria Descritiva*. I.I.A.A., Nova Lisboa. 29 pp.
- ° Maps (1:100,000): Nos 338,339,357-9,378-80.
- ° Maps (1:250,000): SUL O-33 O,P,U,V.

Staff One administrator and 20 rangers

Budget 1981 - 1,500,000KZ

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, CP 74, Luanda. The park headquarters are being reconstructed in Gando; there are no outposts.

Date May 1982

IONA NATIONAL PARK

Management Category VI (Resource Reserve)

Biogeographical Province 3.15.07 (Namib)

Legal Protection Due to the current political situation, management and protection of this area is extremely difficult.

Date Established Established as Porto Alexandre National Park by Legislative Diploma 2873 of 11 December 1957 (B.O. I Série No. 50) and renamed Iona National Park, with boundary alterations by legislative diploma 3524 of 26 December 1964 (B.O. I Série No. 52). First

protected as a hunting national park by Government Decree 2421 of 2 October 1937 (B.O. I Série No. 37). Changed to Mossamedes Hunting Reserve with boundary alterations by Decree 4880 of 6 September 1944 (B.O. I Série No. 35). 9,000ha around the city of Porto Alexandre were removed by Decree 516 of 17 August 1973 (B.O. I Série No. 193).

Geographical Location On the Angolan coast, 170km south of Mocamedes in Mocamedes province. Bounded by the Angola-Namibia border, Atlantic Ocean and the Kuroka and Kunene rivers. 15°44'-17°16'S, 11°44'-13°14'E.

Altitude Sea level to 2,040m

Area 1,515,000ha

Land Tenure Government

Physical Features There is a diverse coastline topography with extensive, pink coloured sand dunes up to 100m high. There are geologically varied rock formations and rugged mountains bordering the Kunene River.

Vegetation The vegetation is predominantly sublittoral steppe formation with shrubs and herbs such as the genera *Acacia*, *Commiphora*, *Colophospermum*, *Aristida*, *Schmidtia* and *Setaria*. There are sparse patches of steppe formations and littoral steppe with mainly *Aristida*, *Cissus* and *Salvadora* genera and occasional pockets of *Welwitschia* (of which *W. bainesii* is particularly noteworthy). Sporadic and patchy desert vegetation with *Odysea* and *Sporobolus* also occurs.

Fauna Mammals include: hunting dog *Lycaon pictus* (T), spotted hyena *Crocuta crocuta*, brown hyena *Hyaena brunnea*, aardwolf *Proteles cristatus*, honey badger *Mellivora capensis*, lion *Panthera leo*, leopard *P. pardus* (T), cheetah *Acinonyx jubatus* (T), elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T), eland *Taurotragus oryx*, kudu *Tragelaphus strepsiceros*, black-faced impala *Aepyceros melampus petersi* (T), klipspringer *Oreotragus oreotragus*, steenbok *Raphicerus campestris*, and Kirk's dik-dik *Madoqua kirkii*, with springbok *Antidorcas marsupialis*, gemsbok *Oryx gazella*, zebra *Equus zebra hartmannae* (T), and *E. burchelli* being the most common species, although numbers have declined. Fur seal *Arctocephalus pusillus* and manatee *Trichechus senegalensis* (T) also occur in the area. The coast is used for nesting by the green turtle *Chelonia mydas* (E) and loggerhead turtle *Caretta caretta* (V). The rivers and estuaries are visited by soft skinned turtle *Trionyx triunguis*, though no nesting activities have been recorded.

Zoning Three control zones were planned in 1974.

Disturbances or Deficiencies About 200 herdsmen with unknown number of cows and goats utilise the park for grazing. Competition between domestic animals and wild species is heightened by the limited reserves of water. Diamond exploration is carried out, and there is a police post and pumping station at Foz do Kunene. The current political situation has had adverse effects on conservation work and tourist potential.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Matos, G.C. de (1970). A Vegetação do Parque Nacional do Iona. *Bol. da Soc. Broteriana* Vol. XLIV (2° Série): 245-247.
- ° Maps (1:100,000): 373,394-396,416-418,419-442,439-441.
- ° Maps (1:250,000): SUL D-32 7, SUL D-33 S, SUL E-32, F,L and SUL E-33 A,B,G.

Staff None

Budget No budget allocation in 1981

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, CP 74 Luanda. The park headquarters were formerly at Espinheira, but has now been demolished. There are unoccupied outposts at Iona and Charojamoa.

Date May 1982

KAMEIA NATIONAL PARK

Management Category VI (Resource Reserve)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Due to the current political situation, management and protection of this area is extremely difficult.

Date Established Established as a National Park by Legislative Diploma 2873 of 11 December 1957 (B.O. I Série No. 50). First protected as a hunting reserve by Government Decree 1670 of 6 April 1935 (B.O. I Série No. 14). Confirmed as Reserva da Cameia with boundary changes by Decree 2620 of 16 April 1938 (B.O. I Série No. 16).

Geographical Location 100km due east of Lwena in the province of Mexico, less than 100km from the Angola-Zambia border. 11°17'-12°30'S, 20°45'-22°36'E.

Altitude 1,059-1,158m

Area 1,445,000ha

Land Tenure Government

Physical Features Characterised by extensive plains which are periodically flooded. There are three permanent rivers, the Zambeze, Lwena, and Luangueje, which drain the area and three lakes, Cauamba, Calundo, and Chaluvanda. The nearest weather station is at Lwena with a recorded mean annual temperature of 20.6°C. The coldest month is June averaging 17.4°C, and the warmest is October averaging 22.6°C. A mean annual rainfall of 1,279mm is recorded for the area, falling over an average of 137 days. The relative humidity is 67%.

Vegetation The vegetation is typical of upland grasslands, or 'dambos', growing on sandstone with deficient drainage. It mainly comprises a medium-dense grass mat of uniform appearance and height with considerable variation in floristic composition; principally fine-leaved perennial bunch grasses and wetter types, such as the abundant Cyperaceae, Xyridaceae, and flowering herbs. *Loudetia simplex* is the most characteristic grass and is dominant over extensive areas. Above ground, vegetation cover is almost complete, but beneath it some 25-30% of the surface may be bare.

Fauna Mammals include: spotted hyena *Crocuta crocuta*, lion *Panthera leo*, leopard *P. pardus* (T), cheetah *Acinonyx jubatus* (T), hippopotamus *Hippopotamus amphibius*, roan antelope *Hippotragus equinus*, lechwe *Kobus leche* (T), reedbuck *Redunca arundinum*, oribi *Ourebia ourebi*, sitatunga *Tragelaphus spekei*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, and bushpig *Potamochoerus porcus*, the commonest species being brindbill gnu *Connochaetes taurinus*. Particularly noteworthy is the presence of topi *Damaliscus lunatus* and wattled crane *Bugeranus carunculatus* (of special concern).

Zoning No information

Disturbances or Deficiencies Some 5,000 people live within the park principally practising fishing.

Visitor Facilities No tourist infrastructure at present.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Maps (1:100,000): 199,200,220-223,242-246.

° Maps (1:250,000): SUL C-34 U,V,X and SUL D-34 C,D,E.

Staff One administrator and eight rangers

Budget 1981 - 700,000 KZ

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, CP 74 Luanda. The park headquarters has been demolished.

Date May 1982

KANGANDALA NATIONAL PARK

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.06.04 (Congo Woodland/savanna)

Legal Protection The park was created specifically for the protection of a few herds of giant sable.

Date Established Established as a National Park by Legislative Diploma 4017 of 25 May 1970 (B.O. 1 Série No. 147). First protected as Reserva Natural Integral da Cangandala by Legislative Diploma 3374 of 25 May 1963 (B.O. 1 Série No. 21), with boundaries altered 26 December 1964 by Legislative Diploma 3529 (B.O. Série No. 52).

Geographical Location 55km east-south-east of Malange in Malange Province. 9°37'-10°02'S, 16°34'-16°52'E.

Altitude 1,040-1,157m

Area 60,000ha (extension proposed to link Kangandala with Luando Nature Reserve (828,00ha)

Land Tenure Government

Physical Features The gently sloping hills are separated by lines of drainage with four major permanent rivers, the Cuque, Cuije, Maubi, and Ombe. There are no lakes or lagoons, but numerous marshy areas are found in the drainage basins. The nearest meteorological station is at Nova Gaia, 95km to the east, with a recorded mean annual temperature of 21.3°C. The coldest month is June, averaging 19.7°C and the warmest is February, averaging 21.9°C. The mean annual rainfall is 1,229mm, falling on an average of 89 days. The mean annual relative humidity is 73%.

Vegetation The predominant vegetation type is the thin 'miombo' woodland and savanna on the middle-upland slopes, characterised by *Brachystegia spiciformis*, *Julbernardia paniculata* and locally abundant *B. wangermeeana*, and *B. boehmii*.

Fauna Mammals include: hyena *Crocuta crocuta*, hunting dog *Lycaon pictus* (T), leopard *Panthera pardus* (T), hippopotamus *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, sitatunga *T. spekei*, waterbuck *Kobus ellipsiprymnus* and reedbuck *Redunca arundinum*, with blue duiker *Cephalophus monticola*, common duiker *Sylvicapra grimmia*, giant sable antelope *Hippotragus niger variiani* (T), roan antelope *H. equinus*, warthog *Phacochoerus aethiopicus*, and bushpig *Potamochoerus porcus* among the more common species. The wildlife density is very low.

Conservation Management Estes (1982) includes recommendation for improved management.

Zoning No information

Disturbances or Deficiencies Some 2,000 people, based in 10 villages along the principal access road, practise fishing and subsistence agriculture (growing cassava and rice) and graze goats (the main livestock) close to and within the park. A heavily travelled network of footpaths dissect the park and there is some poaching. There is slow degradation of the *Brachystegia* woodland in some areas. The limits of the park are in urgent need of revision.

Visitor Facilities The access roads are frequently impassable during the rains.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Estes, R.D. (1982). The giant sable and wildlife conservation in Angola. Report to the IUCN/SSC Antelope Specialist Group.
- ° Maps (1:100,000): Nos. 132 and 151.
- ° Maps (1:250,000): SUL C-33 K,O.

Staff One administrator and five rangers

Budget 1981 - 1.7 million KZ

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, CP 74 Luanda. The park headquarters are at Kulamagia with an outpost at Maubi.

Date May 1982

KISAMA (QUICAMA) NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.06.04 (Congo Woodland/savanna)

Legal Protection No information

Date Established Established as a National Park (Quiçama) by Legislative Diploma 2873 of 11 December 1957 (B.O. 1 Série No. 50). First protected as a hunting reserve (Reserva da Quissama) by Government Decree 2620 of 16 April 1938 (B.O. 1 Série No. 16).

Geographical Location On the coast in Bengo Province, 45km south of Luanda. The limits of the park are formed by the Atlantic coastline between Longa and Kwanza rivers, River Kwanza from its mouth to Muxima, the Longa River from its mouth to Capda, and by the road joining Muxima and Capolo. 9°09'-10°23'S, 13°09'-14°08'E.

Altitude From sea level to 265m

Area 996,000ha

Land Tenure Government

Physical Features The diverse topography comprises extensive flood plains, gently undulating hills with heavy cotton soils and elevated undulating plateaux with deep red to yellow sands. Two permanent rivers pass through the park, the Kwanza and Longa. The rivers are long and meandering with numerous lagoons on the flood plains and they both flood periodically; there are also several permanent lakes. The 125km of Atlantic shoreline within the park has extensive high cliffs and isolated sandy beaches. The nearest meteorological station is at Luanda with recorded mean annual temperature of 24.6°C. The coldest months are July and August, averaging 20.7°C and the warmest is March, averaging 27.4°C. The annual rainfall of 449mm falls on an average of 54 days per year. A mean annual relative humidity of 80% is recorded.

Vegetation There are five main vegetation types: dry forest mosaic, predominantly deciduous, with dry savanna at lower altitudes characterised by *Bombax*, *Pteleopsis*, *Pterocarpus*, *Adansonia* and *Heteropogon* tree genera; coastal mangroves with *Rhizophora* and *Avicennia*; steppes in the coastal region with thickets of raphia palms *Raphia* sp., baobab *Adansonia* sp. and *Euphorbia* woodland and savanna; savanna mosaic in the sublittoral region with steppes, dry thickets and scattered trees characterised by *Adansonia*, *Guibourtia*, *Acacia welwitschii*, *Dichrostachys*, *Sterculia*, *Combretum*, *Strychnos* and *Setaria*; and marshy swampland with *Cyperus papyrus* and some *Typha capensis*, and rich grasslands of *Echinochloa* and *Vetiveria* species along the floodplain margins. A species of special importance is *Tessmannia* sp..

Fauna Mammals include: buffalo *Syncerus caffer nanus*, roan antelope *Hippotragus equinus*, elephant *Loxodonta africana* (T), eland *Taurotragus oryx*, and bushbuck *Tragelaphus scriptus*. Others include: cheetah *Acinonyx jubatus* (T), spotted hyena *Crocuta crocuta*, hunting dog *Lycan pictus* (T), honey badger *Mellivora capensis*, lion *Panthera leo*, leopard *P. pardus* (T), hippopotamus *Hippopotamus amphibius*, reedbuck *Redunca arundinum*, blue duiker *Cephalophus monticola*, common duiker *Sylvicapra grimmia*, warthog *Phacochoerus aethiopicus*, bushpig *Potamochoerus porcus*, talapoin monkey *Miopithecus talapoin* (within mangrove forests), black monkey *Cercopithecus mitis*, and Bosman's potto *Perodicticus potto*. Fur seal *Arctocephalus pusillus* and manatee *Trichechus senegalensis* (T) occur on the coast, where green turtle *Chelonia mydas* (E) and loggerhead turtle *Caretta caretta* (V) also nest. The rivers and estuaries are visited by soft skinned turtle *Trionyx triunguis*, although, no nesting activities have been recorded. Nile crocodile *Crocodylus niloticus* (V) also occur in the park.

Conservation Management Estes (1982) includes recommendations for improved management.

Zonlng No information

Disturbances or Deficiencies Staff numbers, equipment, access, and authority to control poaching are inadequate, and there is a continuous problem with cultivation, cutting and other illegal activities. Some 10,000 people live within the park, practising subsistence fishing and agriculture (principal crops being cotton, oil palm, cassava and maize) and grazing cattle and goats. This has led to increased competition from the human population and their animals for water and grassland and degradation of the soils by the processes of itinerant agriculture. The resultant soil erosion is aggravated by the extensive open trails cut by bulldozers during oil exploration (one well is in production) and traffic on the major road, which runs north-south through the park. Only one bank of the Kwanza River is protected within the park,

consequently the aquatic and marshland wildlife is subject to heavy hunting pressure; this applies, in particular, to hippopotamus, manatee, crocodile, and waterfowl populations.

Visitor Facilities A visitor guide service has been established and there are rest camp facilities available. The park is open from July-December.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Estes, R.D. (1982). The giant sable and wildlife conservation in Angola. Report to the IUCN/SSC Antelope Specialist Group.
- ° Frade, F. (1956). Reservas Naturais de Angola (Alguns mamíferos da reserva da Quiçama). *Anais da Junta Invest. Ultr.* Vol XI, Tomo III and Breve notícia a proposita da Reserva da Quiçama.
- ° Huntley, B.J. (1973). Proposals for the re-definition of the limits of the Parque Nacional da Quiçama Report for Serviço de Veterinária, Luanda.
- ° Teixeira, J.B. (1967). *Parque Nacional du Quiçama. Carta da Vegetação e Memoria Descritiva*. I.I.A.A., Nova Lisboa, 14 p.
- ° Maps (1:100,000): 107, 108, 125-127, 144-146.
- ° Maps (1:250,000): SUL C-33 H,I,N,O.

Staff One administrator, one warden and eight rangers

Budget 1981 - 4 million KZ

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, C.P. 74, Luanda. The park headquarters is at Kaua and there are outposts at Baria do Kwanza, Cabo Ledo, Chio, and Mumbondo.

Date May 1982

MUPA NATIONAL PARK

Management Category VI (Resource Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Due to the current political situation, management and protection of this area is extremely difficult.

Date Established Established as a National Park by Diploma 3527 of 26 December 1964 (B.O. I Série No. 52). First protected as a hunting reserve by Government Decree 2620 of 16 April 1938 (B.O. I Série No. 16) with boundaries changed by Decree 4880 of 6 September 1944 (B.O. I Série No. 35), subsequently given integral nature reserve status (Mupa ou Girafa) by Legislative Diploma 2873 of 11 December 1957 (B.O. I Série No. 50).

Geographical Location 80km north of Ondjiva in Kunene Province on the border with Huila Province. 15°19'-16°35'S, 15°12'-16°00'E.

Altitude 1,130-1,340m

Area 660,000ha

Land Tenure Government

Physical Features The relief is gently undulating, cut in places by tributaries of the Kunene and Kuvelai rivers. Extensive 'dambos' have formed in the river basins. The nearest meteorological station is at Ondjiva with a recorded mean annual temperature of 22.8°C. The coldest month is July, averaging 17°C and the warmest is October, averaging 26°C. The mean annual rainfall of 601mm falls on an average of 57 days per year. The relative humidity is 49%.

Vegetation The principal vegetation types are deciduous woodland and high forest at medium altitudes, characterised by *Baikiaea*, *Brachystegia spiciformis*, *Julbernardia* and *Ricinodendron*; 'miombo' woodland and savanna on middle upland slopes with *Brachystegia spiciformis*, *B. boehmii*, *Julbernardia paniculata* and abundant *Brachystegia* sp.; and dry deciduous forest and mosaic of savanna 'steppe' with *Colophospermum mopane*.

Fauna Mammals include: hunting dog *Lycaon pictus* (T), spotted hyena *Crocuta crocuta*, lion *Panthera leo*, leopard *P. pardus* (T), honey badger *Mellivora capensis*, elephant *Loxodonta africana* (T), zebra *Equus burchelli*, hippopotamus *Hippopotamus amphibius*, bushpig *Potamochoerus porcus*, eland *Taurotragus oryx*, roan antelope *Hippotragus equinus*, impala *Aepyceros melampus*, and common duiker *Sylvicapra grimmia*. Hartebeest *Alcelaphus buselaphus* and giraffe *Giraffa camelopardalis* are worthy of note, though there is now some doubt as to whether giraffe still occurs in the park. Wattled crane *Bugeranus carunculatus* (of special concern) are also present in the area.

Zoning No information

Disturbances or Deficiencies Unknown because of the current political situation

Scientific Research None

Special Scientific Facilities None in 1981

Principal Reference Material

* Maps (1:100,000): 359, 360, 380, 381, 401, 402, 424

Staff None

Budget No information

Local Park or Reserve Administration Direccção Nacional de Conservação da Natureza, CP 74, Luanda.

Date May 1982

ILHEU DOS PASSAROS INTEGRAL NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.06.04 (Congo Woodland/savanna)

Legal Protection Tourism is prohibited.

Date Established Established as an integral nature reserve by Provincial Decree 55 of 21 December 1973 (B.O. I Série No. 297).

Geographical Location An offshore island in Luanda Province, 8km south-west of Luanda. 8°55'-8°56'S, 13°08'-13°08'E.

Altitude Sea level to about 2m

Area 1,700ha

Land Tenure Government

Physical Features An island of mud flats off the coast of Angola, which is periodically flooded. The nearest meteorological station is at Luanda and climatic conditions are similar to those of Kisama National Park. The recorded mean annual temperature is 24.6°C. The coldest months are July and August, averaging 20.7°C, and the warmest is March, averaging 27.4°C. The annual rainfall of 449mm falls on an average of 54 days per year. A mean annual relative humidity of 80% is recorded.

Vegetation The vegetation is characterised by tree and bush mangroves with *Rhizophora* and *Avicennia* species.

Fauna There are no mammals of importance on the island, but various waterbirds are common.

Zoning No information

Disturbances or Deficiencies Increasing recreational activities in the Baía do Mussolo threatens the integrity of the reserve.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Maps (1:100,000): No. 89.

° Maps (1:250,000): SUL C-33 B.

Staff None

Budget None in 1981

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, CP 74, Luanda. There is now no local administrative organisation.

Date May 1983

LUANDO INTEGRAL NATURE RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.06.04 (Congo Woodland/savanna)

Legal Protection Tourism is prohibited. Due to the current political situation, management and protection of this area is extremely difficult.

Date Established Established as an integral nature reserve (Luando/Palanca Gigante) by Legislative Diploma 2873 of 11 December 1957 (B.O. I Série No. 50), to preserve the (then) only known extant herds of giant sable. First protected as a hunting reserve (Palanca Preta/Luanda) by Government Decree 2620 of 16 April 1938 (B.O. I Série No. 16).

Geographical Location 210km south-east of Malanje between the Kwanza and Luando rivers in Malange and Bie Provinces. 10°14'-11°56'S, 16°26'-18°14'E.

Altitude 1,040-1,455m

Area 828,000ha

Land Tenure Government

Physical Features The reserve encloses the gently undulating land between the two permanent rivers, the Luando and Kwanza, both of which pass through extensive flood plains. There are many lagoons in the flood plains of the Luando. The nearest meteorological station is at Nova Gaja (60km to the north-east) with a recorded mean annual temperature of 21.3°C (coldest month June 19.7°C and warmest September 22.4°C). Mean annual rainfall of 1,229mm occurring over 89 days, and relative humidity 73%.

Vegetation The vegetation is predominantly 'miombo' woodland and savanna on middle upland slopes characterised by *Brachystegia spiciformis* var. *latifoliata*, *Julbernardia paniculata* and locally abundant *B. wangermeeana* or *B. boehmii*, with occasional patches of dense forests comprising *Marquesia*, *Berlinia* and *Daniellia*.

Fauna Mammals include: hunting dog *Lycaon pictus* (T), spotted hyena *Crocuta crocuta*, lion *Panthera leo*, leopard *P. pardus* (T), cheetah *Acinonyx jubatus* (T), hippopotamus *Hippopotamus amphibius*, eland *Taurotragus oryx*, sitatunga *Tragelaphus spekei*, bushbuck *T. scriptus*, roan antelope *Hippotragus equinus*, waterbuck *Kobus ellipsiprymnus*, puku *K. vardonii*, reedbuck *Redunca arundinum*, common duiker *Sylvicapra grimmia*, oribi *Ourebia ourebi*, buffalo *Syncerus caffer*, warthog *Phacochoerus aethiopicus* and bushpig *Potamochoerus porcus*, with noteworthy numbers of giant sable antelope *Hippotragus niger variani* (E), and lechwe *Kobus leche* (T). Wattled crane *Bugeranus carunculatus* (of special concern) is one of the more noteworthy bird species to be found in the reserve.

Population There are some 20,000 inhabitants based in the villages of Quimbango and Gunga Palanca.

Zoning An area in the northern part of the reserve is classed as a military operations zone.

Disturbances or Deficiencies The 20,000 inhabitants within the reserve practise subsistence cultivation of cassava, maize and rice, supplemented by fishing and grazing of some 300 cows. Any further population increase will cause serious problems during the next years. There is serious disruption in the area due to the current political situation. Some poaching of giant sable herds continues, but it is less extensive than it was during the 1975/1976 independence period.

Scientific Research Study of giant sable by Dr R.D. Estes in 1971.

Special Scientific Facilities No information

Principal Reference Material

- ° Cabral, J.C. (1967). Mamíferos da Reserva do Luando. *Bol. Inst. Invest. cient. Ang.* 4(2): 33-44.
- ° DNACO (1981). Documentação sobre a Palanca Preta Gigante. Stencilado. Pp. 184.
- ° Maps (1:100,000): 150-2,169-71,191-2,213-15.
- ° Maps (1:250,000): SUL C-33 Q,R,Z and SUL C-34 S.

Staff Twelve rangers; four at each post (village)

Budget No information

Local Park or Reserve Administration Direcção Nacional do Conservação da Natureza, CP 74, Luanda. The reserve headquarters at Kimbango have been destroyed, but the outposts at Kunga Palanka and Mulundo still remain.

Date May 1983

BUFALO PARTIAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Due to the current political situation, management and protection of this area is extremely difficult.

Date Established Established as a partial reserve by Government Decree 325 of 5 April 1974 (B.O. I Série No. 81).

Geographical Location 30km south-east of Benguela in Benguela Province. 12°42'-12°55'S, 13°37'-13°58'E.

Altitude 380-1,210m

Area 40,000ha

Land Tenure Government

Physical Features The topography is fairly irregular, characterised by sloping ground interrupted by rocky outcrops. The permanent rivers, Catumbela, Cavaco, Bungue, and Halo (or Caimbambo), cross the area, but there are no lakes and only a few marshy areas along the rivers. The nearest meteorological station (60km to the north) has a recorded mean annual temperature of 23.5°C. The coldest month is July, averaging 19.4°C, and the warmest is March, averaging 26.8°C. The mean annual rainfall of 305mm falls on an average of 45 days a year. The average humidity is 77%. The climate is variable, however, and differs significantly only 80km to the east, where it is cooler and much wetter.

Vegetation The two principal vegetation types are woodland, and savanna with stunted trees, bushes and high grass, and includes the genera: *Colophospermum*, *Terminalia*, *Albizia*, *Pterocarpus*, *Combretum*, *Hyparrhenia* and *Panicum*; and sublittoral steppe formations predominated by the bush and herb layers, including the genera *Acacia*, *Commiphora*, *Colophospermum*, *Aristida*, *Schmidtia*, and *Setaria*.

Fauna Buffalo *Syncerus caffer caffer* is the most abundant and notable mammal in the reserve. Other mammals include cheetah *Acinonyx jubatus* (T), side-striped jackal *Canis adustus*, spotted hyena: *Crocuta crocuta*, lion *Panthera leo*, leopard *P. pardus* (T), hunting dog *Lycan pictus* (T), hippopotamus *Hippopotamus amphibius*, eland *Taurotragus oryx*, bushbuck *Tragelaphus scriptus*, kudu *T. strepsiceros*, roan antelope *Hippotragus equinus*, reedbuck *Redunca arundinum*, common duiker *Sylvicapra grimmia*, warthog *Phacochoerus aethiopicus*, bushpig *Potamochoerus porcus*, and baboon *Papio ursinus*.

Zoning No information

Disturbances or Deficiencies None reported, but the current political situation causes some disturbance in the area.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

Staff None

Budget None

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, CP 74, Luanda.

Date May 1983

LUIANA PARTIAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Due to the current political situation, management and protection of this area is extremely difficult.

Date Established Established as a partial reserve by Legislative Diploma 3677 of 17 September 1966 (B.O. I Série No. 38).

Geographical Location 550km south-east of Menongue in Cuando-Cubango Province. In the south-eastern corner of Angola on the Angola-Zambia-Namibia border. 16°11'-17°53'S, 22°10'-23°26'E.

Altitude 970-1,024m

Area 840,000ha

Land Tenure Government

Physical Features Extensive plains drained by the Kwando and Luiana river systems occupy the majority of the reserve. There are some small lagoons in the Kwando basin and large marshy areas occur in both river basins. The nearest meteorological station is 235km to the north-east, where a mean annual temperature of 20.6°C is recorded. The coldest month is July, averaging 14.5°C and the warmest is October, averaging 24.2°C. The mean annual rainfall is 828mm, falling on an average of 42 days. The relative humidity averages 51%.

Vegetation The two principal vegetation types are dry deciduous forest and mosaic of savanna steppe, with some scattered trees, including *Colophospermum mopane*, and bushes; and dry semi-deciduous woodland characterised by *Baikiaea plurijuga*, *Guibourtia coleosperma*, and *Ricnodendron rautanenii*.

Fauna Mammals include: Cheetah *Acinonyx jubatus* (T), spotted hyena *Crocuta crocuta*, hunting dog *Lycaon pictus* (T), honey badger *Mellivora capensis*, lion *Panthera leo*, leopard *P. pardus*(V), elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T), hippopotamus *Hippopotamus amphibius*, eland *Taurotragus oryx*, sable antelope *Hippotragus niger niger*, waterbuck *Kobus ellipsiprymnus*, puku *K. vardonii*, reedbuck *Redunca arundinum*, topi *Damaliscus lunatus*, impala *Aepyceros melampus melampus*, oribi *Ourebia ourebi*, and steenbok *Raphicerus campestris*. Lechwe *Kobus lechwe* (T), buffalo *Syncerus caffer caffer*, kudu *Tragelaphus strepsiceros*, sitatunga *T. spekei*, roan antelope *Hippotragus equinus*, and brindled gnu *Connochaetes taurinus* are the most abundant species. Ostrich *Struthio camelus* also occur and wattled crane *Bugeranus carunculatus* (of special concern) is one of the more notable bird species known from the reserve.

Zoning No information

Disturbances or Deficiencies None reported

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Maps (1:100,000): 438,460-2,470-2.
- ° Maps (1:250,000): SUL E-34 K,L.

Staff None

Budget None

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, CP 74, Luanda. There are no reserve headquarters.

Date May 1982

MAVINGA PARTIAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Due to the current political situation, the management and protection of this area is extremely difficult.

Date Established Established as a partial reserve by Legislative Diploma 3677 of 17 September 1966 (B.O. I Série No. 38).

Geographical Location On the Kwando River in Kwando Cybango Province, 300km east-south-east of Merongue. 15°09'-15°57'S, 20°14'-21°30'E.

Altitude 1,052-1,228m

Area 595,000ha

Land Tenure Government

Physical Features The extensive, gently undulating plains are crossed by the Kwando, Lombam Cariei, and Cueio rivers, which feed marshlands along their courses. The nearest meteorological station is 25km to the south-west with a recorded mean annual temperature of 20.6°C. The coldest month is July, averaging 14.5°C and the warmest is October, averaging 24.2°C. The mean annual rainfall of 828mm falls on an average of 92 days per year. The relative humidity averages 51%.

Vegetation The two principal vegetation types are a mosaic of savanna with herb layer or bushes predominant and dry woodland of *Brachystegia bakerana* and *Burkea africana*; and dry semi-deciduous woodland characterised by *Baikiaea plurijuga*, *Guibourtia coleosperma*, and *Ricinodendron rautanenii*.

Fauna Mammals include: cheetah *Acinonyx jubatus* (T), spotted hyena *Crocuta crocuta*, hunting dog *Lycaon pictus* (T), honey badger *Mellivora capensis*, lion *Panthera leo*, leopard *P. pardus* (T), elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T), hippopotamus *Hippopotamus amphibius*, zebra *Equus burchelli*, eland *Taurotragus oryx*, sable antelope *Hippotragus niger niger*, waterbuck *Kobus ellipsiprymnus*, puku *K. vardonii*, reedbuck *Redunca arundinum*, topi *Damaliscus lunatus*, impala *Aepyceros melampus melampus*, oribi *Ourebia ourebi*, and steenbok *Raphicerus campestris*. Lechwe *Kobus leche* (T), buffalo *Syncerus caffer caffer*, kudu *Tragelaphus strepsiceros*, sitatunga *T. spekei*, roan antelope *Hippotragus equinus*, and wildebeest *Connochaetes taurinus* are particularly common species. Wattled crane *Bugeranus carunculatus* (of special concern) and ostrich *Struthio camelus* are among the more notable birds recorded from the reserve.

Zoning No information

Disturbances or Deficiencies None reported, although the current political situation appears to cause some disturbance in the area.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Maps (1:100,000): 369-371, 390-393.
- ° Maps (1:250,000): SUL D-34 U,V.

Staff None

Budget None

Local Park or Reserve Administration Direção Nacional da Conservação da Natureza, CP 74, Luanda.

Date May 1982

MOCAMEDES PARTIAL RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.15.07 (Namib)

Legal Protection Limited traditional grazing allowed

Date Established Established by Legislative Diploma as a partial reserve for a limited period from 12 June 1957 to 31 December 1959 (B.O. I Série No. 24). Maintained for three additional years with boundary alterations by Legislative Diploma 3060 of 24 August 1960 (B.O. I Série No. 34) then for an indefinite period by a resolution of 9 February 1963 (B.O. I Série No. 6). Some 29,000ha around the city of Mocamedes were annexed from the area by Government Decree 480 of 28 July 1973 (B.O. I Série No. 177).

Geographical Location On the coast, seven kilometers south-south-east of Mocamedes in Mocamedes Province. 15°09'-16°16'S, 12°01'-12°44'E.

Altitude Sea level to 750m

Area 445,000ha; a few kilometres north of Iona National Park (1,515,000ha).

Land Tenure Government

Physical Features The topography ranges from desert dunes and extensive plains to rugged mountains and escarpments. There are two intermittent rivers, the Bero and Dos Flamingos, which cross the area, but otherwise, surface water is scarce. The nearest meteorological station is at Mocamedes with recorded mean annual temperature of 20.5°C. The coldest month is July, averaging 16.2°C and the warmest is March, averaging 24.8°C. The mean annual rainfall of 48mm falls on an average of 19 days per year.

Vegetation There are three main vegetation types within the reserve: 1) littoral steppe inter-mixed with thick forest and savanna and characterised by *Chrysobalanus*; 2) sublittoral bush and herb layer steppe, with *Acacia*, *Commiphora*, *Colophospermum*, *Aristida*, *Schmidtia*, and *Setaria*; and 3) steppe formation and littoral steppe, which is thin and discontinuous and characterised by the genera *Aristida*, *Cissus*, *Salvadora* and *Welwitschia bainesii* (the only species in this family of Gymnosperm).

Fauna Mammals include: hunting dog *Lycaon pictus* (T), aardwolf *Proteles cristatus*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T), zebra *Equus burchelli*, Hartmann's zebra *E. zebra hartmannae* (T), kudu *Tragelaphus strepsiceros*, gemsbok *Oryx gazella* and klipspringer *Oreotragus oreotragus*, with springbok *Antidorcas marsupialis* particularly common. Ostrich *Struthio camelus* are also present.

Zoning No information

Disturbances or Deficiencies There is some cattle grazing as part of a transhumance cycle.

Visitor Facilities There is no tourism or tourist infrastructure.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Matos, G.C. de and de Sousa, J.N.B. (1970). *Reserva Parcial de Mocamedes, Carta da Vegetação e Memória Descritiva*. IIAA, Nova Lisboa. 32 p.
- ° Maps (1:100,000): 353-354, 374-375, 395-396.
- ° Maps (1:250,000): SUL D-33 S & SUL E-33 A.

Staff None

Budget 400,000 KZ

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, CP 74, Luanda. The reserve headquarters at Pico do Azavedo have been destroyed.

Date May 1982

CHIMALAVERA REGIONAL NATURE PARK

Management Category V (Protected Landscape)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established Established as a regional nature park by Decree 352 of 15 April 1974 (B.O. I Série No. 88). First protected as a special reserve by Legislative Diploma 4124 of 5 June 1971 (B.O. I Série No. 132).

Geographical Location 20km south-west of Benguela in Benguela Province, approximately 10km from the coast. 13°05'-13°51'S, 12°45'-12°12'E.

Altitude 50-265m

Area 15,000ha

Land Tenure Government

Physical Features The reserve comprises an elevated plain surrounded by rugged mountains and escarpments. There are no permanent rivers, lagoons or wetlands, but underground water is brought to the surface by a pumping station. The nearest meteorological station is at Lobiko (60km to the north-east) with a recorded mean annual temperature of 23.5°C. The coldest month is July, averaging 19.4°C and the warmest is March, averaging 26.8°C. The mean annual rainfall of 305mm falls on an average of 45 days per year. The recorded relative humidity is 77%.

Vegetation The main vegetation type is a sublittoral steppe formation of *Acacia mellifera* spp. *detinens* together with other *Acacia* species.

Fauna Mammals include savanna monkey *Cercopithecus aethiops*, side-striped jackal *Canis adustus*, zebra *Equus burchelli*, and springbok *Antidorcas marsupialis* (one of the commonest species in the area).

Zoning No information

Disturbances or Deficiencies None recorded

Visitor Facilities There is no tourism in the park.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Maps (1:100,000): 251.
- ° Maps (1:250,000): SUL D-33 B.

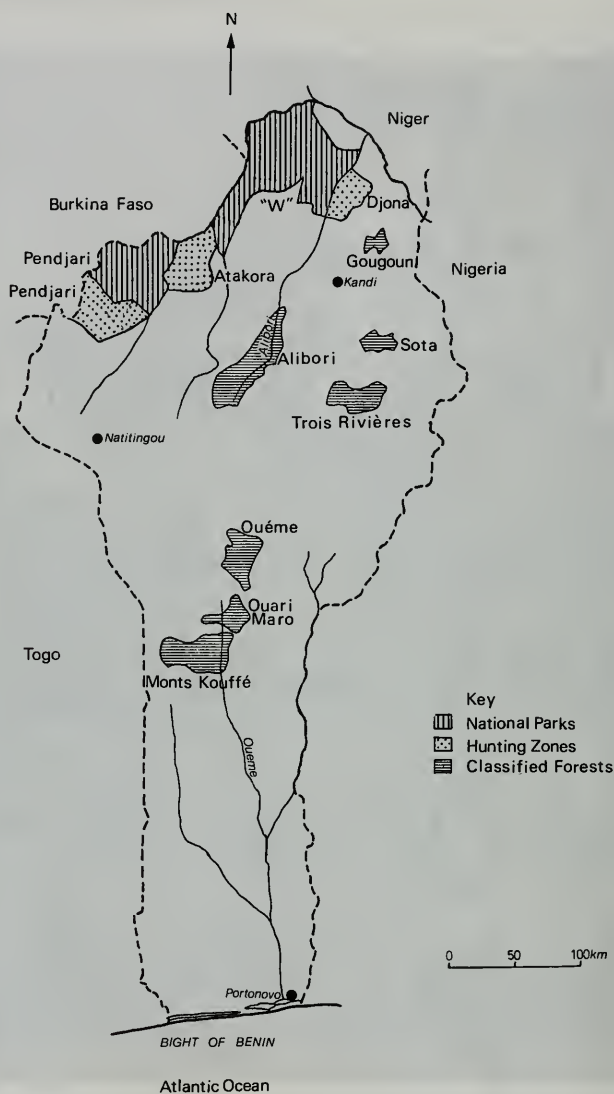
Staff None

Budget 1981 - 600,000KZ

Local Park or Reserve Administration Direcção Nacional da Conservação da Natureza, CP 74, Luanda. The park headquarters at Chimalavera were destroyed.

Date May 1983





BENIN

Area 112,622 sq.km

Population 3,830,000 (1984)

Parks and Reserves Legislation Ordinance No. 71-141 of 6 September 1971 contains regulations on the protection of nature and the control of hunting. It defines a National Park as an area controlled by the state with limits that cannot be modified except by law. National Parks are established for the protection, conservation and propagation of natural resources of scientific and aesthetic value; killing or capture of fauna is only allowed for scientific or management purposes, and all activities perceived to cause modification are prohibited. Permits are required for research within national parks, and sport fishing and camping are allowed only with written authorization. Réserve naturelle intégrale is the term used for areas of total protection, where outside intervention is only permissible in extreme circumstances. Réserves totales de faune and réserves partielles de faune are areas where the fauna (or part of the fauna) is protected, but where human activity may continue. The term zone cynégétique is used for areas set aside for safari hunting. Activities within these areas are controlled. Réserve spéciale or sanctuaire designate areas set aside for the protection/conservation of specific plants, animals or communities. Most legislation relating to nature conservation in Benin is based on old forestry texts of French West Africa. The forestry administration was defined by Decree No. 1704 AP of 24 July 1935, which was promulgated in what is now Benin by Decree No. 1107/EFC of 9 July 1943 which provided for the establishment of Classified Forests and Faunal Reserves. Most of the remaining areas of forest in Benin are classified in some way under this act.

Parks and Reserves Administration The Inspectorate of Nature Protection and Hunting (Inspection de la protection de la nature et de la chasse - IPNC) is one of four inspectorates of the Department of Water, Forests and Hunting (Direction des eaux, forêts et chasses). The other three sections are the southern, central and northern Forestry Inspectorates. There have been proposals made by FAO consultants to establish a new department specifically for national parks and hunting, and various working documents and management plans have been drawn up. There are, however, problems in implementing these proposals due to a lack of qualified staff.

Address

° Inspection de la protection de la nature et de la chasse, Direction des eaux, forêts, et chasses, Ministère du développement rural et de l'action cooperative, BP 393, Cotonou.

Additional Information The north of Benin is under-developed in comparison to the rest of the country, and communications tend to be difficult. This apparently affords some added protection to wildlife populations. In addition two national parks, three hunting zones and a number of classified forests have been created in these regions. However, there is considerably less territory within protected areas in the southern part of the country where the population density is greater.

For a number of years FAO and UNDP have been assisting the Benin government in development and management of its protected areas. This has resulted in the development of management plans for both national parks, and a number of detailed recommendations covering not only the protected areas but also national conservation policy, tourism and conservation of sites, hunting (including sport hunting, subsistence hunting and game ranching) etc. Nevertheless, by the end of 1980 the remaining forest in Benin outside protected areas covered only 540 sq.km, less than 0.4% of the country. The situation is particularly critical in the south of the country. The main factors in this deforestation are reported to be shifting agriculture and fire.

Within national parks, the principle problems are reported to be a lack of surveillance personnel (resulting in increased poaching), uncontrolled brush fires (which are gradually opening up

savanna areas), the presence of cattle during certain seasons, and illicit clearance of natural vegetation (Okio *et al.*, 1983).

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Protected Areas

	(hectares)
<i>National Parks</i>	
Boucle de la Pendjari	275,500
W du Benin	568,000
Subtotal	843,500
<i>Hunting Zones</i>	
Atakora	175,000
Djona	225,000
Pendjari	200,000
Subtotal	600,000
<i>Classified Forests</i>	
Agoua	
Agrimey	2,800
Atcherigbe	3,150
Bogo	
Djigbe	3,150
Gougoun	73,000
Ketou	11,000
Kibibo	
Ko	
L'Albori Superieur	256,000
La Sota	53,000
Lama	16,250
Mektou	
Mont Kouffe	108,000
Ouari Maro	107,600
Oueme	4,300
Oueme Superieur	177,600
Ouenou-Benou	
Trois Rivières	259,500
Subtotal	1,075,350

RESERVA DE LA BIOSPHERE DE LA PENDJARI

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total. Sport fishing is allowed with authorization (though commercial fishing is prohibited).

Date Established Established as a National Park in 1961 by Decree No. 132/FR/MAC/CF. First protected as a classified forest and partial faunal reserve (in effect a sport hunting zone) in 1954 by Decree No. 8839 ST/F and subsequently as a total reserve (classified forest and total faunal reserve) in 1955 by Decree No 2579. This brought total legal protection to flora and fauna, and annulled all rights of use and access by the local population. Accepted as a Biosphere Reserve in 1986.

Geographical Location In Atakora province, north-west Benin, on the international border with Burkina Faso. Within the loop formed by the River Pendjari, 45km north of Natitingon. 11°N, 1°30'E.

Altitude 150-450m

Area The biosphere reserve covers an area of 880,000ha. 275,500ha if the Parc national de Boucle de la Pendjari; contiguous to Pendjari (200,000ha) and Atakora (175,000ha) Hunting Zones, as well as Arly Total Faunal Reserve (76,000ha) in Burkina Faso. There are several hunting zones to the east. The core area for the Biosphere Reserve is 295,000ha.

Land Tenure Government

Physical Features The reserve, which lies within the Volta depression, contains a wide variety of the habitats typical of the West Africa savanna region. The Pendjari River and its floodplain border the park to the east and north, and the River Yapiti to the west. To the south, the quartzite cliffs of the Atakora massif are a distinctive feature, though these are not actually within the park itself. North of these quartzite cliffs, the rock formations are principally schists and sandstones of the Buem series, which form a band 30km wide running parallel to the cliffs. In the centre of this band, a series of long, narrow hills run north-east south-west. Beyond the Buem series to the north, the Voltaïen series comprises further sandstones and schists. Soils are in general ferruginous, and a high proportion are seasonally waterlogged. Annual rainfall 1,000 falling from May to September. Early in the dry season daily temperatures range 38°-44°C (10°-16°C at night) with hot dry winds from the north-east, but by March-April daily temperatures reach 38°-44°C (26°-30°C at night). Temperatures fall to 19°-31°C during the wet season.

Vegetation The reserve is situated in a zone of interchange between Soudanienne and Soudano-guinéenne savanna. Twenty-three vegetation types have been described from this area by Green (1977; 1979), though these can be grouped into six major zones: gallery forest; riverine forest; the floodplain of the Pendjari, with several savanna and woodland savanna zones (the distribution of which depend largely on the depth and duration of flooding); the hills of the Buem series with mainly wooded and shrubby savanna; open forest and wooded savanna with *Anogeissus leiocarpus* (mainly on the better drained soils, and often coincident with old settlements); and woodland and shrubby savanna of the interior. This last zone covers

the major reserve of the park, and is composed of a mosaic of formations resulting from topographic variations. The shrubby savanna is dominated by *Detarium microcarpum*, *Combretum* spp., *Acacia* spp. and *Crossopteryx febrifuga*, while the woodland savanna (mainly found on the deeper soils) is composed principally of *Butyrospermum paradoxum*, *Burkea africana*, *Azelia africana* and *Pterocarpus erinaceus*.

Fauna Many of the West African savanna species occur in this area, including: lion *Panthera leo*, leopard *P. pardus* (T), wild dog *Lycaon pictus* (T) (only two pairs have been seen since 1970, prior to 1970 it was fairly common), cheetah *Acinonyx jubatus* (T), elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, roan antelope *Hippotragus equinus*, waterbuck *Kobus ellipsiprymnus*, kob *K. kob*, Bohar reedbuck *Redunca redunca*, western hartebeest *Alcelaphus buselaphus*, red-fronted gazelle *Gazella rufifrons*, red-flanked duiker *Cephalophus rufilatus*, common duiker *Sylvicapra grimmia*, oribi *Ourebia ourebi*, buffalo *Syncerus caffer*, topi *Damaliscus lunatus* (limited distribution in West Africa), warthog *Phacochoerus aethiopicus*, Anubis baboon *Papio anubis*, vervet monkey *Cercopithecus aethiops*, and patas monkey *Erythrocebus patas*. It has been suggested that giraffe *Giraffa camelopardalis*, giant eland *Taurotragus derbianus* and the black rhino *Diceros bicornis* (V) (present here at the turn of the century) could be reintroduced to the park. Some 250 bird species have been recorded from the park, with raptors particularly diverse comprising 37 out of the 89 known African species. Nile crocodile *Crocodylus niloticus* (V) has been reported and *C. cataphractus* (I) is probably also present. *Python sebae* and the monitor *Varanus niloticus* are recorded. *Kinixys belliana*, an uncommon tortoise species inhabits the marshes and water courses. There are a large number of fish species including dog fish *Hydrocynus* sp., and captains *Lates niloticus*, both of commercial value to local fishermen. Sayer *et al.* (1979) give a list of species.

Conservation Management A management plan for this area was prepared by FAO consultants in 1979 (which also included a proposal for extensions to the park).

Zoning The total area of the biosphere reserve is 880,000ha, of which the Pendjari National park (275,000ha) and its proposed extension (20,000ha) form the central core. A further 388,000ha constitute the game reserve zone where all activities are prohibited except for "game tourism" (visiting hunters with permit) and scientific research: this zone is made up by the Atakora Game Reserve and its proposed extension and part of the existing Pendjari Game Reserve. Another 20,000ha of the Pendjari Game Reserve constitutes the "Controlled Game Use Zone" used for game ranching and hunting. There is a further 177,000ha of "buffer zone" where agriculture, stock-raising and fruit gathering are to be allowed on a sustainable basis.

Disturbances or Deficiencies Brushwood fires, lit for hunting purposes over-thousands of years, or, over the last 30 years, for the purpose of viewing animals, have caused the appearance of a pyroclimatic savanna, of a pseudonatural appearance. The natural balance is disturbed by poaching on an indeterminant scale. Occasional chemical pollution of some areas of water affects the fish in the reserve. A minor area of the reserve (30,000ha) on the western and southern borders of the Zone Cyregetique de la Pendjari has been cleared for the development of agriculture and large scale habitation (17 village). Livestock breeding is little developed in the region, but the encroachment of the desert is forcing the herds of cattle from Burkina Faso and Benin.

Visitor Facilities There is a small hotel and some 300km of tourist roads. 2,113 visitors were reported in 1975-1976. Camping is permitted with the permission of the park administration.

Scientific Research A lot of scientific work has been carried out in the park in connection with the FAO/UNDP project which has resulted in preparation of the management plan. In particular Green (1977; 1979) reports on the vegetation of the area, and Leovinson and Green (1981) on the mammals.

Special Scientific Facilities No information

Principal Reference Material

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Staff The park is the largest employer of unskilled workers in the province; the local people supply some 22,000 man days of labour per year maintaining the roads, etc.

Budget No information

Local Park or Reserve Administration Inspection de la protection de la nature et de la chasse, Natitin Gou.

Date 1981, revised August 1986

PARC NATIONAL DU "W"

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total. Sport fishing is allowed with authorization (though commercial fishing is prohibited).

Date Established 1954; the area had game reserve status prior to this.

Geographical Location In northern Benin, part of the international park shared with Burkina Faso and Niger. Centred approximately at 12°20'N, 2°25'E.

Altitude No information

Area 568,000ha; contiguous to W National Park in both Niger (220,000ha) and Burkina Faso (235,000ha)

Land Tenure Government

Physical Features Extensive savanna plains with scattered lakes, marshlands and rivers make up much of the area, although the Atacora mountain range (here at its north eastern limit)

crosses the park north-north-east south-south-west. The mountain range is crossed twice by the River Mékrou, and on both occasions this is marked by impressive waterfalls and rapids. The range ends in a series of hills running up to the valley of the Niger. To the east of the Atacora range the Borgou plain (covering about two thirds of the park) forms part of a vast peneplain of gneiss and granites, decreasing gradually in altitude towards the north-east and with a number of low hills. To the west of the Atacora range, the Gourma plain also contains a number of low hills. Soils vary widely with topography and bedrock. The climate in the region is typically tropical continental, with a cool dry season (October - February) coinciding with a period of dry winds from the north-east, a hot dry season (February - May) and a rainy season (May - October).

Vegetation Seven major vegetation formations are found within the park: riverine forest with species of *Cola*, *Morellia* and *Syzygium*; gallery forest with species of *Khaya*, *Diospyros* and *Kigelia*; open forest (80% tree cover, with little grass); wooded savanna (35-60% tree cover); tree savanna (5-35% tree cover, and with a far greater cover of bushes and grass); shrubby savanna (less than 5% tree cover); and grassland savanna with virtually no trees or bushes. There are also areas of *Butyrospermum paradoxum* savanna, an artificial vegetation type resulting from cultivation of *Isoberlinia* woodland. Twenty vegetation associations are described in the park management plan.

Fauna The W National Parks in Benin, Niger, and Burkina Faso contain the most important savanna elephant *Loxodonta africana* (T) population in West Africa. Many of the mammal species characteristic to West Africa occur in this area including: lion *Panthera leo*, leopard *P. pardus* (T), cheetah *Acinonyx jubatus* (T), elephant, hippopotamus *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, roan antelope *Hippotragus equinus*, waterbuck *Kobus ellipsiprymnus*, kob *K. kob*, Bohar reedbuck *Redunca redunca*, western hartebeest *Alcelaphus buselaphus*, red-flanked duiker *Cephalophus rufilatus*, Grimm's duiker *Sylvicapra grimmia*, oribi *Ourebia ourebi*, buffalo *Syncerus caffer* and possibly red-fronted gazelle *Gazella rufifrons*, topi *Damaliscus lunatus*, warthog *Phacochoerus aethiopicus*, Anubis baboon *Papio anubis*, vervet monkey *Cercopithecus aethiops*, patas monkey *Erythrocebus patas*, Gambian sun squirrel *Heliosciurus gambianus*, gerbil *Tatera kempi*, spiny mouse *Acomys cahirinus johannis*, crested porcupine *Hystrix cristata senegalica*, Gambian epauletted fruit bat *Epomophorus gambianus*, and Egyptian slit-faced bat *Nycteris thebaica*. Giraffe *Giraffa camelopardalis*, and giant eland *Taurotragus derbianus* are not present. 150 species of bird have been identified so far in the Benin section of the park, though this is unlikely to be the full total. Raptors seem to be particularly abundant. *Crocodylus niloticus* (V) are found within the park, and otherspecies particularly noted are the soft-shelled turtle Trionychidae and the monitor *Varanus niloticus*.

Conservation Management A management plan for this area was prepared by FAO consultants in 1982.

Zoning Buffer zones managed for sport hunting surround the park.

Disturbances or Deficiencies There is insufficient protection, and poaching, cattle grazing and agricultural encroachment are a continuing problem. There is the additional threat from a planned phosphate extraction programme. Because of the free movement of game between the three countries, there is a grave need to co-ordinate policy and anti-poaching measures.

Visitor Facilities There is a single 44km long access road to a well-known waterfall and some simple camp facilities constructed by local people. Otherwise penetration of the park is difficult as there are few passable roads.

Scientific Research A vegetation survey was begun in 1977 by a US Peace Corps Environmental Programme. Research has continued as part of the development process of a park management plan.

Special Scientific Facilities No information

Principal Reference Material

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Staff No information

Budget No information

Local Park or Reserve Administration Inspection de la protection de la nature et de la chasse, Natitin Gou.

Date 1981

ZONE DE CHASSE DE L'ATAKORA

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Managed for sport hunting as a buffer zone to Pendjari National Park.

Date Established No information

Geographical Location In Atakora province, to the north of the country, close to the Benin-Burkina Faso border. 11°08'N, 1°13'E.

Altitude No information

Area 175,000ha; part of the Pendjari National Park (275,500ha), Pendjari Hunting Zone (200,000ha) and Atakora Hunting Zone complex.

Land Tenure Government

Physical Features The region experiences a characteristic humid Soudanian climate with a cool dry season, a warm dry season, and a rainy season.

Vegetation Typical Soudanian zone savanna with bush and tree savanna, grass savanna, interspersed with gallery forest and marshlands surrounding pools.

Fauna Mammals include: buffalo *Syncerus caffer*, elephant *Loxodonta africana* (V), hippopotamus *Hippopotamus amphibius*, topi *Damaliscus lunatus*, kob *Kobus kob*, antelopes and primates; species characteristic of West African savanna.

Zoning The whole area acts as a buffer zone for the Pendjari National Park.

Disturbances or Deficiencies Poaching and cattle grazing are continuing problems.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Inspection de la protection de la nature et de la chasse, Natin Gou.

Date November 1980

ZONE DE CHASSE DU DJONA

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial

Date Established No information

Geographical Location In Borgou province to the north of the country

Altitude No information

Area 225,000ha

Land Tenure Government

Physical Features The region experiences a characteristic humid Soudanian climate with a cool dry season, a warm dry season, and a rainy season.

Vegetation Typical Soudanian zone savanna with bush and tree savanna, grass savanna, interspersed with gallery forest and marshlands surrounding pools.

Fauna Mammals include: buffalo *Syncerus caffer*, elephant *Loxodonta africana* (V), hippopotamus *Hippopotamus amphibius*, topi *Damaliscus lunatus*, and kob *Kobus kob*, antelopes and primates; species characteristic of West African savanna.

Zoning None

Disturbances or Deficiencies Poaching and cattle grazing are continuing problems.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Inspection de la protection de la nature et de la chasse, Natitin Gou.

Date November 1980

ZONE DE CHASSE DE LA PENDJARI

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Managed for sport hunting as a buffer zone to Pendjari National Park.

Date Established No information

Geographical Location North of Daregs in Atakora province. 11°09'N, 1°24'E.

Altitude No information

Area 200,000ha; part of the Pendjari National Park (275,500ha), Atakora Hunting Zone (175,000ha), and Pendjari Hunting Zone complex.

Land Tenure Government

Physical Features The area comprises sandy savanna plains with scattered pools. The climate is humid with a cool dry season, a warm dry season, and a rainy season.

Vegetation The vegetation is predominantly Soudanian savanna comprising both wooded and grass savanna, and interspersed with areas of gallery forest and marshlands.

Fauna Mammals include: buffalo *Syncerus caffer*, elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, antelopes, primates; species characteristic of West African savanna.

Zoning The whole area acts as a buffer zone for the Pendjari National Park.

Disturbances or Deficiencies Poaching and cattle grazing are continuing problems.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

Staff No information

Budget No information






Local Park or Reserve Administration Inspection de la protection de la nature et de la chasse, Natitin Gou.

Date 1981





Key

-  National Parks
-  Game Reserves
-  Forest Reserves
-  Wildlife Reserve
-  Proposed Safari Park

Botswana

BOTSWANA

Area 574,978 sq.km

Population 941,027 (1981)

Parks and Reserves Legislation Areas are declared under the Fauna Conservation Proclamation of 1961 which defines Game Reserves and Sanctuaries, Private Game Reserves, and Controlled Hunting Areas, and the National Parks Act of 1967 (amended in 1976 and again in 1979) which covers establishment, control and management of national parks. Definitions in general follow those found in the international legislation, although FAO (1977) note that under the Fauna Conservation Proclamation only vertebrate species are mentioned (in practice protection is provided for the whole ecosystem). Game reserves and sanctuaries are areas where hunting is forbidden without special permit, though regulations may cover only certain species, or be more general, depending on the act constituting the area. The definition of a national park is almost word for word that given in the 1933 London Convention. In each case, areas are designated by order of the Head of State, confirmed by a resolution of the legislature. Tribal lands are administered by local authorities and it is not possible to create national parks in these areas. Other defined categories of protected area include Forest Reserve, under a 1948 proclamation, and Wildlife Management Areas, under an amendment to the Fauna Conservation Proclamation. Under Statutory Instrument No. 22 of 1968, 19 Controlled Hunting Areas were declared. The Unified Hunting Regulations (Republic of Botswana, 1979) give all citizens equal rights to hunt in any of these areas (for which quotas are set) subject to the other conditions of the Fauna Conservation Act. There is no control over other activities in these areas. Wildlife Management Areas (WMA) were developed in response to the need for conservation and the controlled utilization of wildlife outside gazetted protected areas, combined with the need for buffer zones between parks and reserves and areas of more intensive land-use. These areas are now officially recognized as a category of land-use, and are being included in the land zoning programme of the national Tribal Grazing Land Policy (see Government Paper No. 2 of 1975, and Government Paper No. 1 of 1986). Wildlife utilization will be the primary land use in WMAs, with other land use only permitted if it is compatible with it. The establishment of WMAs is proposed in seven of Botswana's ten districts, in large areas of marginal and sub-marginal land, forming buffer zones around most of the existing national parks and game reserves. Two migration corridors have also been planned and the total area covered by proposed WMAs covers some 20% of Botswana land area (1982). None, however, have so far been gazetted. The concept of WMAs, already endorsed by the Government and most district authorities, should enable the Government to plan comprehensively for wildlife conservation and utilization for the first time and constitutes a major advance in national policy with regard to wildlife. When the proposed network of WMAs is gazetted, a policy for each one will be formulated by the local district authority and DWNP. Once the policy is determined, detailed management plans will be drafted and incorporated into the legislation. These plans will implemented jointly by the district authorities and DWNP. Carter (1983) outlines the regulations governing activities in proposed WMAs.

Parks and Reserves Administration The Department of Wildlife and National Parks (DWNP) is responsible both for the administration of protected areas and for other aspects of wildlife conservation and utilisation within Botswana. Protected areas are patrolled, and police and wardens have powers to arrest poachers. The thinly dispersed staff are supplemented by voluntary 'Honoury Game Officers' with the same powers. The DWNP is also responsible for issuing hunting licences (for defined areas and with predetermined quotas), trophy dealers' permits, import, export and re-export permits (CITES) and permits for the capture of live animals for sale or reintroduction on farms. The education unit within the Department is responsible for promoting public awareness, interpretation of wildlife legislation, and information services (through public meetings and school programmes). A Wildlife Training Centre was established at Maun to train game scouts in conservation and management, and is associated with the Maun Wildlife Education Park.

Address

* Department of Wildlife and National Parks, Ministry of Commerce and Industry, PO Box 131, Gaborone

Additional Information The difficulties facing the Department of Wildlife and National Parks are similar to those faced by most such departments in Africa, the lack of sufficient manpower, funds, equipment and infrastructure. The largest problem is poaching, though attempts are being made to control this by arrest of those found violating regulations, and through public relations campaigns. The recent drought has also seriously affected one of the largest populations of wildebeest surviving in Africa, which is now in grave danger of disappearing through the combined effects of fencing, poaching and drought. At Mopipi, for example, close to the dried up Lake Xau, some 50,000 wildebeest carcasses were recorded in December 1983. The grazing situation at the lake may now be irredeemable.

The veterinary fencing was erected to separate wild fauna (particularly antelope) from livestock to inhibit the transmission of foot and mouth disease. This is blocking migration and watering routes. Mangubo (1982) suggests that as the disease can now be controlled through improved vaccination programmes, these fences, erected without an environmental impact study, should be removed.

Another problem affecting the management of wildlife in Botswana is the lack of available research results. An aerial survey of Northern Botswana (1984-5) has been funded privately, and organised by the Kalahari Conservation Society, to enable accurate estimation of the DWNP's hunting quotas. Prior to this (1978-9) the Countrywide Animal and Range Assessment Project collected data from the central, southern and western parts of the country on wildlife resources, data which was used to plan and zone WMAs. There are also several non-governmental research programmes in Botswana, including fish research in the Okavango Delta, the Kalahari Ungulate Movement Study and research into tse-tse fly control. Elephant distributions have been studied in northern Botswana and conservation recommendations made (Melton, 1985).

The national Tribal Grazing Land Policy mentioned above arose at about the same time as the concept of WMAs, out of concern for over-grazing and range degradation. The objectives of the policy are "to make grazing control, better range management and increased productivity possible (starting) with fencing areas of land over which exclusive rights are recognised. Therefore, under certain conditions, groups and individuals must be granted exclusive rights to land" and "to safeguard the interests of those who own only a few cattle or none at all" (Republic of Botswana, 1975). These objectives have been met through the creation of commercial, communal and reserved areas.

The Wildlife Conservation Policy (Government Paper No. 1 of 1986) clearly states that Botswana's wildlife resource must be seen in terms of its potential contribution to the economic well-being of the nation, as well as in terms of its heritage and aesthetic value. Therefore, while importance is still accorded to national parks and reserves, in particular for tourism, education and protection of significant areas, the policy develops further the idea of wildlife management areas and the rational use of wildlife.

The Kalahari Conservation Society established in 1982, has an influential committee and a research sub-committee which comprises highly qualified and experienced environmentalists. Now, with an office in the capital and a full time Executive Officer, the Kalahari Conservation Society is making a significant contribution towards resolving the many difficult conservation issues.

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Protected Areas

	(hectares)
<i>National Parks</i>	
Chobe	998,000
Gemsbok	2,480,000
Nxai Pan	259,000
Subtotal	3,737,000
<i>Wildlife Reserves</i>	
Gaborone	239
Moremi	180,000
Subtotal	180,239
<i>Game Reserves</i>	
Central Kalahari	5,180,000
Khutse	244,000
Mabuasehube	179,200
Makgadikgadi Pan	414,000
Subtotal	6,017,200

Parks

Maun Educational	300
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Forest Reserves

Chobe	240,000
Kasane	120,000
Kazuma	12,800
Maikaelelo	30,000
Sibuyu	101,024
Subtotal	503,824

Proposed areas

Moselesele Safari Park	1,215
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CHOBE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established Established as a National Park in 1968. First protected as a game reserve in 1961.

Geographical Location Northern Botswana on the border with Namibia, Zambia and Zimbabwe. Access is by tarmac road from Francistown and by dirt road from Maun. 17°15'-18°50'S, 23°00'-25°40'E.

Altitude Up to 900m

Area 998,000ha; reduced from 1,087,800ha (Nchunga,1983). Contiguous to Chobe Forest Reserve (about 240,000ha) on north-west boundary, Kasane Forest Reserve (about 120,000ha) on north-east boundary, and Maikaelelo Forest Reserve (about 30,000ha) on the south-east boundary.

Land Tenure Government

Physical Features Three major topographic features dominate the park. The Chobe River comprises a 35km stretch of the park boundary and national border with Namibia, and is derived from the Linyanti River, which flows eastwards from Angola eventually merging with the Zambezi. The Nogatosau floodplains consist of a cluster of eight large pans including Cwikampa, Mandabuza and Maporo and a dam on the Ngwezumba River which is surrounded by woodland. The fossil lakebed of the sandy Mababe Depression also includes the Savuti Marsh, a dry treeless grassland during the dry season, but flooded during the rainy season (October-March), when the Linyanti-Chobe floodwaters overflow the river banks. The maximum temperature in January can reach 45°C.

Vegetation The varied topography supports a range of vegetation types including dry savanna grassland, *Colophospermum mopane* woodland and riverine forest.

Fauna The park is renowned for large herds of elephant *Loxodonta africana* (T), buffalo *Syncerus caffer* and zebra *Equus burchelli* which gather on the plains and near the pans. Other mammals include: giraffe *Giraffa camelopardalis*, reintroduced white

rhinoceros *Ceratotherium simum* (increasing), lion *Panthera leo* and leopard *P. pardus* (T), oribi *Ourebia ourebi*, roan antelope *Hippotragus equinus* and tsessebe *Damaliscus lunatus* on the plains, sable antelope *Hippotragus niger*, waterbuck *Kobus ellipsiprymnus*, and puku *K. vardonii* near the river. The highest density of animals is reported from the Savuti marshlands. The diverse avifauna (over 300 species) includes: fish eagle *Haliaeetus vocifer*, banded harrier hawk *Polyboroides typus*, guineafowl (Numidinae), slaty egret *Egretta vinaceigula* (I), and carmine bee-eater *Merops nubicus*. The Chobe-Linyanti river system contains tigerfish *Hydrocynus vittatus*, barbel *Clarias gariepinus*, and bream *Tilapia* sp..

Population The park encloses the western Chobe settlements, forming the Kachikao enclave which has reinforced the division between east and west Chobe. The restriction on cattle movements has slowed the transition of the enclave from subsistence to cash economy. There has been a tendency for migration to the more buoyant economy of Kasane in the east.

Zoning No information

Disturbances or Deficiencies Poaching continues to be a problem. Habitat degradation is occurring along the Chobe River, largely due to local over-abundance of elephant (Melton 1985).

Visitor Facilities An ordinary car can be used in the northern section of the park, but elsewhere four-wheel drive is essential. The entrance gates are at Kasane, Saunti and Linyanti and there is an airstrip near the park. Accommodation is available in two permanent camps at Savuti, two lodges near Kasane and campsites at Serondela and Nogatsan. Savuti Marsh and Mabebe Depression are closed to visitors during the rainy season from December through March. A number of tour operators offer tours to various sections of the park. Fishing is permitted in the Chobe-Linyanti river systems.

Scientific Research Projects include lion research at Savuti and elephant research at Chobe.

Special Scientific Facilities No information

Principal Reference Material

- ° Melton, D.A. (1985). The Status of Elephants in Northern Botswana. *Biological Conservation* 31: 317-333.
- ° Nchunga, M.L. (1983). The future of parks and reserves. In: *Which way Botswana's wildlife?* Proceedings of the Symposium of the Kalahari Conservation Society. 15-16 April 1983.
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Staff The assistant game warden is based at Kasane

Budget No information

Local Park or Reserve Administration Chobe National Park Headquarters, Department of Wildlife, National Parks and Tourism, PO Box 17, Kasane.

Date April 1985

GEMSBOK NATIONAL PARK/MABUASEHUBE GAME RESERVE

Management Category II/IV (National Park/Managed Nature Reserve)

Biogeographical Province 3.16.07 (Kalahari)

Legal Protection No information

Date Established Both the National Park and the Game Reserve were established in 1971. Gemsbok was first established as Gemsbok Game Reserve in 1932. Part of the area was established as a game reserve by High Commission's Notice No. 107 of 1940, then declared a sanctuary under the Fauna Conservation Proclamation of 1961. The area was enlarged in 1971.

Geographical Location In south-east Botswana on the border with South Africa and Namibia. 24°10'-25°S, 20°-23°52'E.

Altitude About 1,200m

Area Gemsbok National Park (2,480,000ha); contiguous on the eastern boundary to Mabuasehube Game Reserve (179,200ha). Separated from Kalahari-Gemsbok National Park (960,000ha) in South Africa by the Nossob River.

Land Tenure Government

Physical Features Gemsbok is mainly desert with some savanna vegetation along the sandy banks of the Nossob River. Mabuasehube comprises three large pans supporting a good variety of game. The diurnal temperature range in the desert is extreme, often causing frost at night. Rainfall is spasmodic and not dependable although dew often occurs in the early morning.

Vegetation The area has some dry savanna and grassland. Interesting plants include the water storing tsamma melon *Citrullus lanatus*, Gemsbok cucumber *Acanthosicyos naudinianus*, and the drought-resistant stone plant *Lithops aucampiae*.

Fauna Mammals include large herds of wildebeest *Connochaetes taurinus*, hartebeest *Alcelaphus buselaphus*, eland *Taurotragus oryx*, springbok *Antidorcas marsupialis* and gemsbok *Oryx gazella*. These game animals attract large numbers of predators and scavengers such as lion *Panthera leo*, leopard *P. pardus* (T), cheetah *Acinonyx jubatus* (T), caracal *Felis caracal*, spotted hyena *Crocuta crocuta*, brown hyena *Hyaena brunnea*, wild dog *Lycaon pictus* (T), and cape fox *Vulpes chama*. Over 70 bird species have been recorded, including ostrich *Struthio camelus*.

Conservation Management Some administration is carried out by the South African authorities.

Zoning None

Disturbances or Deficiencies There is some poaching within the reserves.

Visitor Facilities Gemsbok is closed to all visitors, but visitors are allowed into Mabuasehube. There are no official camps but there is a Game Scouts base.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Readers Digest (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff No information

Budget No information

Local Park or Reserve Administration Director, Department of Wildlife, National Parks and Tourism, PO Box 131, Gaborone.

Date April 1985

NXAI PAN NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total. Nxai Pan National Park Regulations (Statutory Instrument No. 128 of 1976)

Date Established 1971

Geographical Location North of Makgadikgadi Pans complex in northern Botswana. Access is from Francistown via Gweta. Approximately centred at 19°50'S, 24°55'E.

Altitude About 900m

Area 259,000ha; separated from Makgadikgadi Pans Game Reserve (414,000ha) in the north by the Maun-Francistown road and Kanye flats.

Land Tenure Government

Physical Features The park contains two salt pans, Nxai Pan, which is a fossil lake bed 14km wide, and the smaller Kgama-kgama Pan, which lies 35km to the north. The rainy season is from December to March.

Vegetation The vegetation is predominantly woodland savanna. Nxai Pan is covered with short grass of salt-tolerant species with scattered islands of trees. Herbaceous plants include the drought-resistant genus *Aptosimum*.

Fauna There are large herds of giraffe *Giraffa camelopardalis*. Migratory zebra *Equus burchelli* and wildebeest *Connochaetes taurinus* concentrate at waterfilled depressions in the pan during the rainy summer months, moving to Boteti River outside the park during the dry season. Other mammals include: lion *Panthera leo*, cheetah *Acinonyx jubatus* (T), bat-eared fox *Otocyon megalotis* and aardwolf *Proteles cristatus*. Avifauna include species of vulture, goshawk *Accipiter tachiro* and bateleur *Terathopius ecaudatus*.

Zoning No information

Disturbances or Deficiencies Access for migratory zebra and wildebeest to the Boteti river may not continue if the Maun-Francistown road is fenced or some cattle ranches erect fencing.

Visitor Facilities There are two public campsites. The northern site has a borehole.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

* Readers Digest (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff No information

Budget No information

Local Park or Reserve Administration Department of Wildlife, National Parks and Tourism, PO Box 131, Gaborone.

Date April 1985

GABORONE WILDLIFE RESERVE

Management Category V (Protected Landscape)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total; the land has been transferred to the Department of Wildlife, National Parks and Tourism by the Ministry of Local Governments and Lands. Local residents still have rights of free access and the collection of firewood.

Date Established No information

Geographical Location On the Notwane River a few miles north of the capital city Gaborone, in south-east Botswana close to the international border with Transvaal, Republic of South Africa. 24°45'S, 25°55'E.

Altitude 970m

Area 239ha

Land Tenure Government. The area was formerly freehold farmland and formed part of the Gaborone Block. The small area in the south of the reserve, part of the crown reserve, was taken by the government in 1963, while the major part, included in the Broadhurst 'B' farm, was purchased by the government in 1971 to allow the Gaborone township to expand.

Physical Features The reserve lies in the Notwane River valley, enclosing parts of the floodplain and the plateau to the west. The whole area is underlain by ectinomorphic and porphyritic Gaborone granites of the Kanye volcanic series. There are several exposures of these rocks forming kopjes, particularly in the southern part of the reserve. There are substantial gravel deposits of high quality in the raised western area. A layer of aeolian Kalahari sand of varying depth covers most of the area. In parts it has been extensively weathered producing ferruginous tropical soils typical of eastern Botswana. Where the granite lies close to the surface, the thin soils are intermediate between tropical ferruginous and the lithosols characteristic of the granite hills south of Gaborone. The soils of the floodplains regularly become waterlogged following flooding and show hydromorphic tendencies (gleying). Surface water is available throughout the year, either from the marshy lagoons fed by the overflow from the sewage works (the Department of Animal Health has certified the water fit

for animal consumption), or from an old stock-watering dam in the Notwane River. There are no developed groundwater sources in the reserve, but there is a borehole just beyond the northern boundary. It is also probable that the alluvial sand deposits under the floodplain are water-bearing. The climate is semi-arid and sub-tropical. The mean annual rainfall of 510mm falls mainly during the summer months (October to March inclusive) when it averages 30mm per month, compared with less than 10mm a month for the rest of the year. The mean maximum and minimum daily temperatures vary from 32°C and 19.5°C between November and January, to 22°C and 4°C in late June and early July.

Vegetation Six vegetation types have been described (White, 1978). 1) Closed canopy riverine woodland dominated by *Combretum erythrophyllum* and *Ziziphus mucronata* with a shrub layer of *Maytenus senegalensis* and *Diospyros lycioides* and the predominant grass *Panicum maximum*. 2) Kopje woodland dominated by *Croton zambesicus* interspersed with *Z. mucronata*, *Boscia albitrunca*, *B. foetida*, *Combretum molle*, *Peltophorum africanum* and *Pappea capensis*. Shrubs include the predominant *Myrsine africana* together with *Grewia monticola*, *G. bicolor* and *G. flavesces*. Grasses include *Rhynchelytrum repens*, *Chrysopogon montanus*, *Aristida stipitata*, *Trichoneura grandiglumis* and *Pogonarthria squarrosa*. 3) Open floodplain savannah dominated by acacias *Acacia karroo*, *A. giraffae* and *A. tortilis*, with shrubs such as *Grewia flava* and *Maytenus senegalensis* and the dwarf shrub *Solanum incanum*. The grass and herb layer is rich in species (though it is poor grazing), including *Carex* spp., *Eragrostis* spp., *Asparagus exuvialis*, *Cymbopogon plurinodis*, *Dichanthium papillosum* and *Chloris virgata*. 4) Dense dryland tree savannah predominated by acacias, such as *Acacia fleckii*, *A. erubescens*, *A. tortilis* and *A. karroo*, together with *Combretum imberbe*, *C. molle* and *C. hereroense*. *Grewia flava* is the most common shrub with grasses such as *Eragrostis rigidior*, *Panicum maximum*, *Urochloa trichopus* and *Digitaria* spp.. The presence of *Aristida congesta* indicates over-grazing. 5) Marshland vegetation in areas flooded for most of the year. *Typha domingensis* and *T. latifolia* are the dominant species in this relatively species-poor marsh community. The outflow from the sewage works has raised the local waterlevel and the marshy areas are expanding into the vlei grassland. 6) The vlei grassland areas depend on seasonal inundation to prevent other species invading these fertile areas. It is dominated by *Setaria* spp., interspersed with patches of *Carex* spp., *Bothriochloa redicans*, and *Panicum coloratum*.

Fauna Resident mammals include: bushbuck *Tragelaphus scriptus*, steenbok *Raphiceros campestris*, duiker *Cephalophus* sp., a few kudu *Tragelaphus strepsiceros* and impala *Aepyceros melampus*, aardvark *Orycteropus afer*, rock dassie *Procavia capensis*, porcupine *Hystrix africaeaustralis*, warthog *Phacochoerus aethiopicus*, and vervet monkey *Cercopithecus aethiops*. The area is rich in waterfowl, with several palearctic migrants and breeding populations of white-backed night heron *Gorsachius leuconotus* and green heron *Butorides striatus*. Several species uncommon in Botswana occur in healthy numbers here, including little bittern *Ixobrychus minutus*, purple swamphen *Porphyrio porphyrio*, and long-tailed widow (sakabula) *Euplectes progne*. The birds of Gaborone are described in *Botswana Notes and Records*, vol. 8 1976. Reptiles include Nile monitor *Varanus niloticus*, python, puff adder *Bitis arietans*, black mamba *Dendroaspis polyleptis*, Cape cobra, spitting cobra *Naja nigricollis* and, Egyptian cobra *Naja haje*.

Conservation Management The main purpose of this reserve is as a tool for the wildlife education efforts of the Department of Wildlife, National Parks and Tourism, aimed at the schools and other educational institutions in Gaborone city. It also provides an attractive recreational area for the city dwellers. A programme of reintroductions has been suggested (White, 1978) to increase the interest value for visitors. Potential species include waterbuck, lechwe, wildebeest, zebra, springbok and giraffe; many of these species used to occur in the area. A perimeter fence has been constructed.

Zoning None

Disturbances or Deficiencies The arrival of the Batswana tribe in the mid 18th century and the subsequent arrival of settler farmers reduced the numbers and diversity of game species. When the government took over the land in the 1960s and 1970s, numbers fell even further through illegal, but uncontrolled, hunting. The increasing number of cattle grazing in the area

has seriously degraded the vegetation from the open savannah grassland formerly present. There is clear evidence of a decline in veld condition through bush encroachment and the invasion by species resistant to grazing pressure. Grazing is now prohibited in the reserve and the whole area is fenced in. Firewood is cut in the reserve and sold in Gaborone; this is a right of the local residents.

Visitor Facilities The reserve is not yet open to the public, but it is hoped that it can be opened by mid 1985 and 10,000-15,000 visitors are expected annually.

Scientific Research No information

Special Scientific Facilities None

Principal Reference Material

° White, R. (1978). A working plan for the Gaborone Wildlife Reserve for the years 1977/1978 to 1981/1982. Department of Wildlife, National Parks and Tourism.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date April 1985

MOREMI WILDLIFE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established Moremi is the first tribal wildlife conservation area established in Botswana. It was declared by the Batawana tribe, in 1962 with final gazetting 12 April 1965, and was enlarged in 1976 with the incorporation of Chief's Island.

Geographical Location Eastern area of the Okavango Delta in Ngamiland District, north-west Botswana. Approximately centred 19°30'S, 23°30'E.

Altitude Up to 900m

Area 180,000ha

Land Tenure Government

Physical Features The reserve is part of the inland delta of the Okavango River where the river, which originates in western Angola, reaches the Kalahari desert. The swamp tract provides virtually the only permanent surface water in Botswana. The substrate (including the Kunyera fault) is predominantly Karoo sediments of sandstone and shale. The reserve includes numerous rivers, lagoons (such as the permanent Xaxanaka lagoon on the Muanachira river), papyrus, reedbeds and islands including the wooded Chief's Island (100km by 15km), which constitutes over a third of the reserve area and is flanked by the Boro and Santantadibe rivers. The input of water is biphasic some from precipitation during the rainy season, but mainly

from the floodwaters which take five to six months to reach the swamps from southeast Angola. Flooding, therefore, occurs during mid-winter (the dry season) and rivers, lagoons and marsh areas dry out between floods. The climate of the area is sub-arid to arid with a rainy season from November to April, and annual rainfall 200–1,200mm, falling mainly in January and February.

Vegetation Four main community types are recognised: (1) Riverine and flood plain vegetation on the alluvial soils. Species include: extensive labyrinthine papyrus *Cyperus papyrus* and reedbeds *Phragmites* spp., floating lily pads such as *Nymphaea caerulea*, date palm *Phoenix reclinata*, and gomoti fig *Ficus verruculosa*. Floodplain grasslands (Melapo) are dominated by the sedges *Scirpus inclinatus* and *Fimbristylis complanata*, or tall grasses such as *Imperata cylindrica*, *Setaria sphacelata* and *Panicum repens*. (2) Dense mopane *Colophospermum mopane* woodland with *Kigelia pinnata*, *Lonchocarpus capassa*, *Combretum imberbe* and *Acacia nigrescens*. (3) *Acacia* woodland and savanna on the sandy and alluvial soils of Chief's Island with *Acacia giraffae*, sycamore fig *Ficus sycomorus* and palm *Hyphaene ventricosa* surrounding a central area of grassland with *Sporobolus spicatus* or couch grass *Cynodon dactylon*. (4) *Terminalia sericea* and *Combretum mechowianum* savanna woodland and scrub on the Kalahari sands.

Fauna The diverse range of habitats supports a wealth of wildlife. Mammal species include: baboon *Papio ursinus*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer* (over 20,000 recorded in the entire delta), the semi-aquatic red lechwe *Kobus leche* (the most numerous large mammal – about 20,000 in the reserve), sitatunga *Tragelaphus spekei*, greater kudu *T. strepsiceros*, reedbuck *Redunca arundinum*, steenbok *Raphicerus campestris*, roan antelope *Hippotragus equinus*, impala *Aepyceros melampus*, topi *Damaliscus lunatus*, elephant *Loxodonta africana* (T), bat-eared fox *Otocyon megalotis*, lion *Panthera leo*, leopard *P. pardus* (T), cheetah *Acinonyx jubatus* (T), wild dog *Lycaon pictus* (T) and spotted-necked otter *Lutra maculicollis*. The rich avifauna includes slaty egret *Egretta vinaceigula* (I), lily-trotter (jacana) *Actophilornis africana*, wattled crane *Bugeranus carunculatus* (of special concern), sacred ibis *Threskiornis aethiopicus*, squacco heron *Ardeola ralloides*, marabou *Leptoptilos crumeniferus*, yellow-billed stork *Mycteria ibis*, kingfishers (Alcedinidae), Pel's fishing owl *Scotopelia peli*, barred owl *Strix varia*, fish eagle *Haliaeetus vocifer*, bearded woodpecker *Dendropicus namaquus*, rollers (Coraciidae), and bee eaters (Meropidae). There are numerous amphibians and reptiles including the Nile crocodile *Crocodylus niloticus* (V), monitor lizards *Varanus niloticus* and *V. exanthematicus albigularis*, and snakes such as boomslang *Dispholidus typus*, bird snake *Thelotornis* sp. and cobra *Naja* spp.. River fish include tigerfish *Hydrocynus vittatus*, barbel *Clarias gariepinus*, bream *Tilapia* sp., *Serranochromis* spp., and Kafue pike *Hepsetus* sp..

Conservation Management A game fence has been constructed along the southern and eastern edges of the Okavango Delta to separate game from cattle. No camps or human habitation are permitted on Chief's Island. Plans for water extraction schemes are advanced.

Zoning No information

Disturbances or Deficiencies The main threats to wildlife are the programme for eradication of tsetse fly with Dieldrin and Endosulphan. By 1981 incursion by cattle had caused severe overgrazing, trampling and pollution of Lake Ngami. Now a game fence has been built, the conflict between cattle and game from the latter spreading foot-and-mouth disease has been prevented (Edmunds 1985). Burning, illegal fishing and increasingly organised and sophisticated poaching methods are additional threats.

Visitor Facilities There were 2,000 international visitors to the reserve in 1976. There are several camps in the reserve including Khwai River Lodge, Delta Noga and Tsaro. Organised tours and photographic safaris are available with boats and light aircraft providing access to the waterbound delta areas.

Scientific Research Fish ecology and vegetation studies are currently under way. Past studies include research on the ecology of Chief's Island and adjacent flood plains; baboon biology;

work by UNDF/FAO (1976); and buffalo and lechwe research projects by various departments of wildlife.

Special Scientific Facilities None

Principal Reference Material

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Staff No information

Budget No information

Local Park or Reserve Administration Senior Warden, Department of Wildlife and National Parks, PO Box 11, Maun.

Date April 1985

CENTRAL KALAHARI (KGALAGADI) GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.16.07 (Kalahari)

Legal Protection Total; control of entry is covered in Notice No. 38, 3 May 1963. Traditional hunting rights are still observed.

Date Established Established in 1975, primarily to protect the resident Basarwa people whose hunting grounds were threatened by ranchers and sportsmen. The area was originally declared under the Fauna Conservation Proclamation of 1961.

Geographical Location Kalahari Desert in central Botswana. Vehicle access from Ghanzi to the west via Dekar or from the east via Orapa. 20°47'-23°20'S, 23°02'-25°20'E.

Altitude Approximately 500-1,000m

Area 5,180,000ha; contiguous to Khutse Game Reserve (259,000ha) in the south

Land Tenure Government

Physical Features The entire reserve is covered by Kalahari sands varying in depth up to about 90m and forming a shallow basin tilted to the northeast. The area is dissected by two fossil river valleys which drain towards the Makgadikgadi Pans. There is no permanent surface water and pans and depressions in the valleys hold water only during heavy rains. Between the

Okwa River and Deception Valley, the topography is of rolling dunes covered by open grassland becoming more pronounced and wooded in the east. Mean annual rainfall is 250-400mm, falling mainly from October to March, but it is very spasmodic and undependable. The diurnal temperature range in the desert is extreme and often causes frost at night.

Vegetation Dunes are covered with grass and occasional stands of *Acacia* and patchy *Bauhinia macrantha* developing into mopane *Colophospermum mopane* woodland in the east. North of Deception Valley is scrub woodland of *Terminalia*, *Acacia*, *Bauhinia* and *Grewia* species and occasional *Lonchocarpus* sp.. Also present are the water storing melons tamma *Citrullus lanatus*, and gemsbok cucumber *Acanthosicyos naudinianus*.

Fauna Mammals include: large herds of wildebeest *Connochaetes gnou* (over 200,000), hartebeest *Alcelaphus buselaphus* (maximum 40,000), gemsbok *Oryx gazella* and springbok *Antidorcas marsupialis*. Also giraffe *Giraffa camelopardalis*, lion *Panthera leo*, leopard *P. pardus* (T), bat-eared fox *Otocyon megalotis*, wildcat *Felis silvestris*, wild dog *Lycaon pictus* (T), cheetah *Acinonyx jubatus* (T), brown hyena *Hyaena brunnea*, and cape fox *Vulpes chama*.

Population Central Kalahari is the principal hunting area for 2,000-3,000 nomadic people of the San tribe who are adapted to harsh desert conditions. They obtain water from plants such as the tamma melon and gemsbok cucumber and poison for their arrowheads is derived from the beetle *Diamphidium*. They hunt for game meat, but also eat roots, insects, frogs, locusts and termites, particularly when game is scarce.

Conservation Management The Kalahari Conservation Society recommends the urgent development of a management plan for the reserve in order to prevent its presently accelerating decline. A consultant is being financed by IUCN in mid-1985 to make a land-use plan for the reserve, from which it is hoped to upgrade its status in the future. Cooke (1985) recommends that more emphasis be placed on wildlife as a sustainable resource, but that this will need funds and staff which Botswana cannot supply at present. A fact finding mission was carried out in late 1985 which aimed to determine a factual basis for deciding what measures be introduced to facilitate environmental protection and wildlife conservation, while keeping in mind the needs and aspirations of the local people. The report of this mission has been reviewed by the Government. Four of their recommendations were fully accepted, that the proposed wildlife management areas bordering the area be gazetted as soon as possible, that the tourism potential of the reserve be developed, that staff and resources be immediately and substantially increased, and that wildlife policies be speedily implemented to facilitate faster realisation of the benefits from wildlife. Other recommendations were accepted with modification, while a further nine recommendations (mainly those dealing with human use of the reserve) were rejected as "unacceptable, not applicable or inappropriate".

Zoning No information

Disturbances or Deficiencies There is one permanent settlement surrounding a borehole that was drilled in 1965. This has led to a congregation of people in one area, most of whom no longer lead a traditional way of life. Extensive veterinary fences, erected to prevent the spread of foot and mouth disease, cut across traditional game (particularly antelope) migration routes and threaten the survival of ungulate populations. They have almost certainly already caused drastic reductions of wildebeest (50,000 died in 1983; Williamson and Williamson, 1984) and zebra. The decline in herd size can also be attributed to the recent severe drought and the construction of water boreholes, vital to migratory wildlife, which are heavily utilised by the human and livestock populations in areas outside the reserve. In a recent survey, a virtual absence of juveniles amongst the wildebeest was encountered. The extensive migratory movements bring ungulate populations into direct conflict with the livestock industry. At several places, hartebeest and wildebeest do massive damage to fences and grazing every year. This damage is causing growing resentment amongst livestock owners. The problem is exacerbated by heavy cattle export subsidies. Between 1965 and 1985, a number of species disappeared from the reserve, including zebra, buffalo and spotted hyena. Poaching is a particular problem, as vehicles and rifles are used, often killing 20-30 springbok at a time.

Domestic donkeys, goats and horses have also been introduced into the reserve. Mineral prospecting, and the proposed trans-Kalahari railway also threaten the integrity of the reserve.

Visitor Facilities There are no roads, facilities or water supplies. The few tracks require four-wheel drive vehicles. Visitors must have permits.

Scientific Research Brown hyenas and lions were studied from 1974 to 1980 (Owens and Owens, 1984). The Frankfurt Zoological Society, together with WWF/IUCN (Project 1754), are supporting a project to document the movement patterns of the four most numerous species of antelope in the Kalahari - the highly nomadic wildebeest and hartebeest, and the more sedentary gemsbok and springbok, to provide a basis for conservation plans. Three methods are being used to document the animal movements: repeated aerial surveys of selected areas; regular ground surveys of particular areas; and radiotelemetry, by attaching radio collars to individual animals.

Special Scientific Facilities A private camp at Deception Pan has an airstrip, radio, weather station and drying oven.

Principal Reference Material

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Staff No information

Budget No information

Local Park or Reserve Administration Senior Warden, Department of Wildlife and National Parks, PO Box 11, Maun.

Date April 1985

KHUTSE (KHUTSWE) GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.16.07 (Kalahari)

Legal Protection No specific information, but contained in the Khutse Game Reserve Regulations (Statutory Instrument 127 of 1976)

Date Established Established in 1971, opened to the public in 1972.

Geographical Location South central portion of the Kalahari Desert; about 240km from Gaborone in central Kweneng District. 23°26'S, 24°20'E.

Altitude Approximately 500-1,000m

Area 244,000ha; contiguous to the Central Kalahari Game Reserve (5,180,000ha) in the north and controlled hunting areas in the east, south, and west

Land Tenure Bakwena tribal land

Physical Features The reserve is a vast flat undulating plain of sand with 50-60 scattered mineralised clay pans (the largest are Khutse and Moreswa) and occasional sand-filled valleys which are the fossil remnants of an ancient drainage system. There is no permanent surface water in the reserve. Some pans hold water only after heavy rains but others are semi-permanent, grassed depressions. The soils are phosphate-deficient. The semi-arid climate has a rainy season from October to March, but rainfall is spasmodic and not dependable. The diurnal temperature range is extreme, often causing frost at night.

Vegetation Some 96% of the area is dry savanna containing a variety of habitats. There are grassed pans, dominated by *Sporobolus ioclados*, *Eragrostis devoxii* and *Panicum coloratum*, which are heavily cropped by wildlife. The pans are surrounded by thick scrub of *Acacia mellifera*, *A. giraffae* and *Catophractes alexandri* and a mosaic of dry savanna ranging from grassland to open savanna to scrubland and closed savanna. The variation in vegetation is due to minor soil differences, droughts, fires and animal use. Major tree species are *Lonchocarpus nelsii*, *Terminalia sericea*, *Acacia giraffae* and *Boscia albitrunca*. Major bush species are *Grewia* spp., *Bauhinia macrantha* and *Dichrostachys cinerea*. Grasses include *Stipagrostis uniplumis*, *Aristida meridionalis* and *Schmidtia pappophoroides*; duneland areas support shrub forest of *Ochna pulchra*, *Burkea africana* and other savanna species. Also present are the water-storing tsamma melon *Citrullus lanatus*, and gemsbok cucumber *Acanthosicyos naudinianus*.

Fauna Resident wildlife is sparse but concentrations of animals may occur during migrations. Mammals include: migrant red hartebeest *Alcelaphus buselaphus*, wildebeest *Connochaetes taurinus*, resident gemsbok *Oryx gazella*, springbok *Antidorcas marsupialis*, kudu *Tragelaphus strepsiceros*, steenbok *Raphicerus campestris*, and common duiker *Sylvicapra grimmia*. Predators include: lion *Panthera leo*, leopard *P. pardus* (T), cheetah *Acinonyx jubatus* (T), brown hyena *Hyaena brunnea*, and wild dog *Lycaon pictus* (T). Also present are bat-eared fox *Otocyon megalotis*, black-backed jackal *Canis mesomelas*, wildcat *Felis silvestris*, and spring hare *Pedetes capensis*. About 180 bird species have been recorded from the reserve (Dawson 1975) including 65 common residents such as violet-eared waxbill *Granatina granatina*, three-streaked tchagra *Tchagra australis*, fan-tailed cisticola *Cisticola juncidis*, francolins *Francolinus* spp. and bustards *Eupodotis* spp.. Twenty uncommon residents include Cape penduline tit *Anthoscopus minutus*, spotted eagle owl *Bubo africanus*, lappet-faced vulture *Torgos tracheliotus* and secretary bird *Sagittarius serpentarius*; and 40 summer migrants include palaearctic migrant peregrine falcon *Falco peregrinus*, intra-African migrant white-bellied stork *Ciconia nigra* and local migrant ring-necked dove *Streptopelia capicola*.

Population The population is sparse. Most inhabitants live at subsistence level by hunting and gathering. Cattle are of great cultural and economic value to the Kgalagad people.

Conservation Management Development of the reserve is minimal. There is a game scout camp just inside the boundary and only 100km of improved tracks.

Zoning None

Disturbances or Deficiencies Fragile vegetation is less seriously degraded than other areas of the Kalahari. Game migration routes have been disrupted through fencing and other human activities outside the boundaries. There is some hunting near the boundary.

Visitor Facilities The reserve is increasingly important for tourists, being the nearest wildlife area to the capital city of Gaborone. A campsite and borehole are run by the Department of National Parks and Wildlife.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

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Staff No information

Budget No information

Local Park or Reserve Administration Senior Warden, Department of Wildlife and National Parks.

Date 1984

MAKGADIKGADI PAN GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1970

Geographical Location North-east Botswana. Access is 30km west of Gweta, 300km from Francistown on the road to Maun. 20°25'S, 24°55'E.

Altitude Up to 900m

Area 414,000ha. Separated from Nxai Pan National Park (259,000ha) to the north by the main Maun-Francistown road and Kanyu flats.

Land Tenure Government

Physical Features The Ntwetwe and Sowa pans form the Makgadikgadi Salt Pan complex which are the last remnants of a huge lake, once over 6,000,000ha. The area is bounded on the south-west by the Boteti River. The pans are only full after heavy rains or exceptional floods from Angola via the Okavanga/Boteti.

Vegetation Wide grassy plains extend to the north of Ntwetwe Pan with groves of vegetable ivory palm *Hyphaene ventricosa*.

Fauna Large aggregations of wildebeest *Connochaetes taurinus* (about 100,000) and zebra *Equus burchelli* migrate independently through the reserve between the Boteti River in the dry season and grass plains of Nxai Pan in the wet season. Other mammals include: springbok *Antidorcas marsupialis*, gemsbok *Oryx gazella*, lion *Panthera leo*, cheetah *Acinonyx jubatus* (T), and jackal *Canis* sp.. Large flocks of waterfowl are attracted to the inundated pans, including flamingo *Phoenicopterus* sp., eastern white pelican *Pelecanus onocrotalus*, and waders. Other birds include: ostrich *Struthio camelus*, bateleur *Terathopius ecaudatus*, and the palm nut vulture *Gypohierax angolensis*.

Zoning No information

Disturbances or Deficiencies Some poaching

Visitor Facilities There is no organised accommodation, but camping is permitted.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Readers Digest (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff No information

Budget No information

Local Park or Reserve Administration Department of Wildlife, National Parks and Tourism, PO Box 131, Gaborone.

Date 1984

CHOBE FOREST RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Exploitation by concessions under terms set by the Ministry of Agriculture.

Date Established Established in 1976 as Tribal Land

Geographical Location On the northern national border with Namibia. Access by road from Kasane or north from Nata. 18°00'-18°30'S, 24°00'-24°50'E.

Altitude 850-1,000m

Area About 240,000ha; contiguous to Chobe National Park (1,087,800ha)

Land Tenure Government

Physical Features Parts of the area are covered by swampy floodplains along the Linyanti River and includes islands, reedmarsh, channels and meandering waterways similar to the Okavango system when exceptional floods on the Kuando river spill water into the Linyanti, thereby linking the Chobe and Okavango systems.

Vegetation This area is one of the few remaining natural timber forests in Botswana with Rhodesian teak *Baikiaea plurijuga* and Mukwa trees. Linyanti seasonal floodplains have extensive papyrus *Cyperus papyrus* and reedbeds *Phragmites* sp. with date palms *Phoenix reclinata* on the islands.

Fauna A wide variety of game, both browsers and predators, move between the forest reserve and the national park. Riverside fauna include: hippopotamus *Hippopotamus amphibius*, sable antelope *Hippotragus niger*, impala *Aepyceros melampus*, elephant *Loxodonta africana* (T), lion *Panthera leo*, wild dog *Lycaon pictus* (T) and Nile crocodile *Crocodylus niloticus* (V). There are over 300 bird species in the Linyanti area including white pelican *Pelecanus onocrotalus*, reed cormorant *Haliëtor africanus*, squacco heron *Ardeola ralloides*, saddle-billed stork *Ephippiorhynchus senegalensis*, fish eagle *Haliaeetus vocifer*, hooded vulture *Necrosyrtes monachus*, African hawk eagle *Hieraaetus spilogaster*, scarlet-chested sunbird *Nectarinia senegalensis*, tinkling cisticola *Cisticola rufilata*, and carmine bee-eater *Merops nubicus*.

Zoning No information

Disturbances or Deficiencies No information

Visitor Facilities There are no tourist facilities in the reserve. A safari camp is based at Linyanti near the southern boundary. Camping is only allowed with prior permission.

Scientific Research No information

Speclal Scientific Facilities No information

Prncipal Reference Material

° Readers Digest (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

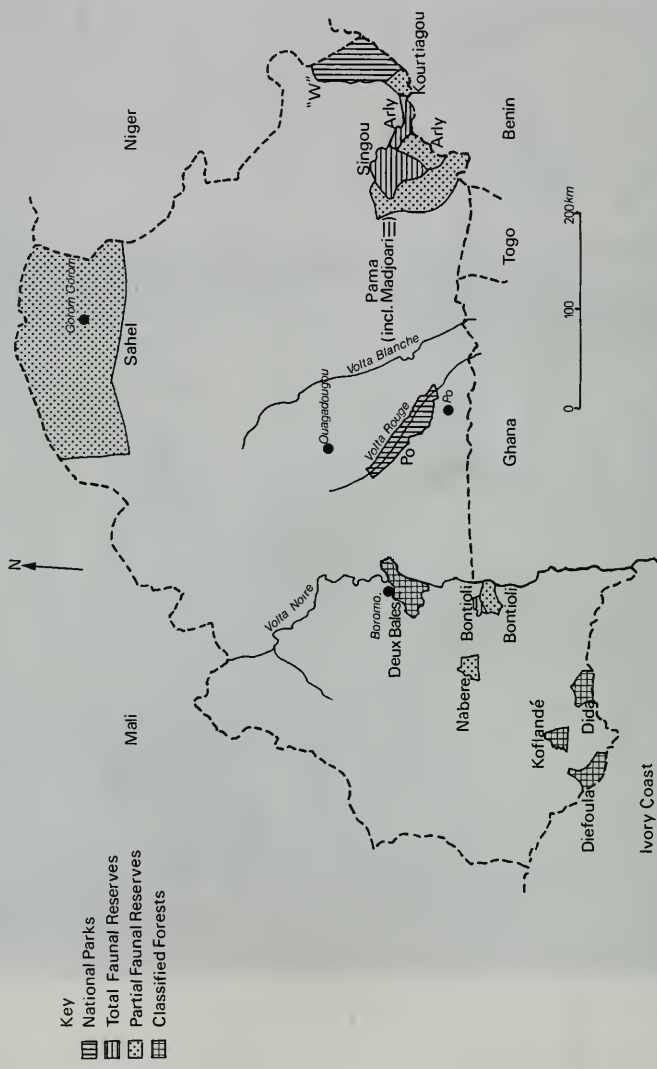
Staff Two foresters

Budget No information

Local Park or Reserve Administration No information

Date 1984





Burkina Faso (Upper Volta)

BURKINA FASO (UPPER VOLTA)

Area 274,200 sq.km

Population 6,700,000 (1983)

Parks and Reserves Legislation Ordinance No. 68-59/PRES/AGRI-EL or 31 December 1968 'sur la conservation de la faune et l'exercice de la chasse' protects species, sets hunting rules and designates protected areas, although certain provisions of the law have never been applied. Ordinance No. 68-50 (1968) ratifies the African Convention for the Conservation of Nature and Natural Resources, and definitions of protected areas largely follow those given in this convention. A Total Faunal Reserve (Réserve totale de faune) is an area primarily set-aside for the conservation and management of the native fauna and its habitat, where hunting, settlement and other human activities are either prohibited or closely controlled, whereas in a Partial Faunal Reserve (Réserve partielle de faune) big game hunting is allowed, the area being administered as an hunting zone. Classified Forests (Forêts classées) have also been set up in principle so as to afford some protection to fauna, depending on their statute. Legislation is currently being revised. Fauna conservation areas were first set up in this region in 1926, when five 'Parcs de refuge' were established covering some 536,700ha. This included the area now known as 'W' National Park. Of the rest, just under half the area is now designated classified forest, while the rest was declassified.

Parks and Reserves Administration This is the responsibility of the Direction des Parcs nationaux, Réserves de faune et de chasses, in the Ministère de l'environnement et du tourisme. Forestry management comes under the Direction de l'aménagement forestier et du reboisement.

Address

* Direction des parcs nationaux, des réserves de faune et des chasses, Ministère de l'environnement et du tourisme, BP 7044, Ouagadougou. Direction de l'aménagement forestier et du reboisement, Ministère de l'environnement et du tourisme, BP 7044, Ouagadougou.

Additional Information Drought is a recurrent climatic problem and the potential for drought may well become much greater. In addition the country is not particularly well endowed with natural resources (Ofori-sarpong, 1983). There is reported to be over-exploitation of the fauna, with insufficient hunting regulation, and practically no control, as guards lack sufficient equipment, transport, funds and infrastructure. Yet in order to attain self-sufficiency in protein there is a need to maintain areas where a base stock is completely protected, and rationalization of the way wildlife resources are utilized is therefore necessary (IUCN/UNEP, 1983).

In 1980 the Government commissioned a report on the wildlife resources of the rural areas (FAO, 1983), which makes management proposals for some of the protected areas and wildlife populations. Spinage and Souleymane (1984) also make a number of recommendations concerning improvement of the protected area network. These include the redesignation of both the Arly total faunal reserve and the Deux Baté Forest and national parks (with increases in size), the establishment of one new national park (Komoé-Léraba), two biosphere reserves, (Séno-Mango and Mare aux Hippopotames) and two sanctuaries (Béli and Mare d'Oursi). Also, as a result of the increased exploitation, the Government has developed a series of plans for assuring a better management of natural resources (Issa, 1983).

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Protected Areas

	(hectares)
<i>National Parks</i>	
Po	155,500
W du Burkina Faso	235,000
Subtotal	390,500
<i>Total Faunal Reserves</i>	
Arly	76,000
Bontioli	12,700
Madjoari	17,000
Singou	192,800
Subtotal	298,500
<i>Partial Faunal Reserves</i>	
Arly	130,000
Bontioli	24,500
Kourtiagou	51,000
Nabere	36,500
Pama	223,500
Sahel	1,600,000
Subtotal	2,065,500
<i>Classified Forests</i>	
Deux Bales	56,000
Dida	
Diefoula	
Koflande	

PARC NATIONAL DE PO

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Ordinance No. 77/041 of 11 November 1977 regulates the issue of permits and licences and taxation related to the exploitation of fauna.

Date Established First partially protected as a forest reserve in 1936, but increased in size in 1953 and a further area classified in 1954. Declared a 'parc national' in 1967, but not officially decreed until 2 September 1976 under Ordinance No. 70/020.

Geographical Location Situated in the central part of the country in Ougadougou Province. The south-eastern boundary extends to within 24km of the border with Ghana and the north-west boundary passes some 70km to the south of Ougadougou. The Volta Rouge River passes from north-west to south-east through the centre of the park. 11°10'-11°50'N, 0°50'-1°50'W.

Altitude 200-400m

Area 155,500ha, although Spinage and Souleymane (1984) suggest a redefinition to 149,400ha

Land Tenure Government

Physical Features The flood plains of alluvial clays or alluvial sands and muds which extend along both banks of the Volta Rouge River are the dominant feature of the park. During the dry season the river is reduced to isolated waterholes. Where the land rises to 240m in the south-east and 300m in the north-west the relatively flat terrain is interrupted by a number of small marshes derived from tributaries of the Volta Rouge. In general, the area is low-lying, apart for a few peaks of granite and laterite rising to 400m. The geology is predominantly Precambrian granite with a little schist and quartzite towards the south-east, overlain with clay soils on top of a clay alluvium layer, raw mineral and ferruginous tropical soils or a cover of washed out sandy material. The climate is generally dry and warm with a short rainy season from June to September. The annual precipitation, which varies considerably, has a mean of 950mm. Average temperatures range from 20°C to 35°C.

Vegetation Wooded savanna predominates, comprising: *Combretum lamprocarpum*, *Piliostigma thonningii*, *P. reticulatum*, *Butyrospermum paradoxum*, *Terminalia avicennioides*, *T. laxiflora*, *Detarium microcarpum*, *Anogeissus leiocarpus*, *Combretum binderanum* and *Crossopteryx febrifuga*, with *Mitragyna inermis* restricted gallery forests on the banks of the river. *Isobertlinia doka* and baobab *Adansonia digitata* are also present. The herb layer is dominated by grasses, such as *Andropogon ascinodis*, *A. gayanus*, *Hyparrhenia glabriuscula*, *H. involucrata*, *H. rufa*, *H. smithiana*, *H. subplumosa*, *Cymbopogon giganteus*, *Ctenium newtonii*, *Schoenefeldia gracilis*, *Brachiaria jubata*, *Aristida kerstingii*, *Loudetia togoensis*, *Chrysochloa hindsii*, *Sporobolus festivus*, *S. pyramidalis*, and *Oryza longistaminata*.

Fauna Mammals include lion *Panthera leo*, elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, Bohor reedbuck *Redunca redunca*, roan *Hippotragus equinus*, hartebeest *Alcelaphus buselaphus*, common duiker *Sylvicapra grimmia*, red-flanked duiker *Cephalophus rufilatus*, oribi *Ourebia ourebi*, bushbuck *Tragelaphus scriptus*, warthog *Phacochoerus aethiopicus*, baboon *Papio anubis*, vervet monkey *Cercopithecus aethiops*, and patas *Erythrocebus patas*. There are doubts as to whether all these species still occur in the park.

Conservation Management A management plan for the park was prepared in 1976 by an FAO consultant. As part of IUCN/WWF Project 1913 the park staff were supplied with a vehicle and six motorcycles to help combat poaching, as well as the prevention of unauthorized grazing and wood-cutting. The improved patrols have also enabled staff to locate illegal settlements and move them to alternative grazing areas. Control barriers have been erected on the main roads which cross or border on the park. Public awareness visits have been made to nearby villages to inform the people about the park, check on known hunters and investigate the destination of game products. Some of the new park recruits are being trained at the francophone College of African Wildlife Management at Garoua in Cameroon.

Zoning The park is surrounded by a zone in which hunting is permitted.

Disturbances or Deficiencies All the permanent ponds are utilised continuously by local fishermen, thereby restricting wildlife access to water. Poaching is the severest threat, especially to elephants, large ungulates and cat species, which are killed to supply urban markets. It has been partly checked in the eastern part of the park since the introduction of vehicles and regular patrols, but much of the park is still subject to incursions, both by traditional users of its products as well as visitors from the towns and cities. At present, there are three operational guardposts, but seven more need to be equipped to provide full protection. Other threats include cattle grazing and woodcutting by local people (especially during the dry season), land-clearance for agriculture and the commercial collection of firewood.

Scientific Research A study of the area has been carried out by a Peace Corps biologist.

Special Scientific Facilities None

Principal Reference Material

- ° Bousquet, B. (1982). Résultats des inventaires aériens de la faune. Document de terrain No. 6. FO: DP/UPV/78/008, FAO, Rome.
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- ° Spinage, C.A. and Souleymane, T. (1984). Résumé des aires de faune protégées et propositions. FO: DP/UPV/82/008 Document de travail 3. FAO, Rome.

Staff In response to the considerable requirements of the various forestry activities, annual recruitment of staff is being increased to 40. This compares with only 10 in 1979 and 20 in 1982. Some of the new recruits will have been trained at the College of African Wildlife Management at Garoua in Cameroon.

Budget Salaries

Local Park or Reserve Administration Directeur des parcs nationaux

Date 1984

PARC NATIONAL DE "W"

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Ordinance No.77/041 of 11 November 1977 regulates the issue of permits and licences and taxation related to the exploitation of fauna.

Date Established Declared a 'parc national' in 1937, but not decreed until a Decree dated 4 August 1954. The area had been classified as a réserve totale de faune a year earlier by Arrêté No. 2606/SE/F (14 April 1953). First established as a 'parc de refuge' in 1926, and named the Parc des cercles de Say et de Fada.

Geographical Location In the sub-préfecture of Diapago (Fada n'Gourma Province) in the extreme eastern corner of the country on the international borders with Benin and Niger. 12°00'N, 2°00'E.

Altitude 230-373m

Area 235,000ha; part of the international W park complex shared with Benin (568,000ha) and Niger (220,000ha). Also contiguous to Kourtiagou Partial Faunal Reserve (51,000ha). The area of this park is often quoted in error as being larger, as the definition given in the 1953 legislation includes a piece of territory actually in Niger (Spinage and Souleymane, 1984).

Land Tenure Government

Physical Features The park comprises a peneplain in the upper Niger basin. It includes a stretch of the Mékrou River, which forms the international border with Benin. The river passes through a steep-sided, north-south orientated gorge with several areas of accelerated erosion. An interesting natural feature at the southern end of the gorge is the unusual rock formation of the Koudou Falls. The Atakora mountain range, which reaches an altitude of 344m, defines the southern limit of the park. The area has a varied geology, comprising Lower and Pre-Cambrian sandstone, quartzite, schists, and granites. The poorly developed soils overlay gravelly materials. There are also areas of tropical ferruginous, mineral to pseudo-gley hydromorphic soils and raw minerals.

Vegetation Open Soudanian savanna predominates in the north of the park, while Soudanian wooded savanna has developed in the south, characterised by *Balanites aegyptiaca*, *Vitellaria paradoxa*, *Parkia biglobosa*, *Entada africana*, *Burkea africana*, *Terminalia avicennioides*, *Pterocarpus erinaceus*, *Detarium microcarpum*, *Piliostigma reticulatum*, *Sterculia tomentosa*, *Sclerocarya birrea*, *Azelia africana*, *Maytenus senegalensis*, *Combretum* spp., *Acacia* spp. The shrub-layer is characterised by *Anogeissus leiocarpus*, *Daniellia oliveri*, *Khaya senegalensis*, and *Cassia sieberana*. Gallery forest occurs along the rivers, comprising a thin cover of *Ficus* and other species, with a herb layer dominated by *Schoenefeldia gracilis*, *Loudetia simplex*, *L. togoensis*, and *Hyparrhenia hirta*.

Fauna Mammals include: lion *Panthera leo*, leopard *P. pardus* (T), cheetah *Acinonyx jubatus* (T) (unconfirmed), elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, kob *K. kob*, Bohor reedbuck *Redunca redunca*, roan *Hippotragus equinus*, hartebeest *Alcelaphus buselaphus*, bushbuck *Tragelaphus scriptus*, topi *Damaliscus lunatus*, common duiker *Sylvicapra grimmia*, red-flanked duiker *Cephalophus rufilatus*, warthog *Phacochoerus aethiopicus* and olive baboon *Papio anubis*. Hippopotamus *Hippopotamus amphibius*, crocodile *Crocodylus* sp., and tortoise in well-watered areas.

Conservation Management There are three surveillance posts, at La Tapoa, Kabougou and Kondio

Zoning No information

Disturbances or Deficiencies Poaching and illicit removal of timber are continuing problems. The vegetation is degraded throughout the park.

Visitor Facilities The area is fairly inaccessible, and there is a no adequate accommodation.

Scientific Research FAO consultants carried out an aerial survey of the larger mammals in 1981.

Special Scientific Facilities None

Principal Reference Material

- ° Bousquet, B. (1982). Résultats des inventaires à pied de la faune dans les parcs nationaux. Document de terrain No. 5 FO: UPV/78/008, FAO, Rome.
- ° Bousquet, B. and Szaniawski, A. (1981). Résultats des inventaires aériens des grands mammifères dans la région "Pendjari-Mékrou". Document de terrain No. 4. FO: DP/UPV/78/008 and DP/BEN/77/011, FAO, Ouagadougou.
- ° Spinage, C.A. and Souleymane, T. (1984). Résumé des aires de faune protégées et propositions. FO: DP/UPV/82/008 Document de travail 3. FAO, Rome.
- ° Urvoy, Y. (1929). Le Mékrou et le Double V. *Bull. Com. Afrique Française*. Fèv: 135-140.

Staff Five forestry agents and three trackers

Budget Salaries

Local Park or Reserve Administration Direction des parcs nationaux

Date 1984

RESERVE TOTALE ET RESERVE PARTIELLE DE FAUNE DE L'ARLY

Management Category Partial IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial

Date Established 'Réserve totale de faune de l'Arly' was established on 13 December 1954 by Arrête No. 8885. This area has been referred to as parc national de l'Arly since 1978 but it has no legal basis. The proposal to upgrade the area to national park status has yet to be implemented. The 'réserve partielle de faune' was established at the same time as the total faunal reserve, with the same legislation.

Geographical Location The reserve is situated to the east of Pama in Fada n'Gourma Province, in the south-east of the country on the international border with Benin. 11°30'N, 1°30'E.

Altitude Average 300m

Area Total faunal reserve 76,000ha; partial faunal reserve 130,000ha; Contiguous to Singou Total Faunal Reserve, 192,800ha

Land Tenure Government

Physical Features The area is a flat lowland bordered on the south-east by the Pendjari River. Some permanent ponds persist during the dry season. The mean annual rainfall is 1000mm, falling mainly during the rainy season from early May through to late September. The mean annual temperature is 28°C.

Vegetation Undifferentiated Soudanian woodland predominates. Extensive gallery forest occurs in the northern parts and along the Pendjari River.

Fauna Mammals include: leopard *Panthera pardus* (T), lion *P. leo*, side-striped jackal *Canis adustus*, cheetah *Acinonyx jubatus* (T), elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, western kob *K. kob*, bushbuck *Tragelaphus scriptus*, oribi *Ourebia ourebi*, hartebeest *Alcelaphus buselaphus major*, common duiker *Sylvicapra grimmia*, topi *Damaliscus lunatus*, roan antelope *Hippotragus equinus*, warthog *Phacochoerus aethiopicus*, patas monkey *Erythrocebus patas*, vervet monkey *Cercopithecus aethiops*, and olive baboon *Papio anubis*.

Zoning The reserve is divided into a total faunal reserve, where human settlement and interference are prohibited and a partial faunal reserve, administered as a hunting reserve.

Disturbances or Deficiencies Poaching, fishing and illicit removal of timber are the principal problems facing reserve staff.

Visitor Facilities A modern and attractive hotel was built in 1975 and some 3,000 to 4,000 tourists visited the area that year.

Scientific Research Study by Peace Corps biologist and mammal counts by FAO consultants

Special Scientific Facilities None

Principal Reference Material

- Bousquet, B. and Szaniawski, A. (1981). Résultats des inventaires aériens des grand mammifères dans la région Pendjari-Mékrou. Document de terrain No. 4, FO: DP/UPV/77/011. FAO, Rome.
- Bousquet, B., Charest, A., Gansaoré, G. and Ouédraogo, L. (1982). Résultats des inventaires à pied de la faune dans les parcs nationaux. Document de terrain No. 5, FO: DP/UPV/78/008, FAO: Rome.
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- Green, A.A. and Sayer, J.A. (1979). The birds of Pendjari and Arli National Parks (Benin and Upper Volta). *Malimbus* 1: 14-28.
- Green, A.A. (1977). Estimate of Large Mammals of Arly National Park, Upper Volta (Burkina Faso). In: *Proceedings of the Peace Corps volunteer conference on West African parks and wildlife*, Niamey, Niger, June 20-24, 1977.
- Spinage, C.A. and Souleymane, T. (1984). Résumé des aires de faune protégées et propositions. FO: DP/UPV/82/008 Document de travail 3. FAO, Rome.

Staff One 'chef de poste', three forestry agents and two trackers

Budget Salaries

Local Park or Reserve Administration Direction des parcs nationaux

Date 1984

RESERVE TOTALE ET RESERVE PARTIELLE DE FAUNE DE BONTIOLI

Management Category Partial IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Complete protection in the total Faunal Reserve, but only partial in the remainder.

Date Established 1957 under Arrête No. 3417/SE/F.

Geographical Location Gaoua Province in south-west Burkina Faso; approximately 10°40'N, 3°00'W

Altitude Approximately 100-500m

Area Total faunal reserve 12,700ha and partial faunal reserve 24,500ha

Land Tenure Government

Physical Features No information

Vegetation Wooded savanna predominates, characterised by *Isoberlinia*.

Fauna Wildlife numbers have declined dramatically, with only very low numbers of kob *Kobus kob*, roan *Hippotragus equinus*, and warthog *Phacochoerus aethiopicus*. Elephant *Loxodonta africana* (T) pass through the reserves on their seasonal passage.

Zoning The reserve is divided into a total faunal reserve, where human settlement and interference are prohibited and partial faunal reserve, administered as a hunting reserve.

Disturbances or Deficiencies Poaching, cattle grazing and illicit timber extraction continue to degrade the area; local wildlife has virtually been exterminated.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget None

Local Park or Reserve Administration Controlled by the provincial administration.

Date 1984

RESERVE TOTALE DE FAUNE DE SINGOU

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Complete

Date Established 5 August 1955, under Arrête No.6089/SE/F

Geographical Location South of the town of Fada n'Gourma in Fada n'Gourma Province, eastern Burkina Faso; approximately 11°55'N, 1°00'E

Altitude Approximately 100-500m

Area 192,800ha; contiguous to 'réserves totale et partielle de faune de l'Arly' (206,000ha)

Land Tenure Government

Physical Features The area is predominantly dry with a few scattered areas of marshland.

Vegetation Fairly dense Soudanian wooded savanna predominates, characterised by the fire tolerant *Hypparrhenia* sp.. This savannah is generally drier than that found further south.

Fauna The mammal fauna resembles that found in the Arly reserves, including: lion *Panthera leo*, leopard *P. pardus* (T), elephant *Loxodonta africana*, (T) buffalo *Syncerus caffer*, kob *Kobus kob*, hartebeest *Alcelaphus buselaphus*, various antelope and several species of primate.

Zoning No information

Disturbances or Deficiencies Illegal settlement, grazing and heavy poaching are continuing problems.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

* Arid Lands Information Centre (1980). *Draft environmental report on Upper Volta*. Office of Arid Lands Studies, University of Arizona.

Staff One 'chef de poste' and two forestry agents

Budget None

Local Park or Reserve Administration Administered from Pama

Date 1984

RESERVE PARTIELLE DE FAUNE DE KOURTIAGOU

Management Category No category assigned

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial; hunting is permitted

Date Established 1957

IUCN Directory of Afrotropical Protected Areas

Geographical Location Fada n'Gourma Province in eastern Burkina Faso; approximately 11°40'N, 1°40'E

Altitude Approximately 100-500m

Area 51,000ha; contiguous to W National Park complex shared between Burkina Faso (235,000ha), Benin (568,000ha) and Niger (220,000ha)

Land Tenure Government

Physical Features No information

Vegetation Wooded savanna

Fauna Mammals include spotted hyena *Crocuta crocuta*, caracal *Felis caracal*, kob *Kobus kob*, Bohor reedbuck *Redunca redunca*, oribi *Ourebia ourebi*, and bushbuck *Tragelaphus scriptus*.

Zoning No information

Disturbances or Deficiencies Poaching, grazing and illicit timber extraction are continuing problems.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Controlled by Konolio ('W' Park) with two forestry agents and a tracker

Budget Salaries

Local Park or Reserve Administration Direction des parcs nationaux.

Date 1984

RESERVE PARTIELLE DE FAUNE DU NABERE

Management Category No category assigned

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Hunting is permitted

Date Established 9 November 1957 by Arrêté No. 3550/SE/F

Geographical Location In the sub-préfecture of Diébougou; approximately 11°00'N, 3°45'W

Altitude Approximately 200-500m

Area 36,500ha

Land Tenure No information

Physical Features No information

Vegetation Soudanian wooded savanna

Fauna Apparently very little large wildlife remains.

Zoning None

Disturbances or Deficiencies Heavy poaching

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget None

Local Park or Reserve Administration Controlled by the provincial administration.

Date 1984

RESERVE PARTIELLE DE FAUNE DE PAMA

Management Category No category assigned

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial. The law is unclear; half of the area seems to have been de-gazetted or never classified. 'Réserve partielle de faune de Pama' is believed to be within this area, but information is misleading. This area was established on 13 April 1970 by Decree No. 70/175.

Date Established 1955

Geographical Location Fada n'Gourma Province in eastern Burkina Faso; approximately 11°30'N, 0°45'E

Altitude Approximately 100-300m

Area 223,500ha, possibly including Madjoari Total Faunal Reserve (17,000ha). Contiguous to Singou Total Faunal Reserve (192,800ha) and Arly Faunal Reserve (206,000ha)

Land Tenure Government

Physical Features The area comprises a flat plain with seasonal rivers.

Vegetation Wooded savanna predominates.

Fauna Mammals include: lion *Panthera leo*, leopard *P. pardus* (T) (rarely seen), olive baboon, *Papio anubis*, hares, and genets.

Zoning No information

Disturbances or Deficiencies Poaching and illicit timber extraction are continuing problems.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff One 'chef de poste' and two forestry agents

Budget Salaries only

Local Park or Reserve Administration Direction des parcs nationaux

Date 1984

RESERVE PARTIELLE DE FAUNE DU SAHEL

Management Category No category assigned

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Partial; there are hunting restrictions

Date Established 9 December 1970 by Decree No. 70-302/PRES/AGRI-EL/F

Geographical Location In the sub-préfecture of Dori; approximately 14°30'N, 1°00'W

Altitude Approximately 200-500m

Area 1,600,000ha

Land Tenure Government

Physical Features The reserve lies in a sandy zone, with both ancient and more recent dunes in the northern part.

Vegetation Sahelian bushland

Fauna This includes: gazelle *Gazella* sp., ostrich *Struthio camelus* (uncommon), hares, francolin *Francolinus* sp., and guinea fowl.

Zoning No information

Disturbances or Deficiencies There is some poaching. The whole reserve is overgrazed and there is much tree destruction by lopping.

Scientific Research ORSTOM (Organisation Recherche Scientifique et Technique Outre Mer) have carried out research in the area, but are now being replaced by CVRST (Centre Voltaïque de Recherche Scientifique et Technique).

Special Scientific Facilities ORSTOM have a research centre in the area, now being taken over by CVRST.

Principal Reference Material None listed

Staff No information

Budget None

Local Park or Reserve Administration Controlled by provincial administration

Date 1984

LES FORETS CLASSEES DES DEUX BALES

Management Category No category assigned

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection None

Date Established First established in 1937 as the forêts classées des Deux Balés (61,000ha). In 1967, the area was given National Park status and referred to as 'parc national des Deux Balés', but there is no law establishing it as a national park. Proposal to establish national park legislation in 1984.

Geographical Location Central western section of the country, in Black Volta Province just west of the Black Volta River. 11°30'-11°50'N, 2°11'-3°10'W.

Altitude 235-310m

Area Approximately 56,000ha (although sometimes quoted as 115,000ha).

Land Tenure Government

Physical Features An undulating granitic plain, broken up in places by rock outcrops and lateritic plateaux.

Vegetation The vegetation comprises Sudano-Zambezian savanna with a carpet of grasses, and trees such as *Anogeissus leiocarpus*, *Isobertlinia doka* and *Terminalia laxiflora*. There is gallery forest on the riverbanks.

Fauna Mammals include: hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, elephant *Loxodonta africana* (T), crocodile *Crocodylus* sp. and antelopes, although the diversity of fauna has been reported as being reduced.

Zoning No information

Disturbances or Deficiencies Poaching occurs and in 1968 there was a considerable reduction of large mammal populations by the 'Service de l'Elevage'.

Scientific Research Study by Peace Corps biologist

Special Scientific Facilities None

Principal Reference Material

° Bousquet, B. (1982) Résultats des inventaires aériens de la faune. Document de terrain No.

6, FO: DP/UPV/78/008, FAO, Rome.

- ° Ouédraogo, K.L. (1982) Influence de la population environnante sur le Parc National des Deux-Balés, République de Haute-Volta. Rapport de Stage, Ecole de Faune, Garoua. 29 pp mimeo.
- ° Sihvonen, J.P. (1974). Inventaire de la faune du Parc National des Deux-Balés, Haute-Volta, et recommandations pour son aménagement. Unpublished report, 39 pp.
- ° Sihvonen, J.P. (1978). Le troisième inventaire de la forêt classée des Deux-Balés. Annexe 3 dans Un Schéma Directeur d'aménagement pour le Parc National d'Arli. Rapport technique 1, FO: DP/UPV/72/029, FAO, Rome.
- ° Spinage, C.A. and Souleymane, T. (1984). Résumé des aires de faune protégées et propositions. FO: DP/UPV/82/008 Document de travail 3. FAO, Rome.

Staff One 'chef de poste', seven forestry agents





Budget Salaries only

Local Park or Reserve Administration Direction des Parcs Nationaux

Date 1984





- Key
-  National Parks
 -  Managed Nature Reserves
 -  Natural Forest Reserves
 -  National Monuments
 - All proposed

Burundi

BURUNDI

Area 27,731 sq.km (of which 2,000 sq.km forms part of Lake Tanganyika)

Population 4,920,000 (1983)

Parks and Reserves Legislation Establishment of national parks and nature reserves is covered in Decree Law No. 1/6 of 3 March 1980. However, the final legal status of the two national parks, two nature reserves, three forest reserves and two national monuments is still being determined and these areas are here considered as proposed.

Parks and Reserves Administration The National Institute for Nature Conservation (L'Institut national pour la conservation de la nature - INCN) was created by Decree No. 100/47 of 3 March 1980 and is directly attached to the Presidency. A programme of action including plans for surveillance of sites and management of natural resources, and an administrative chart, was drawn up for the INCN in 1980, though by 1982 there were only two staff within this organisation.

Address

- ° Institute national pour la conservation de la nature, Présidence de la République, BP 938, Bujumbura.
- ° Département des eaux et forêts, Ministère de l'agriculture et de l'élevage, BP 631, Bujumbura.

Additional Information INCN recognizes the greatest problems impeding an effective parks system to be settlements within the protected areas, compounded by a lack of expertise and finance. Burundi is one of the most densely populated countries in Africa, with over 300 people/sq.km in some areas, and consequently it is difficult to eliminate the cultivation, grazing, fishing and logging which is currently occurring in all the proposed protected areas. The government is trying to encourage people to move by offering them alternative areas to settle. Of particular concern to INCN is Ruvubu National Park where 3,000 families need to be resettled; an extremely costly exercise (Zimmerman, 1982; Kabayanda, *in litt.*). Approaching the problem from a different angle, the director of INCN initiated the National Committee on the Relative Problems of the Environment in 1982 to try and make the general population aware of environmental degradation. Several international experts have worked in Burundi during the last 12 years, which has led to the development of various proposals for nature conservation (IUCN/UNEP, 1983). Some of these suggestions appear to have been followed up in spite of immense difficulties (Zimmerman, 1982).

References

- ° Bider, J.R. (1974). Rapport au gouvernement du Burundi sur la conservation et la gestion de la faune et de la flore au Burundi. FAO, Rome.
- ° Institut National pour la Conservation de la Nature (1986). Etude des Parcs Nationaux de la Ruvubu et de la Kibira. INCN, République du Burundi.
- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° Kabayanda, A. (undated). La conservation de la nature au Burundi. Mimeo Report, IUCN.
- ° Kabayanda, A. (undated). L'Institut national pour la conservation de la nature (I.N.C.N.) "le passé, le présent, l'avenir". République du Burundi Institut national pour la conservation de la nature, Bujumbura.
- ° McDonald, G.C. *et al.* (1969). *Area Handbook for Burundi*. US Government Printing Office. Washington D.C.
- ° Verschuren, J. (1976). Conservation de la nature et parcs nationaux au Burundi. Rapport de mission de Jacques Verschuren, 25 juin au 26 août 1976. Institute Royal des Sciences Naturelles de Belgique, Bruxelles.
- ° Verschuren, J. (1977). Burundi and wildlife: Problems of an overcrowded country. *Oryx* 14(3): 237-240.

Protected Areas

	(hectares)
<i>Proposed areas</i>	
Kibira National Park	37,870
Ruvubu National Park	43,630
Lake Rwihinda Managed Nature Reserve	425
Rusizi Managed Nature Reserve	5,235
Bururi Natural Forest Reserve	1,500
Kigwena Natural Forest Reserve	360
Rumonge Natural Forest Reserve	400
Karera Falls Natural Monument	15
Nyakazu Natural Monument	20

RUVUBU NATIONAL PARK

Management Category Proposed

Biogeographical Province 3.05.04 (East Africa Woodland/savanna)

Legal Protection Partial

Date Established Decree Law No. 1/6 of 3 March 1980 facilitates the establishment of national parks and nature reserves. However, the final legal status of this area is still to be determined.

Geographical Location In the provinces of Gitega, Muyinga, Ruyigi. The international border with Tanzania defines the north-east boundary, while the south-west boundary lies about 20km to the north of Gitega. Approximately 2°40'-3°20'S, 30°05'-30°40'E.

Altitude Approximately 1,000-1,500m

Area 43,630ha

Land Tenure No information

Physical Features The Ruvubu River valley drains a large part of the country. It is 125km long and 3-5km wide and comprises a series of meanders flanked by meadows and riverine forest.

Vegetation The park lies at the northern range limit for Zambesian *Brachystegia* vegetation. Other formations include savanna/woodland of *Acacia seyal*, *Combretum*, *Terminalia* and riverine forest of *Cyperus papyrus* and *Phoenix reclinata*.

Fauna Mammal species include lion *Panthera leo*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, bushbuck *Tragelaphus scriptus*, sitatunga *T. spekei*, waterbuck *Kobus ellipsiprymnus*, impala *Aepyceros melampus*, roan antelope *Hippotragus equinus*, and warthog *Phacochoerus aethiopicus*. Large numbers of waterbirds are reported including, white pelican *Pelecanus onocrotalus* and yellow-billed stork *Mycteria ibis*.

Zoning None

Disturbances or Deficiencies The establishment of the park is dependent upon translocation of 3,000 families. Resource degradation within the valley is considerable. Traditional hunting is prevalent, but has little serious impact.

Scientific Research Brief surveys have been undertaken in the area.

Special Scientific Facilities No information

Principal Reference Material

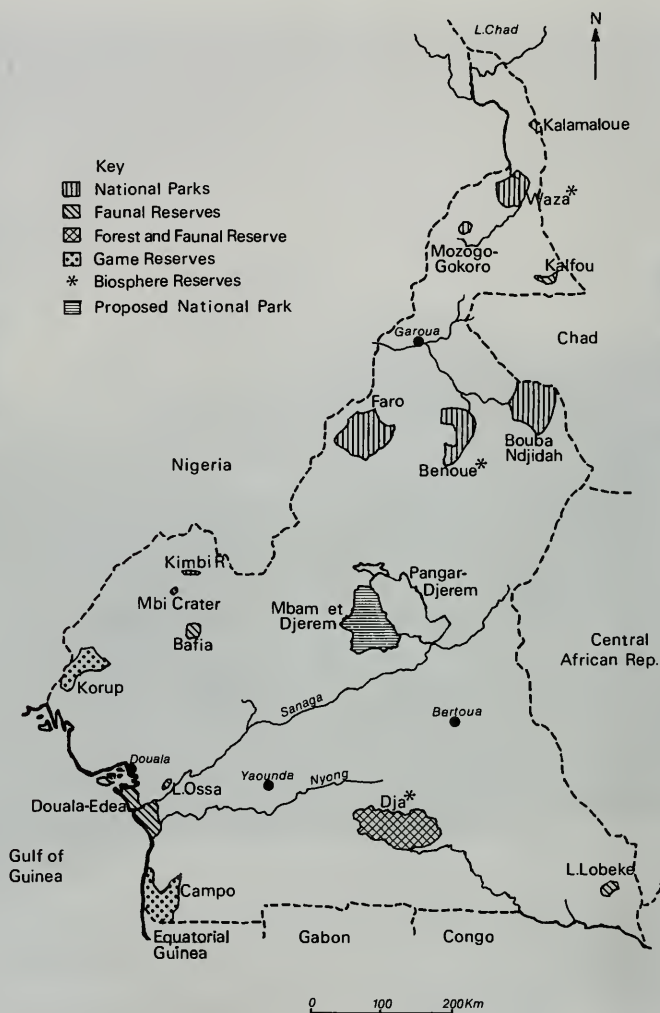
- ° UNEP/IUCN. (1983). Le Répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. IUCN, Gland, Switzerland.
- ° Verschuren, J. (1976). Conservation de la nature et parcs nationaux au Burundi. Rapport de Mission de Jacques Verschuren, 25 juin au 26 août 1976. Institute Royal des Sciences Naturelles de Belgique, Bruxelles.
- ° Verschuren, J. (1977). Burundi and wildlife: Problems of an overcrowded country. *Oryx* 14(3): 237-240.

Staff No information

Budget No information

Local Park or Reserve Administration L'Institute national pour la conservation de la nature, B.P. 2757, Bujumbura.





Cameroon

CAMEROON

Area 465,054 sq.km

Population 9,060,000 (1983)

Parks and Reserves Legislation Law No. 81-13 of 27 November 1981 (updating Ordinance 73/18 of 22 May 1973) provides for the classification of state forests into ten categories, national parks, nature reserves, sanctuaries, fauna reserves, production forests, protection forests, recreation forests, reafforestation areas, zoological/botanic gardens, and state game ranches.

National park regulations are set out in Decree 78/076 of 11 March 1978 and the protection of the parks is ensured under Law 78/23 of 29 December 1978. Also relevant are Decree 79/369 of 12 September 1979 (relating to application of the regulations), Arrêté 217/CAB/RR of 7 October 1978 and Arrêté 2653 of October 1979 (which regulates visitor access). Decree No. 83-170 of 12 April 1983 describes the criteria for the management of a national park, also providing for the creation of buffer zones around the parks and the fully protected nature reserves. National Parks are defined as areas placed under the control of the State, the boundaries of which cannot be modified without the authorisation of the General Delegation of Tourism. They are designated for the propagation, protection, conservation and management of wildlife, or for other scientific or aesthetic values. Faunal reserves are areas intended to provide absolute protection to flora and fauna, with access closely controlled. Certain activities other than hunting and fishing can be authorised by the appropriate ministry, however. Law 81/13 of 27 November 1981 and Decree 82/216 of 12 June 1982 set out the responsibility of the General Delegation of Tourism (Délégation Générale du Tourisme) who (under the 12 June Decree) took over responsibility for wildlife management from the Ministry of Agriculture. Previously only national parks had come under the control of the Délégation. There are more than a dozen forest reserves of over 5,000ha (three are over 100,000ha). In all there are some 98 forest reserves, though many of these are quite seriously threatened. Decree No. 83-169 of 12 April 1983 describes the procedure for the classification of forests, and exploitation of their resources.

Parks and Reserves Administration The Department of Wildlife and National Parks within the General Delegation of Tourism, is responsible for running the national parks and coordinating the various conservation activities. The work of this department is divided between the Wildlife and National Parks Service responsible for research and development of wildlife conservation and formulation and implementation of conservation policy; and the Game Service responsible for game policy, control of hunting and supervision of protected areas. Regulations in the national parks are fairly strict: hunting is strictly prohibited and visitors, who are not allowed to travel within the park without a guide, must be out of the park by sunset. Disturbance of the natural resources of the park is only allowed for management or scientific reasons (with the correct authorisations). The Ministry of Agriculture administers the forestry reserves and hunting zones which come under their Department of Water and Forests (Direction des eaux et forêts). Park wardens are usually recruited from the School for the Training of Wildlife Specialists at Garoua. More senior staff are further educated at the Department of Forestry in the Agricultural College at Yaoundé.

Address

- ° Direction de la faune et des parcs nationaux, Délégation général du tourisme, Yaoundé.
- ° Direction de forêts, Ministère de l'agriculture, BP 194, Yaoundé.
- ° Ecole de Formation de Spécialistes de faune, BP 271, Garoua.

Additional Information The six national parks were primarily set up to attract tourists, as big game is easily viewed within the reduced cover of the Sudanian savanna and woodland vegetation types, and around the limited watering points. FAO and UNDP have, for a number of years, been assisting in the management planning of three of these parks, Waza, Kalamaloué and Bénoué. The wetter and more heavily forested areas have tended in the past to be less well

protected (Gartlan and Agland, 1980). Cameroon is receiving support from various groups (including IUCN and WWF) for the conservation and development of national parks in the lowland rainforest.

In western Cameroon there is more montane forest than in other West African countries with a chain of mountains of mainly volcanic origin, which includes the still active Mount Cameroun. The montane forest and grassland above it has been isolated from similar areas for a long time and contains many endemic species and subspecies of plant and animal, many of which are threatened. In 1983/84 an ICBP expedition, in conjunction with the Cameroon Government, surveyed the montane areas to make recommendations for their conservation, none being protected except by forest reserve status. The Bamenda Highlands were found to be particularly degraded, and one of the survey's recommendations is that a protected area should be set up on Mount Oku, north of Bamenda.

Local farming methods are traditionally based on shifting cultivation and are eroding forested wildlife habitats and also reportedly facilitating illegal trapping and hunting. Poaching by non-locals is also reported to be a considerable problem.

The association of the Friends of Nature (Amis de la Nature) Clubs of Cameroon, initiated in 1973, is chiefly concerned with schools to train a new generation of people sensitive to environmental problems. Visits to national parks are organised for club members, and clubs have undertaken investigations into the causes of bush fires, particularly the practice of burning off vegetation for agriculture, to encourage new grass growth or to hunt game. This was followed by a campaign amongst villagers, with films and slides to explain the ill-effects of bush fires on soil, fauna and flora, while making it clear that some grass burning techniques can contribute to improving pasturage. The club also launched an appeal to save Waza National Park, threatened by lack of water following construction of the Maga barrage. The Government has since taken steps to provide the park with water by digging ponds.

The wildlife training college at Garoua (Ecole de Formation de Spécialistes de Faune), was created in 1969 with international aid. The main objective of the college is the training of those involved in protected area management. Students at the college come from most francophone African countries. Despite the college's achievements to date there are a number of difficulties which must yet be overcome, these include development both of staff and infrastructure, as well as a continuing problem of getting the diploma recognised.

References

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- ° Arid Lands Information Centre (1980). Draft environmental Report, Cameroon Office of Arid Lands Studies, University of Arizona.
- ° Délégation Générale du Tourisme (1980). Les Parcs nationaux et réserves analogues du Cameroun. 7 pp.
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- ° FAO (1977). Assistance aux parcs nationaux de la zone de savane du Cameroun. Conclusions et recommandations du projet. FO: DP/CMR/72/025 Rapport terminal. UNDP/FAO, Rome.
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- ° Hesse, J. (1984). Rapport Préparatoire à l'Etude Comparative des Politiques de Conservation de la Nature et de leurs Implications Economiques dans des pays anglophones d'Afrique de l'est (Kenya, Tanzanie) et des pays francophones d'Afrique de l'Ouest (Cameroun, Senegal). Secrétariat d'état à l'environnement et à la qualité de la vie. Fédération des parcs naturels de France.

- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° IUCN/WWF Project 1089. Cameroon, Tropical Rainforest Reserves.
- ° IUCN/WWF Project 1613. Primate Action Fund.
- ° IUCN/WWF Project 1920. Cameroon, Wildlife Education Programme.
- ° IUCN/WWF Project 3206. Cameroon, Elaboration of a system and training facilities, and setting up of protected areas.
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Protected Areas

	(hectares)
<i>National Parks</i>	
Benoue	180,000
Bouba Ndjidah	220,000
Faro	330,000
Kalamaloue	4,500
Mozogo-Gokoro	1,400
Waza	170,000
Subtotal	905,900
<i>Forest and Faunal Reserves</i>	
Dja	500,000
<i>Faunal Reserves</i>	
Bafia	42,000
Douala-Edea Forestiere	160,000
Kalfou	4,000
Lake Ossa	4,000
Lobeke Lake	43,000
Subtotal	253,000
<i>Game Reserves</i>	
Campo	330,000
Kimbi River	5,625
Korup	83,675
Mbi Crater	370
Pangar-Djerem	480,000
Subtotal	899,670
<i>Biosphere Reserves</i>	
Parc national de la Benoue	180,000
Parc national de Waza	170,000
Reserve forestiere et de faune du Dja	500,000
Subtotal	850,000
<i>Proposed areas</i>	
Mbam et Djerem National Park	421,000

PARC NATIONAL DE LA BENOUE

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total. Strict protection, though fishing is allowed on payment of a licence. No camping is allowed, and vehicles are not permitted to leave the roads.

Date Established 5 November 1968 by Law No. 120/SEDR as a National Park. Originally established as a faunal reserve on 18 November 1932. Approved as a Biosphere Reserve in 1981.

Geographical Location North Cameroon. Adjoining the Bénoué River and bordered on the west by the national highway between Ngaoundéré and Garoua, 175km south of Garoua, 150km north of Ngaoundéré. 7°55'-8°55'N, 13°34'-14°01'E.

Altitude On average 300m, with mountain blocks reaching 800-1,100m

Area 180,000ha, surrounded by controlled hunting zones.

Land Tenure Government

Physical Features On the Bénoué plain, at the foot of the Adomaoua plateau, though with a very rugged relief culminating in Mount Garoua (1,100m). The Bénoué river drains almost the entire park. After descending from the Adomaoua plateau the river winds its way northward through granitic bedrock for most of its length within the park, and then into an alluvial plain as it leaves the park after its confluence with the Laindelas River. The north-west corner of the park is drained by the Sala River. Three-quarters of the park is underlain by a late pre-Cambrian base complex. Gneissose rock covers much of the area, but with grey and red Cretaceous sandstones in the north-west section. There are intrusions of porphyritic granite in the north-central section, and basalt in the south. The soils are generally described as "ferruginous tropical". The climate is Sudanian, with a dry season from November to March with very low relative humidity and no precipitation. July through to September thunderstorms are very common, accompanied by heavy rain. Mean annual rainfall is around 800mm-1200mm and the mean annual temperature 24°C. December is coldest, with mean monthly minimum of 13°C and maximum of 32°C. April, just before the rains, is hottest with mean monthly minimum of 23°C and maximum of 36°C.

Vegetation There are three main vegetation types: 1) Woody vegetation with closed canopy in areas with rocky soils; relatively dense basal cover and sparse underbrush with *Isobertia doka* predominating. 2) More open vegetation on less rocky soil, dense basal growth and moderate underbrush with the dominant tree being *Burkea africana*. 3) Light forest of mainly *Anogeissus leiocarpus* on sandy soils with relatively sparse basal cover and underbrush. Two other types are also recognised, *Terminalia macroptera* vegetation, usually on heavy soils, and *Isobertia dalzielii* woodland vegetation. In fact most of the park is heavily wooded, and the predominant tree species are *Isobertia* spp., *Burkea africana*, *Azelia africana*, *Terminalia* spp., *Anogeissus leiocarpus* and *Borassus aethiops* (an introduced palm). Other species recorded in the park include: *Butyrospermum parkii* (the oily seeds of which are pressed to yield shea butter), *Daniellia oliveri*, *Monotes* spp., *Uapaca detarium*, *Vitex doniana*, *Lophira lanceolata*, *Combretum* spp., *Khaya senegalensis*, *Detarium microcarpum*, *Parkia biglobosa*, *Boswellia* spp., *Prosopis africana*, *Sterculia setigera*, *Cassia sieberana*, *Kigelia africana*, and *Ziziphus* spp.. Baobab *Adansonia digitata* and kapok *Ceiba pentandra* trees characterize sites of past human habitation.

Fauna The park contains most wild life associated with a sudano-guinean vegetation type. Mammals include elephant *Loxodonta africana* (T), lion *Panthera leo*, a few leopard *P. pardus* (T), probably caracal *Felis caracal*, hippopotamus *Hippopotamus amphibius*, black rhinoceros *Diceros bicornis* (T) (population of 15-20 in 1980), buffalo *Syncerus caffer*,

hyaena *Crocuta crocuta* (fairly rare in the park), warthog *Phacochoerus aethiopicus*, hartebeest *Alcelaphus buselaphus*, oribi *Ourebia ourebi*, bushbuck *Tragelaphus scriptus*, giant eland *Taurotragus derbianus* (T), red-flanked duiker *Cephalophus rufilatus*, common duiker *Sylvicapra grimmia*, roan antelope *Hippotragus equinus*, bohor reedbuck *Redunca redunca*, kob *Kobus kob*, waterbuck *K. ellipsiprymnus* and various monkey species such as olive baboon *Papio anubis*, black and white colobus *Colobus guereza*, patas monkey *Erythrocebus patas*, and Tantalus monkey *Cercopithecus aethiops*. There is a rich avifauna. The Nile crocodile *Crocodylus niloticus* (V) is also present, as is the Nile monitor *Varanus niloticus* and the pythons *Python sebae* and *P. regius*.

Conservation Management One of the principal objectives of the area is its development for game viewing. There is a management plan which controls budget expenditure. Activities of the local population living near the boundaries are controlled. Ecological studies were undertaken in the park by UNDP/FAO with the aims of analysing wildlife conditions in the park (with special emphasis on buffalo), assessing the effects of fire on *Afycia africana*, assessing road development within the park (in relation to both game viewing and their value as fire breaks), and to prepare a vegetation map and study fire policy within the park. Various developments and recommendations were discussed by FAO/UNDP relating to park extension, communications, tourist facilities, staffing, poaching and fire, and it was recommended that long-term, continuous research on the natural resources of the park was particularly important for future management (Stark and Wit, 1977). Public education films have been shown in the park by the wildlife club of Cameroon as part of IUCN/WWF Project 1317.

Zoning None. The park is surrounded by a hunting zone with five camps.

Disturbances or Deficiencies Poaching and bushfires are a major threat. The local population also collect firewood, and there is some cultivation. Fire appears to have caused a reduction in *Afzelia* trees within the park.

Visitor Facilities Access to the park is relatively easy. Within the park there were in 1977 some 235km of graded roads, and this is likely to have increased since then. There are tourist lodges, and camps in the hunting zones surrounding the park.

Scientific Research Studies by the Wildlife College at Garoua include a survey of the effects of burning, dry season mammal censusing, analysis of animal use of three vegetation types, and a bird species list. Species lists were also drawn up by UNDP/FAO, and are given in Stark and Wit (1975). Ecological research on various topics was also carried out under this project.

Special Scientific Facilities There are no special facilities.

Principal Reference Material

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Staff One warden, four rangers, and eight guards

Budget National

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism. Secretariat Permanent, Comité National de l'Homme et de la Biosphère, BP 4742, Yaoundé.

Date 1983

PARC NATIONAL DE BOUBA NDJIDA

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 5 December 1968 as a national park. Established as a forest and faunal reserve by Law No. 270 of 29 July 1947 and officially created by Law No. 26 of 12 February 1949.

Geographical Location North Cameroon on the border with Chad, 8°20'-9°00'N, 14°24'-14°55'E.

Altitude Average 350m, with peaks up to 900m

Area 220,000ha; contiguous to a 212,600ha hunting zone (open season December to June).

Land Tenure Government

Physical Features The park comprises a large rugged peneplain with several isolated rocky outcrops (some fairly mountainous) of granites and gneisses. Numerous watercourses cross the park. The dry season is from November to May and mean annual rainfall is 1,200mm. The mean annual temperature is 26°C. December is coolest, with mean monthly minimum of 14°C and maximum of 33°C. April, just before the rains, is hottest with mean monthly minimum of 23°C and maximum of 37°C.

Vegetation Savanna woodland occurs over most of the park containing four main vegetation types: (1) Closed canopy with *Isoberlinia doka* predominant. (2) Fringing forest with *Anogeissus leiocarpus* predominant. (3) *Terminalia laxiflora* wooded savanna with grass cover of Andropogoneae. (4) Mixed *Anogeissus leiocarpus*-*Monotes kerstingii* woodland. Important species include *Acacia sieberana*, *Boswellia* sp., *Sclerocarya birrea*, *Prosopis africana*, *Borassus flabellifer* (a palaeotropical species with a wide range of uses), *Butyrospermum parkii* (the oily seeds of which are used for making shea butter), *Burkea africana*, *Khaya senegalensis*, *Ziziphus* sp., *Celtis integrifolia*, *Mitragyna inermis*, and *Pericopsis laxiflora*.

Fauna The mammal fauna is similar to 'parc national de Waza' but with a lower density. The park was established to protect the black rhinoceros *Diceros bicornis* (T), giant eland *Taurotragus derbianus* and the primate population including baboon *Papio anubis*, patas monkey *Erythrocebus patas*, green monkey *Cercopithecus aethiops* and black-and-white colobus *Colobus polykomos*. Other mammals include elephant *Loxodonta africana* (T), cheetah *Acinonyx jubatus* (T), lion *Panthera leo*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, kob *Kobus kob*, defassa waterbuck *K. ellipsiprymnus*, giraffe *Giraffa camelopardalis*, common duiker *Sylvicapra grimmia*, red-flanked duiker *Cephalophus rufilatus*, bushbuck *Tragelaphus scriptus*, hartebeest *Alcelaphus buselaphus*, topi *Damaliscus lunatus* and oribi *Ourebia ourebi*.

Conservation Management Villages in the park were relocated between 1950 and 1970.

Zoning There is a buffer zone where agricultural and pastoral activities are controlled.

Disturbances or Deficiencies There is poaching, particularly from neighbouring Chad.

Visitor Facilities There were about 500 visitors in 1980. There is an airstrip and a tourist centre with a 28 bed hotel and restaurant in the centre of the park.

Scientific Research There have been studies by the Wildlife College at Garoua on plant and animal populations. Research was supported by FAO/UNDP and German Aid but is now maintained by central government funds.

Special Scientific Facilities None

Principal Reference Material

- ° Bosch, M.L. (1976). Enquete écologique du parc national de Bouba Ndjida.
- ° Depierre, O. and Ole, Z. (1976). Parcs nationaux et réserves de faune du Cameroun. *Bois et forêts des tropiques* 170: 3-20.
- ° Van Lavieren, L.P. and Esser, J.D. (1980). Number, distribution and habitat preference of large mammals in Bouba Ndjida National Park, Cameroon. *Afr. J. Ecology* 18(2-3): 141-153.
- ° Van Lavieren, L.P. and Bosch, M.L. (n.d.). Evaluation des densités de grands mammifères dans le parc national de Bouba-Ndjida.

Staff One warden and 12 rangers

Budget National. 1980: CF 2,000,000 for personnel and CF 7,000,000 for management costs.

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism.

Date 1983

PARC NATIONAL DE FARO

Management Category II (National Park)

Biogeographical Province 3.19.12 (Guinean Highlands)

Legal Protection Total

Date Established 1980 as a National Park. Established as a forest reserve by Law No. 25 of 13 February 1947 and as a faunal reserve by Law No. 270 of 29 June 1947.

Geographical Location North Cameroon. 7°50'-8°30'N, 12°10'-13°08'E.

Altitude 627-905m

Area 330,000ha

Land Tenure Government

Physical Features The park comprises a plateau with mountainous massifs. The climate is typical of the Sudanian zone, with a dry season from November to May. Mean annual rainfall is 1,200mm and mean annual temperature 26°C. December is coolest, with mean monthly minimum of 15°C and maximum of 34°C. April, just before the rains, is hottest with mean monthly minimum of 24°C and maximum of 37°C.

Vegetation Sudanian savanna and woodland predominates, with species including *Isoberlinia*, *Burkea*, *Combretum*, *Ficus*, *Anogeissus*, *Leiocarpus*, and *Cassia*.

Fauna The fauna is varied and plentiful with 33 recorded mammal species including: cheetah *Acinonyx jubatus* (T), hippopotamus *Hippopotamus amphibius*, rhinoceros *Diceros bicornis* (T), buffalo *Syncerus caffer*, defassa waterbuck *Kobus ellipsiprymnus*, kob *Kobus kob*, giant eland *Taurotragus derbianus*, roan antelope *Hippotragus equinus*, topi *Damaliscus lunatus*, giraffe *Giraffa camelopardalis*, elephant *Loxodonta africana* (T), and warthog *Phacochoerus aethiopicus*. There is a rich and varied avifauna, and numerous fish species.

Zoning None

Disturbances or Deficiencies Poaching and bushfires

Scientific Research A fish and mammal survey has been carried out by the 'Ecole Supérieure Agronomique du Cameroun'.

Special Scientific Facilities None

Principal Reference Material

° Depierre, D. and Ole, Z. (1976). Parcs nationaux et réserves de faune du Cameroun. *Bois et Forêts des Tropiques* 170: 3-20. Délégation Générale au Tourisme, Yaoundé.

Staff One conservator, seven guards, and five rangers

Budget National

Local Park or Reserve Administration Department for Wildlife and National Parks, General Delegation of Tourism.

Date 1983

PARC NATIONAL DE KALAMALOUÉ

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 4 February 1972 as a National Park by Law No. 82. Originally established as a forest and fauna reserve on 8 November 1947 by Law No. 467. According to Vanpraet (1976) Kalamaloué was established as a National Park in 1968 at the same time as Waza, Bénoué and Bouba n'Djiddah.

Geographical Location 450km from Garoua, 12km west of Kousséri on the main road between Maltam and Kousséri, 70km from Lake Chad in the extreme north of Cameroon. The park is on the border with Chad, and only 17km from the Nigerian border. 12°05'-12°12'N, 14°49'-14°57'E.

Altitude 293m to the south, but lower on the flood plains.

Area 4,500ha (Approximately 14km long, but only 2.5km wide)

Land Tenure Government

Physical Features The north edge of the park on the Chari floodplain has waterholes even in dry years. The region has a steppe climate, with a dry season from October to May. Mean annual rainfall is 600mm with a mean annual temperature 28°C. December is coolest, with mean monthly minimum of 14°C and maximum of 33°C. April, just before the rains, is hottest with mean monthly temperature of 23°C and maximum of 41°C.

Vegetation South of the road, flat areas of open *Balanites aegyptiaca* savanna predominate, with minimum ground cover during the dry season, often with a green muddy swamp during the rainy season. In places stunted open vegetation give way to belts of taller woodland of *Acacia sieberana*, *Balanites aegyptiaca* and *Tamarindus indica* with *Ziziphus* spp., *Piliostigma reticulatum*, *Ficus* spp., and *Capparis sepiaria*. On the wetter soils are areas of *Acacia seyal*, usually associated with *Echinochloa colona*, and *Acacia nilotica*, usually associated with *Mitragyna inermis* (particularly on the edges of ponds). North of the road the degree of inundation is such higher and formations with *Mitragyna inermis* are much more frequent. Patches of Combretaceae savanna with *Anogeissus leiocarpus*, *Sclerocarya birrea*, *Terminalia avicennioides*, *Combretum glutinosum* and *Pilostigma reticulata* are found both north and south of the road. The ground is bare in the dry season but if heavy rain falls in August, the woodland floor is covered with lily ponds, grasses and herbs. Some watercourses at the southeastern end of the park are lined with *Morelia senegalensis*.

Fauna Densities of a number of species, particularly of mammal, are relatively high as a result of the water situation in the park. Mammals include: vervet monkey *Cercopithecus aethiops*, patas monkey *Erythrocebus patas*, elephant *Loxodonta africana* (T) (though the park includes only a part of their range), hippopotamus *Hippopotamus amphibius* (again individuals not always remaining within the park), warthog *Phacochoerus aethiopicus*, waterbuck *Kobus ellipsiprymnus*, kob *Kobus kob*, bushbuck *Tragelaphus scriptus* (high densities), topi *Damaliscus lunatus*, reedbuck *Redunca redunca*, common duiker *Sylvicapra grimmia*, mongoose *Mungos mungo*, ground squirrel *Xerus erythropus*, genet *Genetta genetta*, wild cat *Felis silvestris*, spotted hyena *Crocuta crocuta*, and sand fox *Vulpes pallida*. There is a rich birdlife including: guinea fowl *Numida meleagris*, long-tailed glossy starling *Lamprolornis caudatus*, fish eagle *Haliaeetus vocifer*, crowned crane *Balearica pavonina*, marabou stork *Leptoptilos crumeniferus*, saddle-billed stork *Ephippiorhynchus senegalensis*, Abyssinian roller *Coracias abyssinica*, red-throated bee-eater *Merops bulocki*, and carmine bee-eater *M. nubicus*. Nile crocodile *Crocodilus niloticus* (V) are reported, but as with hippopotamus individuals often move out of the park to make use of other parts of the Chari.

Conservation Management Fortunately there are plans to deviate the road to the south of the park.

Zoning None

Disturbances or Deficiencies The park is small and the surrounding area is heavily grazed by domestic stock. The main problems are poaching, periodic invasion by elephants from outside the park (which highly modify the habitat), and road deaths of animals on the international road that crosses the park.

Visitor Facilities Facilities are a tourist camp in the centre of the park and a network of tracks. Park rangers act as guides. It is accessible from January to July. Roads are blocked when the Chari River floods during the wet season. The tourist potential is increased by proximity to an international airport at Ndjamena, and it seems likely that this area will increase in value as a tourist attraction.

Scientific Research There have been studies by the Wildlife College at Garoua and research sponsored by FAO/UNDP, under the project mentioned above.

Special Scientific Facilities None

Principal Reference Material

- ° Kavanagh, M. (1978). National Park in the Sahel. *Oryx* XIV(3): 241-244.
- ° Vanpraet, C.L. (1976). Assistance aux parcs nationaux de la zone de savane du Cameroun. L'écologie et l'aménagement du Parc national de Kalamaloué. CMR/72/025 Document de travail No. 4. FAO, Rome.

Staff One conservator, five rangers and 11 guards

Budget National

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism.

Date 1983

PARC NATIONAL DE MOZORO-GOKORO

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.4.4 (West African Woodland/savanna)

Legal Protection Total. Tourism is prohibited and only scientific visits allowed. The area has been protected from fire for 30 years.

Date Established 5 December 1968 as a National Park by Law No. 120. Established as a forest and faunal reserve on 12 June 1932 by Law No. 165.

Geographical Location 25km from Mokolo in North Cameroon. 10°45'-11°00'N, 13°38'-13°54'E.

Altitude 440m average

Area 1,400ha

Land Tenure Government

Physical Features The park comprises a shallow basin between the Mandara mountains and the massifs of Mora. Soils are a sandy-clay resulting from breakdown of the bedrock and alluvial deposits. The region has a mountain-steppe climate type. The dry season is from October to May and the mean annual rainfall about 900mm. Mean annual temperature is 27°C. December is coolest, with mean monthly minimum of 17°C and maximum of 31°C. April, just before the rains, is hottest, with mean monthly minimum of 20°C and maximum of 37°C.

Vegetation Much of the area is covered with dry forest resulting from protection of the area from bushfire. The woodland savanna is dominated by *Acacia albida*, with *Acacia senegal*, and *Acacia nilotica*. Other species include: *Balanites aegyptiaca*, *Ziziphus*, *Crateva adansonii*, *Celtis integrifolia*, *Khaya senegalensis* and *Ficus* spp..

Fauna Recorded fauna include vervet monkey *Cercopithecus aethiops*, patas monkey *Erythrocebus patas*, baboon *Papio* sp., warthog *Phacochoerus aethiopicus*, Buffon's kob *Kobus kob*, and python *Python sebae*.

Zoning None

Disturbances or Deficiencies Bushfire would change the habitat and wood cutting for domestic use is a threat.

Scientific Research A survey on the effects of fire on the vegetation has been carried out.

Special Scientific Facilities Accommodation is available in Mokolo for scientists working in the park.

Principal Reference Material None listed

Staff Two forest guards

Budget National

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism.

Date 1983

PARC NATIONAL DE WAZA

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 5 December 1968 as Parc national de Waza by Arrête No. 120. Established 24 March 1934 (Arrête No. 71) as a hunting reserve with the name of Zina-Waza. Enlarged from 155,000ha to 165,000ha by Arrête No. 264 of 9 September 1935, and then raised to the level of forest and faunal reserve by Arrête No. 297 of 30 July 1938. Approved as a biosphere reserve in May 1979.

Geographical Location Near Lake Chad (N'djamena) in the Department of Logone and Chari, Northern Province. 90km south of Kousséri. 11°00'-11°30'N, 14°30'-14°75'E.

Altitude Average 300-320m, rising to 500m

Area 170,000ha

Land Tenure Government

Physical Features The park lies in the Chad depression in an area of low relief with no permanent rivers. Part of the area was once covered by Lake Chad. Sand dunes in the west indicate that this area was once desert. The rocky outcrops around Waza village rise to over 500m and are probably fairly important, having effects on soil formation and temperature buffering in particular. Soils are mainly ferruginous tropical with various catenas, hydromorphic soils and vertisols. The dry season is from October to May. Rainfall is irregular, with an annual mean of 700mm. Mean annual temperature is 28°C. December is coolest, with mean monthly minimum of 16°C and maximum of 33°C. April, just before the rains, has a mean monthly minimum of 21°C and maximum of 41°C.

Vegetation There are five main vegetation types: (1) Open combretaceous shrub savanna with *Sclerocarya birrea* tree savanna, *Combretum* and *Terminalia* shrubs and stands of palm *Hyphaene thebaica*. The soil is sandy, with a sparse ground cover, burnt annually to prevent late accidental fires which are difficult to control. (2) *Anogeissus leiocarpus* woodland on sandy soil with absence of young trees due to annual fires. (3) *Lannea humilis* open grass savanna with short annual grasses, sparse trees and stands of *Mitragyna inermis* forming small islands around temporary waterholes. The soil is compact clay, which is very saline due to high evaporation. (4) *Acacia seyal* tree savanna on black clay soils which are saturated with water in the rainy season. Perennial grasses are absent. This vegetation type is slowly spreading as the area gradually dries out. (5) Yaéré floodplains with perennial grasses such as *Vetiveria nigritana*, *Oryza barthii*, *Echinochloa pyramidalis* and *E. stagnina* and some herbaceous legumes including *Sesbania pachycarpa*. Trees are absent and fires common. The floodplains are vital to the carrying capacity of the Waza region as the perennial grasses last long into the dry season.

Fauna The fauna is rich and varied with large numbers of giraffe *Giraffa camelopardalis* (increasing with the spread of *Acacia* woodland), elephant *Loxodonta africana* (T), aardvark *Orycteropus afer*, warthog *Phacochoerus aethiopicus*, hyena *Hyaena hyaena*, lion *Panthera leo*, red-fronted gazelle *Gazella rufifrons*, waterbuck *Kobus ellipsiprymnus*, kob *K. kob*, topi *Damaliscus lunatus*, roan antelope *Hippotragus equinus*, some impala *Aepyceros melampus* (once common at Waza), vervet monkey *Cercopithecus aethiops*, patas monkey *Erythrocebus patas*, and olive baboon *Papio anubis*. Leopard *Panthera pardus* (T) and cheetah *Acinonyx jubatus* (T) are present but their current status is uncertain. Towards the end of the dry season, many animals move onto the Chari (Yaéré) plains. There is a diverse avifauna including ostrich *Struthio camelus*, ground hornbill *Bucorvus abyssinicus*, bateleur *Terathopius ecaudatus*, white-faced tree duck *Dendrocygna arborea*, Abyssinian roller *Coracias abyssinica*, standard-winged nightjar *Macrodipteryx longipennis* and guinea fowl *Numida meleagris*.

Conservation Management There is currently reported to be no management plan, though FAO/UNDP carried out a lot of work in Waza in the mid-1970s under a project to assist the Cameroon government in management and development of the parks of the savanna zone. This work is drawn by Vanpraet (1977) who makes a wide variety of comments and recommendations on park development and management. Control of poaching, bushfires and tree cutting is carried out by park wardens. Public education films have been shown in the park by Wildlife Clubs of Cameroon as part of IUCN/WWF Project 1317.

Zoning Two main zones can be visited from November to May according to the flood season and animal migrations.

Disturbances or Deficiencies Water continues to be one of the most serious problems for Waza. Since the drought of 1972/1973, when some 2,500 Buffon kob and eight giraffe died, rainfall has been low. Also the periodic inundation of the yaéré has been prevented by construction of the Maga Dam 25km south of the park (which blocks the Tsanaga, Guirleo and Logone Rivers) and by the digging of irrigation dykes along the Logone River. This effectively reduces the carrying capacity of the park as a whole, despite the provision and maintenance of waterholes. Poaching is reported to be extensive due mainly to the proximity of relatively unguarded borders with Nigeria and Chad. Regeneration of *Sclerocarya* vegetation in the scrub savannah area is poor due to burning and damage by elephants. Elephants also destroy some tree savannah. Some important dry season watering places and grazing lands are outside the park boundary and controlled by pastoral tribes. There are some villages in the park.

Visitor Facilities Visitor facilities are good. There is a hotel on the park boundary and park wardens accompany tourists in the park. There is no access on foot.

Scientific Research Work by the Wildlife College at Garoua is supported by FAO/UNDP and the African Wildlife Foundation. Research has included ecological studies, population counts of several animal species and studies on elephant migration in the park. The park serves as a

reference area for the MAB Cameroon Project on the integrated management of North Cameroon.

Special Scientific Facilities Wildlife College at Garoua (about 350km away).

Principal Reference Material

- ° Biosphere Reserve nomination submitted to Unesco.
- ° Esser, J.D. and Van Lavierez, L.P. (1978). Recensement aérien des populations des grands ongulés et d'autruches du parc national de Waza.
- ° IUCN/WWF Project 1317. Wildlife Clubs.
- ° IUCN/WWF Project 1613. Primate Action Fund.
- ° Leblay, J.R. (1976). Assistance aux parcs nationaux de la zone de savane du Cameroun. Amélioration et mise en profil des pistes dans le Parc national de Waza. FO: SF/CMR/72/025 Document de Terrain No. 5. FAO, Rome.
- ° Ngog Nje, J. (1981). *L'écologie de la girafe au parc national de Waza*. Ph.D. thesis. Paris.
- ° Ngog Nje, J. (1983). Structure et dynamique de la population de girafes au parc national de Waza. *La Terre et la Vie* 3.
- ° Van Lavieren, L.P. (1977). Rapport sur le dénombrement aérien des grands mammifères du Parc National de Waza. Ecole de Faune de Garoua.
- ° Vanpraet, C.L. (1977). Assistance aux parcs nationaux de la zone de savane du Cameroun. L'écologie et l'aménagement du Parc national de Waza. FO: DP/CMR/72/025, Rapport technique 1. FAO, Rome.
- ° Vanpraet, C.L. (1976). Assistance aux parcs nationaux de la zone de savane du Cameroun. Changements écologiques dans le bassin du Logone et quelques conséquences sur l'écosystème du Parc national de Waza. FO: DSF/CMR/72/025 Document de travail 2. FAO, Rome.
- ° Wit, P. (1975). Assistance aux parcs nationaux de la zone de savane du Cameroun. Preliminary notes on the vegetation of Waza National Park with map. FO: SF/CMR/72/005 Project Working Document No. 1. FAO, Rome.
- ° Wit, P. Some notes on the Vegetation of Waza National Park, Cameroon. Ecole pour la formation des spécialistes de la fauna, Garoua 4 pp. (Based on a FAO study 1974/1975).

Staff 25 guard staff

Budget National

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism. Secretariat Permanent, Comité National de l'Homme et de la Biosphère, BP 4742, Yaoundé.

Date 1983

RESERVE FORESTIERE ET DE FAUNE DU DJA

Management Category I and IX (Strict Nature Reserve and Biosphere Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Protected as a Game Reserve by Law No. 319 of 26 June 1950, and under the National Forestry Act Ordinance No. 73/18 of 22 May 1973. Agriculture and hunting are prohibited.

Date Established 1950, as a forest and faunal reserve. Originally protected in 1932. Accepted as a Biosphere Reserve in October 1981. Proposed as a National Park.

Geographical Location On the Dja River in the South-central and East Provinces of Cameroon. 243km south-east of Yaoundé; 5km from Lomie. 2°49'-3°23'N, 12°25'-13°35'E.

Altitude 400-800m

Area 500,000ha

Land Tenure Government

Physical Features The reserve lies to the north of the Dja River, which becomes a tributary of the Congo. The relief is fairly flat, except in the south-east where tributaries of the Dja cut deep valleys. The Dja river on the southern boundary follows a major fault line. The soil is red clay, with crystalline rocks of Precambrian origin, composed of chlorite schist and micaschist. The mean annual temperature is 23°C and the mean annual rainfall is 1610mm. The Equatorial type climate has two rainfall peaks, in May and September. Temperatures are similar all year. August is coolest with mean monthly minimum of 18°C and maximum of 27°C. April is hottest with mean minimum temperature of 19°C and maximum of 30°C.

Vegetation The vegetation comprises dense evergreen Congo rainforest of great height dominated by Sapotaceae with a main canopy of at least 43 tree species, predominantly legumes including *Afrostryax lepidophyllus*, *Anopyxis klaineana* and *Anthonotha*. The shrub layer contains over 53 species including *Diospyros* spp. and *Drypetes* spp.. The grass layer is composed of Marantaceae and *Mapania* spp.. Other vegetation includes swamp vegetation, old secondary forest around the villages which were abandoned in 1946, recently abandoned cocoa and coffee plantations, and areas of *Gilbertiodendron dewevrei* forest.

Fauna The area has a wide range of primate species including lowland gorilla *Gorilla gorilla gorilla* (T), greater white-nosed guenon *Cercopithecus nictitans*, moustached guenon *Cercopithecus cephus*, crowned guenon *Cercopithecus pogonias*, talapoin *Miopithecus talapoin*, white-collared mangabey *Cercocebus torquatus*, white-cheeked mangabey *Cercocebus albigena*, agile mangabey *Cercocebus galeritus*, mandrill *Mandrillus sphinx*, Angolan black and white colobus monkey *Colobus angolensis* and chimpanzee *Pan troglodytes* (T). Other mammals include: elephant *Loxodonta africana* (T), bongo *Tragelaphus euryceros*, sitatunga *T. spekei*, buffalo *Syncerus caffer*, leopard *Panthera pardus* (T), warthog *Phacochoerus aethiopicus* and pangolin *Manis* sp.. Bates's weaver *Ploceus batesi* (R), endemic to southern Cameroon, and grey-necked picathartes *Picathartes oreas* (R) probably occur in this reserve. The type locality of the Dja River warbler *Bradypterus grandis* (K) is near the reserve and there are few other records of this kind. Reptiles include python, lizard and crocodile.

Population There are some villages and a population of pygmies in the reserve.

Conservation Management There is no management plan. No commercial logging has taken place in the reserve. Traditional hunting rights are allowed but the use of non-traditional hunting methods needs to be controlled. Dja is the focus for IUCN/WWF Project 1613, whose objectives are to conserve and develop three national parks in the forest zone (Dja, Pangar-Djerem and Korup) and to establish a programme of conservation education in the forest zone.

Zoning No information

Disturbances or Deficiencies Cocoa, coffee and subsistence plots encroach onto the reserve. Poaching is a problem.

Scientific Research Phytogeographic studies (Letouley, 1968) and a research report on fauna (Rowell, 1975) have been carried out. The area could serve as a reference zone for studies on tropical rainforest and is easily accessible by road (four-wheel drive) in the dry season.

Special Scientific Facilities No information

Principal Reference Material

- ° Gartlan, J.S. and Agland, P.C. (1980). *A Proposal for a Program of Rainforest Conservation and National Park Development in Cameroon, West Central Africa*. Report presented to the Gulf Oil Corporation and Société Naitonale Elf Aquitaine.
- ° IUCN/WWF Project 1613. Primate Action Fund.
- ° Letouzey, R. (1968). *Etudes phytogeographiques au Cameroun*. Editions Paul Lechevalier, Paris.
- ° Rowell, T.E. (1975). *Report on the Reserve du Faune du Dja*. University of California, Berkeley. Department of Zoology.

Staff One conservator, one game guard, and eight rangers

Budget National

Local Park or Reserve Administration Department of Water and Forests, Ministry of Agriculture, Yaoundé.

Date 1983

RESERVE DE FAUNE DE DOUALA-EDEA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Total, as a 'forêt domaniale'

Date Established 1932

Geographical Location In the south of the Littoral Province between the Sanaga and Nyong Rivers. 3°14'-3°50'N, 9°34'-10°50'E.

Altitude Sea level to 15m

Area 160,000ha; includes Edea-Marienberg Forest Reserve

Land Tenure Government

Physical Features The reserve is a natural ecological unit bounded on three sides by rivers or the ocean, and on the fourth by a geological boundary, the Precambrian scarp of the interior. Several black-water rivers drain the area including the Nyong, Sanaga and Dibombé. Lake Tissoongo (rainy season lake) drains into the Sanaga River, 40km downstream of Edea. The reserve lies on ancient beaches laid down in a process that began in the Cretaceous era and is still continuing. Soils are predominantly acidic, low-nutrient, white and sandy. The soil structure has affinities with the podsol soils of northern latitudes. There is a humid equatorial climate with no distinct dry season and two rainfall peaks, in May and September. Annual rainfall is about 4,000mm. Temperatures are similar all year, with a mean monthly minimum of 22°C. Mean monthly maximum temperatures are between 27°C in August and 31°C in April.

Vegetation The vegetation is similar to neighbouring Equatorial Guinea. The main vegetation type is coastal forest with 43 families of trees including Euphorbiaceae (23.6%), Caesalpiniaceae (13.4%) (such as *Cynometra hankei*, *Berlinia* sp. and *Macrobium* spp.), and Olacaceae (12%). Other trees include *Lophira alata*, *Sacoglottis gabonensis* and *Cola edulis*.

Deciduous trees are sparse. Areas of mangrove occur along the coast and in the coastal lagoons. The vegetation seems generally to have high levels of defensive chemicals such as tannins, alkaloids, saponins, terpenoids and cardiac glycosides, which may be important for future research.

Fauna There are a large number of primates in the forests including black colobus *Colobus satanas* (T), Preuss' red colobus *C. badius preussi*, de Brazza's monkey *Cercopithecus neglectus* and greater white-nosed monkey *C. nictitans*, white-collared mangabey *Cercocebus torquatus*, grey-cheeked mangabey *C. albigena*, mandrill *Mandrillus sphinx*, and chimpanzee *Pan troglodytes* (T). Other mammal species include: African civet *Civettictis civetta*, sitatunga *Tragelaphus spekei*, blue duiker *Cephalophus monticola*, elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, giant pangolin *Manis gigantea*, tree pangolin *M. tricuspis* and, in the coastal lagoons, West African manatee *Trichechus senegalensis* (T). There is a rich and abundant avifauna.

Zoning None

Disturbances or Deficiencies The combination of sandy soil, nutrients in the surface layers and heavy rainfall make the area particularly vulnerable if extensive deforestation occurs. Immediate threats include poaching and the population explosion in Malimba and Bokoko. Few tree species are of commercial interest and only *Lophira alata* is a major trade species though its occurrence rate at 1% is too low to be significant. Growth rate of trees in the area seems to be slow and there is a low regeneration rate after clearing.

Scientific Research Research includes detailed ecological studies of the area including phenolic content of vegetation (Gartlan, 1978; McKey *et al.*, 1978), and studies since 1974 by the Wisconsin Regional Primates Research Centre and the University of Michigan on primates.

Special Scientific Facilities None

Principal Reference Material

- ° Gartlan, J.S. (1978). *The Douala-Edea Reserve*.
- ° Gartlan, J.S. and Agland, P.C. (1980). A Proposal for a Program of Rainforest Conservation and National Park Development in Cameroon. Report presented to the Gulf Oil Corporation and Société Nationale Elf Aquitaine.
- ° IUCN/WWF Project 1089. Cameroon, Establishment of Two Tropical Rainforest Reserves.
- ° McKay *et al.* (1978). Phenolic content of vegetation in two African rainforests: ecological implications. *Science* 202: 61-64.

Staff One warden and five rangers

Budget National. 1974/1975 - CFA 2,000,000 allocated to the Reserve Conservator for initial surveys.

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism.

Date 1983

RESERVE DE GIBIER DE CAMPO

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.02.01 (Congo Rain forest)

Legal Protection Partial

Date Established 19 November 1932

Geographical Location In the Centre-south Province on the border with Gabon. 2°08'-2°52'N, 9°56'-10°12'E.

Altitude Up to 900m

Area 330,000ha

Land Tenure Government

Physical Features The reserve is on the coastal plain and includes some low hills. It has a humid Equatorial climate, with a mean annual temperature of 26°C and a mean annual rainfall of 2,000mm which has two peaks, in May and October. Temperatures are similar all year, with a mean monthly minimum of 22°C. Mean monthly maximum temperatures vary between 27°C in August and 30°C in April.

Vegetation Thick tropical forest occurs at sea level with legumes predominating at higher altitudes. There are a wide variety of species including *Lophira alata*, *Azelia*, *Khaya ivorensis*, *Pterocarpus* and *Aframomum*, and several of medicinal importance.

Fauna Mammals include: elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, bongo *Tragelaphus euryceros*, sitatunga *T. spekei*, bush pig *Potamochoerus porcus*, tree hyrax *Dendrohyrax dorsalis*, African civet *Civettictis civetta*, five species of duiker *Cephalophus* spp., common duiker *Sylvicapra grimmia* and many primates, including gorilla *Gorilla gorilla* (T). There is a rich and varied avifauna including grey-necked picathartes *Picathartes oreas* (R), and numerous fish.

Zoning None

Disturbances or Deficiencies Logging is permitted and a 25-year logging concession (1968 to 1993) has been granted, resulting in considerable degradation. There is heavy poaching of large and small mammals for ivory and meat. There is an increasing human population in the reserve.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- ° Depierre, D. and Ole, Z. (1976). Parcs nationaux et réserves de faune du Cameroun. *Bois et Forêts des Tropiques* 170: 3-20.
- ° Gartlan, J.S. (1974). Campo Reserve and Dipikar Island. Rapport sur l'étude de création d'un sanctuaire de gorille à Campo. January 1979.
- ° Webb, J. C. (unknown date). Reports on the mammals, birds and primates.

Staff Four guards

Budget 1980 - National budget of CFA 800,000 for personnel and CFA 200,000 for management.

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism.

Date 1983

RESERVE DE GIBIER DE RIVIERE DU KIMBI

Management Category IV (Nature Reserve)

Biogeographical Province 3.19.12 (Guinean Highlands)

Legal Protection Partial: game protected

Date Established 1964

Geographical Location Near the border with Nigeria in western Cameroon. On the ring road in Menchum Division between Wum and Nkambe. 6°30'N, 10°30'E.

Altitude 800-1,000m

Area 5,625ha

Land Tenure Government

Physical Features The underlying rocks are basement complex rocks with numerous rocky outcrops. Small streams and springs flow throughout the year. The boundaries are defined by the Tongo and Kimbi Rivers and Dumbo Cattle Ranch. High rainfall.

Vegetation The area is in the transition zone between rain forest and woodland and has a high component of gallery forest. Vegetation includes grassland with forest outliers, montane grassland and savanna with *Pennisetum purpureum*, *Imperata cylindrica*, *Bridelia ferruginea* and *Annona senegalensis*.

Fauna Mammals include: buffalo *Syncerus caffer*, red river hog *Potamochoerus porcus*, warthog *Phacochoerus aethiopicus*, otter, kob *Kobus kob*, waterbuck *K. ellipsiprymnus*, bushbuck *Tragelaphus scriptus*, common duiker *Sylvicapra grimmia*, baboon *Papio anubis*, chimpanzee *Pan troglodytes* (T), vervet monkey *Cercopithecus aethiops*, Mona monkey *C. campbelli lowei*, spot-nosed monkey *C. petaurista petaurista*, porcupine, pangolin *Manis* sp., rock hyrax *Procavia capensis*, African civet *Civettictis civetta*, and cane rat *Thryonomys gregorianus*.

Zoning None

Disturbances or Deficiencies Serious problems are: disturbance due to the small size and attenuated shape of the reserve; poaching; and shortage of staff.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- ° Depierre, D. and Ole, Z. (1976). Parcs nationaux et reserves de faune du Cameroun. *Bois et forêts des tropiques* 170: 3-20.
- ° Hechtel, J. (1976). Status of wildlife conservation and game reserves, North-west Province, Cameroon.

Staff One warden, five rangers, two game guards, one caretaker for the government rest-house and one permanent labourer.

Budget National

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism.

Date 1983

RESERVE DE GIBIER DE KORUP

Management Category IV (Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection No information

Date Established 1961 by regional legislation. Size has since been reduced. Proposed as National Park in 1981.

Geographical Location In South-West Province on the border with Nigeria. 4°54'-5°25'N, 8°42'-9°54'E.

Altitude Up to 1,079m (Yuhan)

Area 83,675ha

Land Tenure Government (previously Kumba Municipality)

Physical Features It is situated on an inland part of on a large plateau in the coastal zone. The park is crossed by the N'dian, Cross and Akpa Korup Rivers. The Akpa Korup forms the western boundary and the international border with Nigeria. The topography is low and flat in the south with more inselbergs and ancient volcanic intrusions in the centre and north. The sandy soils are derived from quartz and granite bedrock with most of the nutrients in the surface layers. The humid equatorial climate has a mean annual rainfall of 6,000mm-8,000mm and a mean annual temperature of about 22°C. Temperatures are similar all year round.

Vegetation The medium altitude evergreen forest of the Biafran type is one of the most florally diverse in Africa with 52 recorded families of tree and liana including Scytopetalaceae (12%), Euphorbiaceae (11.7%), Caesalpiniaceae (9.6%), Olacaceae (6.7%) and Sterculiaceae (6.4%) with *Oubanguia alata* particularly common. Many of the plants are found to contain high levels of defensive chemicals, thought to be associated with poor soils.

Fauna There are 40 recorded mammal species including 14 primates. Mammals include: drill *Papio leucophaeus* (T), Preuss' red colobus monkey *Colobus badius preussi* (T), black colobus *C. satanas* (T), grey-cheeked mangabey *Cercocebus albigena*, sooty mangabey *C. torquatus*, Preuss' monkey *Cercopithecus preussi*, elephant *Loxodonta africana* (T), Lord Derby's flying squirrel *Anomalurus derbianus*, Ogilby's duiker *Cephalophus ogilbyi*, bush pig *Potamochoerus porcus*, tree squirrels *Funisciurus* spp., bushbaby *Galago* spp., potto *Perodicticus potto*, sitatunga *Tragelaphus spekei*, African civet *Civettictis civetta*, and leopard *Panthera pardus* (T). The 240 recorded bird species include: grey-necked picathartes *Picathartes oreas* (R), black-headed bee-eater *Merops breweri*, red-tailed greenbul *Criniger calurus*, white-tailed ant-thrush *Neocossyphus poensis*, blue-billed malimbe *Malimbus nitens*, and crested malimbe *M. racheliae*.

Zoning None

Disturbances or Deficiencies Poaching of large animals occurs from neighbouring Nigeria. The area has never been commercially logged though some ebony *Diospyros crassiflora* has been extracted.

Scientific Research Vegetation studies since 1974 have been made by the Wisconsin Regional Primate Research Centre and a two year ecological study by IUCN/WWF.

Special Scientific Facilities None

Principal Reference Material

- ° Gartlan, J.S. and Agland, P.C. (1980). A Proposal for a Program of Rainforest Conservation and National Park Development in Cameroon, West-Central Africa. Report presented to the Gulf Oil Corporation and Société Nationale Elf Aquitaine. Lists flora by family, mammal and bird species.
- ° IUCN/WWF Project 1089. Cameroon. Tropical Rainforest Reserves.

Staff One conservator (warden)

Budget National. 1981 - WWF provided US\$30,000 towards the cost of essential equipment.

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism.

Date 1983

RESERVE DE GIBIER DU CRATERE DE MBI

Management Category IV (Nature Reserve)

Biogeographical Province 3.19.12 (Guinean Highlands)

Legal Protection Total

Date Established 1964

Geographical Location North-West Province 35km north of Bamenda. 6°10'N, 10°00'E.

Altitude About 1800m

Area 370ha

Land Tenure Government

Physical Features The extinct volcanic crater has very steep slopes and is breached but contains a crater lake.

Vegetation There are three vegetation types: grassy crater rim; fringing Guineo-Congolian lowland rainforest; and marshy crater plain including *Piptandeniastrum*, *Schefflera*, *Ficus* and crotons.

Fauna Mammals include: bushbuck *Tragelaphus scriptus*, Maxwell's duiker *Cephalophus maxwelli*, common duiker *Sylvicapra grimmia*, rock hyrax *Procavia capensis*, cane rat *Thryonomys gregorianus*, porcupine (Hystricidae), patas *Erythrocebus patas*, spot-nosed monkey *Cercopithecus petaurista*, vervet monkeys *C. aethiops*, potto *Perodicticus potto*, and olive baboon *Papio anubis*.

Zoning None

Disturbances or Deficiencies Problems include: the small size of the reserve; high entrance fee for visitors; and threat of poaching and cattle grazing.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Hechtel, J. (1976). Status of wildlife conservation and game reserves in North-West Province, United Republic of Cameroon.

Staff One conservator, two game guards and one caretaker

Budget National

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism.

Date 1983

RESERVE DE CHASSE DE PANGAR-DJEREM

Management Category No category assigned

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection No current information

Date Established 1968. Proposed as a National Park in 1981, but this proposal has now been 'moved'. It is not clear whether this area still exists as such.

Geographical Location Bounded in the east by the Pangar River and Yaounde-Ngoundere railway, south by the Com River and west by the Djerem River (all tributaries of the Sanaga). 5°20'-6°07'N, 12°51'-13°37'E.

Altitude 600-900m (average altitude 850m)

Area 480,000ha

Land Tenure Government

Physical Features The bedrock is mainly syntectonic granites and lower Precambrian magmatites and gneisses. The area is drained by watercourses running into the Pangar, Com and Djerem Rivers. Annual rainfall is about 1500mm with two peaks in May and September. Mean annual temperature is 23°C.

Vegetation This is one of only a few reserves in Africa situated in the zone of transition between forest and savanna. There are four main vegetation types: evergreen gallery forest; semi-deciduous forest dominated by Sterculiaceae and Ulmaceae; *Acacia* savanna; and broad-leaf savanna.

Fauna The fauna of the area is one of the richest in Cameroon including: vervet *Cercopithecus aethiops*, olive baboon *Papio anubis*, patas *Erythrocebus patas*, magistrate colobus *Colobus* sp., chimpanzee *Pan troglodytes* (T), Senegal galago *Galago senegalensis*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, Buffon's kob *K. kob*, common duiker *Sylvicapra grimmia*, yellow-backed duiker *Cephalophus sylvicultor*, bushbuck *Tragelaphus scriptus*, bongo *T. euryceros*, sitatunga *T. spekei*, hartebeest *Alcelaphus buselaphus*, elephant *Loxodonta africana* (T), pangolin *Manis* sp., and possibly gorilla *Gorilla gorilla* (T). Crocodile *Crocodylus* sp. are present.

Zoning None

Disturbances or Deficiencies Intensive poaching apparently on a professional basis. The National Park proposal made for this area has now been 'moved' to the west of the Pangar River. The area would appear to be similar, though it has less forest - a result of human activity.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Gartlan, J.S. and Agland, P.C. (1980). A Proposal for a Program of Rainforest Conservation and National Park Development in Cameroon, West-Central Africa. Report presented to the Gulf Oil Corporation and Société Nationale Elf Aquitaine.

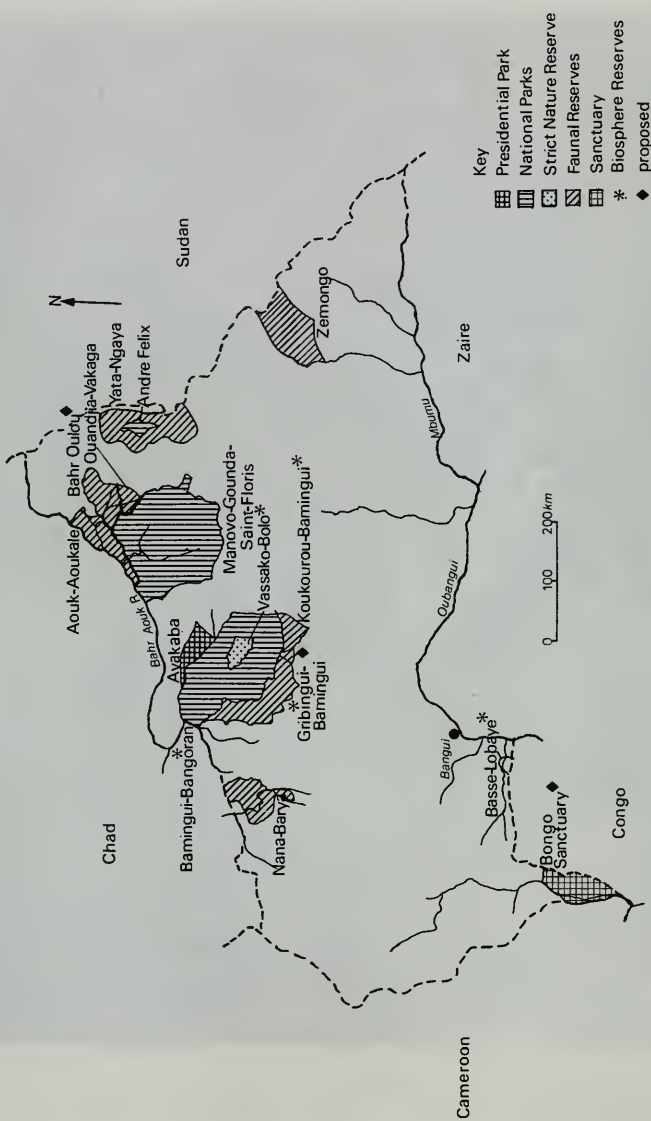
Staff Two wardens and two gamekeepers

Budget National

Local Park or Reserve Administration Department of Wildlife and National Parks, General Delegation of Tourism.

Date 1983





Central African Republic

CENTRAL AFRICAN REPUBLIC

Area 622,996 sq.km

Population 2,520,000 (1983)

Parks and Reserves Legislation The first two 'réserves de chasse', both located in the east of the country, were gazetted for a period of 30 years in 1925. The creation of national parks and reserves was provided for by a Decree passed in 1929, but this stipulated that the establishment of such areas should not affect the economic life of the surrounding regions, and possibly confused terminology by defining national parks as 'integral nature reserves'. A partial reserve category 'réserves de chasse' was introduced in 1935. Hunting was allowed in these reserves until 1939 when it was completely forbidden, subsequently these reserves were renamed 'réserves de faune'. In 1940 national parks were also redefined. A new law redefined all the categories of protected area in 1944 and in 1954 another decree brought these definitions more fully into line with the London Convention. On 3 November 1956 Law No. 56-1106 was passed covering the protection of natural monuments and sites and monuments of historic, scientific, or aesthetic value. In 1960, all the laws in force, except 56-1106, were reconstituted under Law 60-104, which covered zones of hunting interest (Zone d'intérêt cynégétique), national parks and reserves, and Law 60-140 which dealt with nature protection. Detailed proposals for modification of this legislation were developed by FAO in 1977 and then prepared by the government for transmission to the Council of Ministers for approval. Ordonnance No. 84-045 of 27 July 1984 concerning protection of wildlife and regulation of hunting provides for the protection and rational exploitation of the fauna and its natural environment. This includes control of the national parks and reserves. The Forest Code passed in 1961 (Law No. 61-273) allows for the classification of Forêts domaniales where exploitation may be more carefully controlled.

Parks and Reserves Administration The authority responsible for protected areas management is the Centre National pour la protection et l'aménagement de la faune (CNPAF) within the Department of Wildlife and National Parks, in turn within the General Directorate of Water and Forests. Day-to-day management and protection of each area is the responsibility of the local government concerned. Implementation of the Forest Code is the responsibility of the Office national des forêts, within the same directorate.

Address

* Direction générale des eaux, forêts, chasses et pêches, Ministère des eaux, des forêts, de la chasse, des pêches et du tourisme, BP 830, Bangui.

Additional Information Within CAR, wildlife represents first and foremost a source of food, but as such the fauna is both unevenly distributed and under-managed. In addition little benefit is realised from tourism associated with protected areas, which are under pressure from grazing, hunting, etc. Realising these problems the government has looked for assistance from FAO and UNDP in improving the situation. This resulted in work under two projects, CAF/72/010 'Etudes préliminaires pour l'aménagement de la faune en zone nord' and FO: DP/CAF/78/006 'Aménagement de la faune République Centrafricaine'. The principal aims of the latter, more recent, project are to assist with training of personnel involved in fauna management, elaboration of a rational programme of exploitation of the wildlife resource, and development of tourism associated with wildlife. In both projects particular attention has been paid to Bamingui-Bangoran, and to a lesser extent Manovo-Gounda-St Floris. IUCN/WWF have also been involved in assistance to Manovo-Gounda-St Floris national park.

As in many countries, poaching, particularly for ivory but also in other species, has been a particular problem. In 1982/3 several laws were enacted, including the introduction of a ban on elephant hunting (and incidentally a moratorium on the movement of ivory in certain parts of the country). Poaching is still severe, however, and CAR is looking for International

assistance in dealing with this problem, as well as with the potentially more serious problem of desertification.

References

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- ° FAO (1982). Aménagement de la faune République Centrafricaine. FO: DP/CAF/78/006 Rapport intérimaire. FAO, Rome.
- ° IUCN/WWF Project 3019. Central African Republic, Management and Protection of Elephants. (Followed by two further projects, 3636 and 3687, assisting anti-poaching operations.)
- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° Saussay, M. du (1978). Aménagement de la faune en zone nord. Empire Centrafricain. Le droit de la protection de la faune en Empire Centrafricain. FO: CAF/72/010 Document de travail No. 12. FAO, Rome.
- ° Spinage, C.A. (1981). Résumé des aires de faune protégées et proposées pour être protégées. Projet FAO/CAF/78/006. FAO, Rome.

Protected Areas

(hectares)

National Parks

Andre Felix	170,000
Bamingui-Bangoran	1,070,000
Manovo-Gounda-Saint Floris	1,740,000
Subtotal	2,980,000

Strict Nature Reserves

Vassako-Bolo	86,000
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Faunal Reserves

Aouk-Aoukale	330,000
Gribingui-Bamingui	438,000
Koukourou-Bamingui	110,000
Nana-Barya	230,000
Ouandjia-Vakaga	130,000
Yata-Ngaya	420,000
Zemongo	1,010,000
Subtotal	2,668,000

Private Reserves

Avakaba Presidential Park	175,000
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Biosphere Reserves

Bamingui-Bangoran Conservation Area	1,622,000
Basse-Lobaye Forest	18,200
Subtotal	1,640,200

Proposed areas

Bahr Oulou Faunal Reserve	320,000
Bongos Sanctuary	265,000

PARC NATIONAL ANDRE FELIX

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection About 77,200ha of the park is leased to a private society, but a condition of the lease was that this area must still be managed in accordance with the park establishment order.

Date Established 10 November 1960, by Arrêté No. 1893/60.

Geographical Location In the north-east of the country on the international border with Sudan. 9°00'-9°42'N, 23°10'-23°24'E.

Altitude Up to 900m

Area 170,000ha. The area is surrounded by the Yata-Ngaya Faunal Reserve (420,000ha).

Land Tenure Government, of which some 77,200ha is leased to a private society.

Physical Features The extensive plains, with their characteristic lateritic soils, are bordered to the west by the Yata River, and by the Ngaya (Boulou) River in the extreme east.

Vegetation Wooded savanna with *Isoberlinia* spp..

Fauna The fauna is less rich than that of the 'parc national Manova-Gounda-St Floris'. Mammals include lion *Panthera leo*, leopard *P. pardus* (T), elephant *Loxodonta africana* (T), rhinoceros *Diceros bicornis* (T), giraffe *Giraffa camelopardalis*, various species of antelope, and hippopotamus *Hippopotamus amphibius*. Ostrich *Struthio camelus*, and crocodile are also present.

Zoning The park is completely surrounded by the Yata-Ngaya Faunal Reserve, which is the designated buffer zone.

Disturbances or Deficiencies There are no surveillance patrols and cattle grazing and intensive poaching continue unchecked. The buffalo population was decimated by a bovine disease in the 1960s.

Scientific Research An air count of the larger mammals on the northern plains has been carried out by FAO consultants.

Special Scientific Facilities None

Principal Reference Material None listed

Staff None

Budget No information

Local Park or Reserve Administration Birao Inspectorate of Forestry

Date 1984

BAMINGUI-BANGORAN CONSERVATION AREA

Management Category A complex of areas comprising a strict Nature Reserve (I), a National Park (II), and two Faunal Reserves (IV). The whole area forms a Biosphere Reserve (IX).

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection All areas were redefined in 1940 to comply with the London Convention on the Protection of African Wildlife, 1933.

Date Established Established as Oubangui-Chari National Park (2,660,000ha) in 1933. Later in the same year 630,000ha were declassified, part of which now forms the Koukourou-Bamingui Faunal Reserve (110,000ha). A further 530,000ha were declassified in 1934, part of which now forms the Gribingui-Bamingui Faunal Reserve. Both faunal reserves were designated in 1940. The strict nature reserve was also established by reclassification of part of the park (the area was then defined as 150,000ha). A further area was added to the north of the park in 1980 and then revised the same year to form the Avakaba Presidential Park (established in 1980 by Ordinance No.80/055). The current conservation area was accepted as Bamingui-Bangoran Conservation Area (Biosphere Reserve) on 23 July 1979, but this has never been promulgated in national law.

Geographical Location Situated in the north of the country on the international border with Chad. 7°06'-8°04'N, 18°56'-20°21'E.

Altitude 350-450m

Area Vassoko-Bolo Strict Nature Reserve (86,000ha), Bamingui-Bangoran National Park (1,070,000ha), Koukourou-Bamingui Faunal Reserve (110,000ha), Gribingui-Bamingui Faunal Reserve (438,000ha) and Bamingui-Bangoran Conservation Area (Biosphere Reserve) 1,622,000ha.

Land Tenure Government

Physical Features The reserves lie in an area of low relief, mainly of Precambrian basement complex which dips below the Quaternary alluvia of the Chad basin in the north and north-west. There are three principal rivers, the Bolo (seasonal), Vassako and Vou (seasonal), which define the boundaries of the strict nature reserve. Several parts of the area are seasonally flooded. The mean annual rainfall is 1300mm, falling mainly between December and February. The mean annual temperature is 26.6°C.

Vegetation Sudano-Guinean vegetation predominates, with dry forests, wooded savannas, edpahic savannas, and gallery forests. The wooded savanna comprises *Terminalia* (34%), *Anogeissus* (8%), *Isobertlinia doka* (38%), and grassland (13%).

Fauna The fauna is also typically Sudano-Guinean and has been very rich in the past. The area is sufficiently large to include a large range of migratory mammals. Mammals include: leopard *Panthera pardus* (T), hunting dog *Lycaon pictus* (T), spotted hyena *Crocuta crocuta*, elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, black rhinoceros *Diceros bicornis* (T), buffalo *Syncerus caffer*, giraffe *Giraffa camelopardalis*, bushbuck *Tragelaphus scriptus*, giant eland *Taurotragus derbianus*, roan antelope *Hippotragus equinus*, waterbuck *Kobus ellipsiprymnus*, kob *K. kob*, reedbuck *Redunca redunca*, hartebeest *Alcelaphus buselaphus*, topi *Damaliscus lunatus*, yellow-backed duiker *Cephalophus sylvicultor*, red-flanked duiker *C. rufilatus*, blue duiker *C. monticola*, common duiker *Sylvicapra grimmia*, oribi *Ourebia ourebi*, warthog *Phacochoerus aethiopicus*, olive baboon *Papio anubis*, patas monkey *Erythrocebus patas*, vervet monkey *Cercopithecus aethiops*, eastern black-and-white colobus *Colobus guereza*, giant ground pangolin *Manis gigantea*, central African hare *Poelagus marjorita*, white-tailed mongoose *Ichneumia albicauda*, banded

mongoose *Mungos mungo*, serval *Felis serval*, African civet *Civettictis civetta*, genet *Genetta* sp., aardvark *Orycteropus afer*, porcupine *Hystrix cristata*, cane rat *Thryonomys* sp., savanna gerbil *Tatera valida*, multimammate rat *Praomys natalensis fumatus*, striped grass rat *Lemniscomys striatus*, and Geoffroy's ground squirrel *Xerus erythropus*. The bird fauna is described in Green (1983 and 1984).

Conservation Management No information

Zoning The four areas in the complex are defined differently in law. Together they comprise a central (or core) area, buffer zone, manipulative zone, and zone of traditional cultivation. No substantial new changes will be permitted in the cultivated zone. The strict nature reserve is entirely enclosed by the national park.

Disturbances or Deficiencies Because of persistent application of insecticide against cotton pests, the Bamingui River and tributaries are rapidly being poisoned and are becoming sterile. Poaching continues to be a major problem, particularly in the faunal reserves, where there is insufficient access for proper control and wildlife numbers have been seriously depleted. There are some areas of traditional and cotton cultivation.

Visitor Facilities The potential for tourism is limited, with visibility reduced by vegetation, and relatively few animals to observe. The Bangoran River is considered of most interest.

Scientific Research Preliminary studies, including an air-count of the larger mammals, have been carried out in the area by UNDP/FAO consultants.

Special Scientific Facilities There are no special facilities.

Principal Reference Material

- ° Boulvert, Y. (1970). *Essai de catalogue de la flore de Centrafrique*. ORSTOM, Bangui.
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- ° Sillans, R. (1958). *Les savanes de l'Afrique Centrale*. Paris.
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- ° Spinage, C.A. (1977). Etudes additionnelles de Parc national du Bamingui-Bangoran. Projet CAF/72/010. FAO, Rome.
- ° Spinage, C.A., Loevinsohn, M.E. and Ndouté, J. (1977). Etudes Additionnelles du Parc National Bamingui-Bangoran. CAF/72/010. FAO, Rome.

Staff Three proposed

Budget No information

Local Park or Reserve Administration CNAF, Ministère de l'Agriculture, Direction Générale des Eaux et Forêts, BP 830, Bangui. The national park comes under the Ndélé Forestry Inspectorate.

Date 1984

PARC NATIONAL MANOVO-GOUNDA-ST FLORIS

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection The park was given total protection under Government ownership, but there is no information regarding protection since the area became a private concession in 1984.

Date Established Incorporated into Oubangui-Chari National Park on 10 December 1933. The name of the area was changed in 1935 to Matoumara National Park, and again on 27 July 1940 to St Floris National Park (and redefined with an area of 40,000ha). The area was enlarged to 100,700ha in 1960 by Law 60-104; again in 1974 to cover 277,600ha; and, finally, in 1979 to cover 1,740,000ha.

Geographical Location In the north of the country, on the international border with Chad. 8°00'-9°50'N, 20°30'-22°20'E.

Altitude 400-800m

Area 1,740,000ha; contiguous to the 'réserve de faune de l'Aouk-Aoukalé' (330,000ha), 'réserve de faune de l'Ouandjia-Vakaga' (130,000ha), and the proposed 'réserve de faune du Bahr Oulou' (although there are now doubts that this area will ever be established).

Land Tenure Private (since 1984; previously Government owned)

Physical Features The area comprises a flat plain with coarse, generally ferruginous and well-drained soils. The land rises to 800m in the south-east. Some areas, particularly the depressions, have developed a lateritic or ironstone shield, on which woody vegetation is noticeably sparse or absent. The lowland areas (30% of the park) are seasonally flooded and have fine, deep alluvial soils. Drainage in these areas may be quite poor. The major rivers are Bahr Kameur, Ovandjia, Vakaga and Gounda. The climate is tropical, semi-humid Sudano-Guinean, with a mean annual rainfall of between 950 and 1700mm, mainly falling between June and November. There is only one rainy season, alternating with a hot dry season.

Vegetation The predominant vegetation type is wooded savanna (70%) and in the main bulk of the park this can be divided into five different types: 1) *Terminalia laxiflora* wooded savanna (39.3%) with *Crossopteryx febrifuga* and *Butyrospermum parkii*; 2) *Isobertlinia doka* and *Monotes kerstingii* woodland in the upland areas; 3) *Pseudocedrela kotschy* and *Terminalia macroptera* woodland (15%); 4) mixed lowland woodland or wooded savanna; and 5) *Anogeissus leiocarpus* and *Khaya senegalensis*. Small patches of fringe forest occur in the lowland areas, particularly along the Gounda and Koumbala rivers. The *Terminalia* savanna is used extensively by wildlife during the dry season. The lowland areas are subject to both flooding and fire, and this is reflected to some extent in the vegetation (although *Anogeissus leiocarpus* is not fire resistant, which may, together with low rainfall, be contributing to its decline). Other less common vegetation types include gallery forest, bamboo open savanna, the woodlands associated with the hilly areas of the river sources, open *Erythrophleum-Isobertlinia* woodland and plains dominated by perennial grasses such as *Vossia cuspidata*, *Echinochloa stagnina*, *Jardinea congoensis*, *Setaria anceps*, *Hyparrhenia rufa*, and *Eragrostis* sp., with relative distributions depending on duration and depth of seasonal flooding.

Fauna Black rhinoceros *Diceros bicornis* (T)(30 individuals), elephant *Loxodonta africana* (T)(2,000-3,000), leopard *Panthera pardus* (T), and crocodile are all found within the park, but in considerably reduced numbers. Other mammals include lion *Panthera leo*, wildcat *Felis silvestris*, giraffe *Giraffa camelopardalis*, buffalo *Syncerus caffer*, bushbuck *Tragelaphus scriptus*, giant eland *Taurotragus derbianus*, common duiker *Sylvicapra grimmia*, waterbuck *Kobus ellipsiprymnus*, kob *Kobus kob*, roan antelope *Hippotragus equinus*, hartebeest *Alcelaphus buselaphus oribi* *Ourebia ourebi*, warthog *Phacochoerus aethiopicus*, baboon *Papio anubis*, vervet monkey *Cercopithecus aethiops*, and lesser galago

(bushbaby) *Galago senegalensis*. Animals which occur in the area but which are rather less common include cheetah *Acinonyx jubatus* (T), golden cat *Felis aurata*, hippopotamus *Hippopotamus amphibius*, reedbuck *Redunca redunca*, topi *Damaliscus lunatus*, red-fronted gazelle *Gazella rufifrons*, de Brazza's monkey *Cercopithecus neglectus*, and yellow-backed duiker *Cephalophus sylvicultor*. Two species not sighted in the area until 1982/83 are bush pig *Potamochoerus porcus* and greater white-nosed monkey *Cercopithecus nictitans*. The avifauna includes large seasonal populations of pelican *Pelecanus* sp. (in the Gata-Vakaga area), shoebill *Balaeniceps rex* (of special concern), and marabou stork *Leptoptilos crumeniferus*. The black-headed bee-eater *Merops breweri* was observed frequently during 1982/83 along the Koumbala forest; it was previously considered to be very uncommon in the park.

Zoning No information

Disturbances or Deficiencies Poaching (poachers have recently begun to use automatic weapons), cattle grazing and fishing are the main problems. Numbers of black rhinoceros, leopard, elephant, giraffe, and crocodile have been reduced in the area due to poaching pressure, and the situation is deteriorating; an estimated 300-500 elephants were killed in 1982/83. Nomads from Chad and the Sudan invade the park during the dry season.

Scientific Research A four year study was begun in 1981 to study the ecology of the elephant in the park with special reference to diet, distribution and the impact of poaching. This project (WWF/IUCN Project 3019) was carried out by Peace Corps biologists. Other activities carried out by the research team included observations on poaching and other illegal activities in the park; a botanical survey; notation of species considered rare or previously unidentified in the park, and monitoring rhinoceros activity. An air count of larger mammals in the St Floris sector was carried out by FAO consultants. A vegetation study of the area was carried out by I.E.M.V.T., CEDEX, France. There is a proposal to survey the dense forests for gorillas and determine their general distribution patterns (Carroll, 1984).

Special Scientific Facilities None

Principal Reference Material

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Staff No information

Budget No information

Local Park or Reserve Administration No information

Date 1984

RESERVE DE FAUNE DE L'AOUK-AOUKALE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 1939, as a hunting reserve (the 'Circonscription de la Salamat') containing the 'parc national du Goz-Sassoulko', which was created provisionally in 1935. In 1940, the limits were redefined, and the area specified as 1,500,000ha. In 1960 this was reduced to 319,000ha, but further changes have since slightly increased the area.

Geographical Location In the north of the country, on the border with Chad, and to the north of the 'parc national Manovo-Gounda-St. Floris'. The boundary of the reserve runs along the Chad border for over 175km. 9°20'-10°01'N, 20°50'-21°54'E.

Altitude No information

Area 330,000ha. The reserve is contiguous to the 'parc national Manovo-Gounda-St Floris' (1,740,000ha), and will have part of its border common with the proposed 'réserve de faune du Bahr Oulou' (although there are now doubts that this area will ever be established).

Land Tenure Government

Physical Features The reserve lies between the Aoukale and Bahr Oulou/Bahr Kameur rivers, and is mainly composed of their flood plains, with clay soils.

Vegetation Wooded savanna

Fauna The fauna is representative of the Sudanese type with elephant *Loxodonta africana* (T), lion *Panthera leo*, giraffe *Giraffa camelopardalis* and buffalo *Syncerus caffer*, with some Sahelian species such as striped hyena *Hyaena hyaena*, and red-fronted gazelle *Gazella rufifrons*. Ostrich *Struthio camelus* are also present.

Zoning None

Disturbances or Deficiencies There is poaching, and grazing of the reserve by livestock of nomadic groups.

Scientific Research There has been an air count of large mammals by FAO consultants.

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Forestry inspectorate at Birao

Date 1984

RESERVE DE FAUNE DE LA NANA-BARYA

Management Category VI (Resource Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection No information

Date Established 10 December 1960, by Regulation 1897/60.

Geographical Location In the north-west of the country, on the border with Chad.
7°19'-8°00'N, 17°10'-17°50'E.

Altitude No information

Area 230,000ha

Land Tenure Government

Physical Features Flat plain

Vegetation *Isobерlinia* wooded savanna

Fauna The reserve is almost empty of large wildlife. Originally there was a rich Sudano-Guinean fauna with elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, giraffe *Giraffa camelopardalis*, hartebeest *Alcelaphus buselaphus*, eland *Taurotragus oryx*, lion *Panthera leo*, rhinoceros *Diceros bicornis* (T), and waterbuck *Kobus ellipsiprymnus*.

Zoning None

Disturbances or Deficiencies There is heavy poaching, with no surveillance or protection.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff None

Budget No information

Local Park or Reserve Administration Inspectorate of forestry at Markounda

Date 1984

RESERVE DE FAUNE DE L'OUANDJIA-VAKAGA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Hunting is allowed within nearly 500,000ha of the reserve.

Date Established 29 June 1925 as a hunting reserve. Hunting was forbidden in 1939, but in 1972 nearly 500,000ha were being used for hunting. The reserve was not named until 1940, at which time its area was given as 950,000ha (though the actual area was nearer 615,000ha).

Geographical Location In the north-east of the country, to the north of the 'parc national Manovo-Gounda-St Floris'. 8°35'-9°30'N, 21°55'-22°35'E.

Altitude No information

Area 130,000ha; contiguous to 'parc national Manovo-Gounda-St Floris' (1,740,000ha), and the proposed 'réserve de faune du Bahr Oulou' (although there are now doubts that this area will ever be established).

Land Tenure Government

Physical Features Plateau with sandy soils

Vegetation *Isoberlinia* wooded savanna

Fauna Wildlife is sparse but similar to that in the 'parc national Manovo-Gounda-St Floris' with buffalo *Syncerus caffer*, elephant *Loxodonta africana* (T), giraffe *Giraffa camelopardalis*, rhinoceros *Diceros bicornis* (T), antelope species, such as giant eland *Taurotragus derbianus* and hartebeest *Alcelaphus buselaphus*, warthog *Phacochoerus aethiopicus*, cheetah *Acinonyx jubatus* (T), shoebill *Balaeniceps rex* (of special concern) and crocodile.

Zoning None

Disturbances or Deficiencies There are fishing villages and other developments along the river within the park. Shepherds and hunters, particularly from Chad and Sudan, also use the area, and poaching is a problem.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Inspectorate of forestry at Birao

Date 1984

RESERVE DE FAUNE DE LA YATA-NGAYA

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection About 203,000ha in the centre of the reserve is leased to a private hunting society, but this area remains bound by the rules and regulations in force for the rest of the reserve.

Date Established 1960. An area in the north west was declassified in 1967. The southern half was part of a hunting reserve created in 1925. Hunting was completely forbidden there by 1939. In 1940, the southern area became part of the new 'réserve de faune de la Haute Kotto', but this reserve was declassified in 1960, when the 'réserve de faune de la Yata-Ngaya' was established (with 509,500ha).

Geographical Location In the north-east of the country, partly on the border with the Sudan. 8°32'-9°52'N, 23°05'-23°24'E.

Altitude Up to 900m

Area 420,000ha; surrounds the 'parc national André Félix' (170,000ha)

Land Tenure Government; about 203,000ha is leased to a private hunting society until 1992.

Physical Features A sandy plain, with hills in the central part

Vegetation *Isobertinia* wooded savanna

Fauna The fauna is little known though rhinoceros *Diceros bicornis* (T) possibly occurs, and perhaps white rhinoceros *Ceratotherium simum*, but this is doubtful. There are giant eland *Taurotragus derbianus* (T).

Zoning The reserve acts as a buffer zone for the 'parc national André Félix'.

Disturbances or Deficiencies No control infrastructure has yet been set up within the area, and there is both nomadism and poaching.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Birao Inspectorate of Forestry

Date 1984

RESERVE DE FAUNE DE ZEMONGO

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Hunting is allowed within about 60,000ha of the reserve (the area most recently gazetted).

Date Established 9 June 1925, as a hunting reserve. Protected against hunting in 1939. The area was not named until 1940, at which time its area was given as 950,000ha. This was extended to its present size in 1975, with the inclusion of further hunting sectors to the

south-west. Despite this fact, these southern sectors were still open to hunting during the 1981-1982 season (Arrêté No. 397 of 28 August 1981).

Geographical Location In the far east of the country, on the border with the Sudan. 6°10'-7°28'N, 24°40'-26°00'E.

Altitude No information

Area 1,010,000ha

Land Tenure Government

Physical Features The reserve comprises a flat plain, which is mainly without water in the dry season although it lies between the Vovodo and Goangoa rivers, and is crossed by the River Bitá. The soils are lateritic sands.

Vegetation Dense *Isobertinia* wooded savanna

Fauna The status of the elephant *Loxodonta africana* (T) is uncertain in this area. Giant eland *Taurotragus derbianus* (T) and possibly black rhinoceros *Diceros bicornis* (T) are present.

Zoning None

Disturbances or Deficiencies There is poaching. No control of the interior is possible because of inaccessibility.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Inspectorate of forestry at Rafai

Date 1984

BASSE-LOBAYE FOREST

Management Category IX (Biosphere Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection No restriction on human activities

Date Established Accepted as a Biosphere Reserve in October 1977 by Unesco. No decree under national law, but known as a scheduled forest.

Geographical Location In the south-west of the country on the border with Congo-Brazzaville. 3°40'N, 17°50'E.

Altitude Less than 500m

Area 18,200ha

Land Tenure Government

Physical Features The climate of the region is hot and wet with little annual variation. Mean annual temperature is 24.5°C and the relative humidity is 93% at six in the morning and 78% at noon. There is a short dry season in January and a rainy season from March to December with high rainfall in August, September, and October (230mm/month). Mean annual rainfall is 1761mm.

Vegetation The vegetation comprises dense, humid, semi-deciduous forest of Ulmaceae, Sterculiaceae, Meliaceae, and Sapotaceae which has not been exploited for at least the last 40 to 50 years. The canopy at about 40m is discontinuous, the intermediate storeys well developed, and the undergrowth thin. In the northern area, there is secondary growth on fallow cultivation, with more open canopy, less variation of intermediate storeys and a dense, shrubby undergrowth characterized by creepers.

Fauna Common mammals include various species of duiker *Cephalophus* and monkeys *Cercopithecus*, *Colobus*, and *Cercocebus*. Chimpanzee *Pan troglodytes* (T) and forest elephant *Loxodonta africana cyclotis* (T) are rare. Carnivores include leopard *Panthera pardus* (T), African civet *Civettictis civetta*, potto *Perodicticus potto*, and genet *Genetta* spp.. Snakes include puff adder *Bitis arietans*, mamba, spitting cobra *Naja nigricollis* and python. The relatively few bird species include: hornbill, grey parrot *Psittacus erithacus*, giant kingfisher *Ceryle maxima*, and Hartlaub's goose *Pteronetta hartlaubii*.

Conservation Management There is no management plan

Zoning No information

Disturbances or Deficiencies The area is inhabited by the Aka pygmies who live by hunting and gathering. The reserve also includes the zone on the fringe of the forest which contains several local villages. Disturbance is serious in the northern part near villages but there is none in the area of the pygmies.

Visitor Facilities No information

Scientific Research A study of man in the tropical rainforest ecosystem was started by the 'Centre Eurafricain de Biologies Humaines' among the Aka pygmy communities in 1974. Specialists from CEABH, CNTS, ORSTOM, the Pasteur Institute, the 'Centre d'Hémitypologie' of CNRS and Paris universities have taken part in this study which has become a MAB project.

Special Scientific Facilities A laboratory has been established at the research centre at Bokaka.

Principal Reference Material Publications on region and population have been produced by the Pasteur Institute, the 'Centre Eurafricain de Biologie Humaine' and ORSTOM.

Staff Three permanent employees

Budget No information

Local Park or Reserve Administration Ministère des Eaux et Forêts, BP 830, Bangui.

Date 1984





Chad

CHAD

Area 1,270,994 sq.km

Population 5,120,000 (1984)

Parks and Reserves Legislation Ordinance 14/63 of 28 March 1963 regulates hunting and the protection of nature. Areas established prior to 1963 were set up under Decree No. 47-2254 (18 November 1947) regulating hunting in the French Overseas Territories, as modified for French Equatorial Africa by Decree No. 52-182 of 18 February 1952. Decree No. 02/PR/EEPC/PNR relates to the organisation and responsibilities of the Directorate of National Parks and Faunal Reserves. Réserves naturelles intégrales are areas where all forms of usage are prohibited. National Parks appear to differ only in that they are open to visitor access. Réserves spéciales are areas where regulations can be made on a total or partial basis either permanently or temporarily, for conservation purposes. Ressources totales de faune are areas where only hunting is prohibited and other usage continues. Zones d'intérêt cynégétique are areas where the fauna is of particular scientific or economic potential, the aim being to maintain this potential. Two types of classified forest are distinguished, Classified Forest, where exploitation is controlled on a concession basis, and Protected Forests (which still remain open for use by the local population).

Parks and Reserves Administration The authority responsible for conservation policy, and exploitation and protection of natural resources is the Ministry of Tourism, Water and Forests (previously the Ministry of Tourism, Arts, and Natural Resources). This ministry is also specifically responsible for both national parks and faunal reserves. Day to day administration of protected areas is the responsibility of the Division of Management and Conservation of the Fauna (Service de l'aménagement et conservation de la faune), a central office of the Directorate of Tourism, National Parks and Faunal Reserves. At the regional level there are six 'secteurs des parcs nationaux et réserves de faune', each of which is divided into 12 surveillance blocks. The Directorate of Forests, Hunting and Antipoaching is responsible both for control of hunting outside protected areas, and for protection and management of forests.

Address

- ° Service de l'aménagement et conservation de la faune, Direction du tourisme, des parcs nationaux et réserves de faune, Ministère du tourisme, des eaux et forêts, BP 447, Ndjamená.
- ° Direction des forêts, chasse, et de la lutte contre la desertification, Ministère du tourisme, des eaux et forêts, BP 447, Ndjamená.

Additional Information The current security problems within Chad, and the general problems of desertification, seem likely to be having serious consequences for the wildlife. Nevertheless, there appears to be a firm commitment to nature conservation at all levels, with renewed management effort within some protected areas, and an increase in anti-poaching activity. As in many developing countries, however, there is an unfortunate shortage of both equipment and personnel.

References

- ° Cabot, J. and Bouquet, C. (1972). *Practical atlas of Chad*. National Institute of Social Sciences. 79 pp.
- ° d'Elzjus, C. and Gillet, H. (1964). Rapports au gouvernement du Tchad sur la faune et sa conservation. FAO, Rome.
- ° Gillet, H. and d'Elzjus, C. (1964). Preliminary report for the Chad Government on fauna and its conservation. FAO, Rome.
- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° Stanguennec, B. (1975). *Parcs nationaux et réserves de faune du Tchad*.

Protected Areas

	(hectares)
<i>National Parks</i>	
Manda	114,000
Zakouma	300,000
Subtotal	414,000
<i>Faunal Reserves</i>	
Aboutelfan	110,000
Bahr Salamat	2,060,000
Binder Lere	135,000
Fada Archei	211,000
Mandelia	138,000
Ouadi Rime-Ouadi Achim	8,000,000
Siniaka-Minia	426,000
Subtotal	11,080,000

PARC NATIONAL DE MANDA

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 19 March 1965 under Decree No. 56/EFPC; modified by Decree No. 243/PR/EFPC/PNR. Initially protected in 1953 as a réserve de faune.

Geographical Location In the préfecture of Moyen-Chari (sub-préfecture Rurale Sarh). Delimited on the east by the Chari River and on the west by a road. 9°12'-9°35'N, 17°45'-18°12'E.

Altitude No information

Area 114,000ha

Land Tenure Government

Physical Features The park is situated in a densely wooded plain with a substrate of sedimentary and red ferrous soils. The Chari River bed provides an excellent refuge for animals, as well as natural watering holes. In the eastern part there are numerous marshy areas formed round stagnant pools. The climate is tropical with a mean annual rainfall of between 950-1100mm in the north and more than 1100mm in the south.

Vegetation Sudanese bush with savanna woodland predominates, comprising trees of the families Leguminosae and Combretaceae, grading into patchy stands of dense forest. The marshy pools are surrounded by typical water course fringing vegetation dominated by Sudanese-Guinean species of *Isobertinia* and *Monotes*.

Fauna The Park was originally established for the protection of the giant eland *Taurotragus derbianus* (T), which may still be common here. Other mammals include leopard *Panthera pardus* (T), lion *Panthera leo*, spotted hyaena *Crocuta crocuta*, African civet *Civettictis civetta*, genet *Genetta* sp., elephant *Loxodonta africana* (T), hippotamus *Hippopotamus amphibius*,

buffalo *Syncerus caffer*, kongoni *Alcelaphus buselaphus*, roan antelope *Hippotragus equinus*, topi *Damaliscus lunatus*, waterbuck *Kobus ellipsiprymnus*, kob *Kobus kob*, oribi *Ourebia ourebi*, red-fronted gazelle *Gazella rufifrons*, common duiker *Sylvicapra grimmia*, and warthog *Phacochoerus aethiopicus*. The marshes and river courses are rich in birdlife.

Zoning None

Disturbances or Deficiencies Poaching is a continuing problem and there is a lack of equipment to ensure adequate surveillance. There is also overgrazing by stock of seasonal nomads and some permanent settlements have been established over the last few years.

Scientific Research Gillet and D'Elzius (1964) prepared a preliminary report on the park's fauna and conservation for the Chad Government. A study of the avifauna was carried out in 1972.

Special Scientific Facilities None

Principal Reference Material

- ° Cabot, J. and Bouquet, C. (1972). *Practical Atlas of Chad*. National Institute of Social Sciences. 79 pp.
- ° Gillet, H. and d'Elzius, C. (1964). Preliminary Report for the Chad Government on Fauna and its Conservation. FAO, Rome.
- ° Stanguennec, B. (1975). *Parcs nationaux et réserves de faune du Tchad*.

Staff One engineer of forestry work, one technical assistant of water and forests and 40 guards from the National Parks and Fauna Reserves Department.

Budget Salaries are assured by the government. Some 28,000,000 FCFA was granted by the government to the Department of National Parks and Faunal Reserves in 1983 to cover operational costs.

Local Park or Reserve Administration Southern sector, Division of Management and Conservation of National Parks and Faunal Reserves.

Date April 1985

PARC NATIONAL DE ZAKOUMA

Management Category VI (Resource Reserve)

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Total, but, due to the political situation, no management has been possible for a number of years. The situation seems to be improving, however.

Date Established Upgraded to National Park status 7 May 1963 by Decree No 86/TEF. Previously protected since 1958 as a réserve de faune.

Geographical Location Located within the adjacent préfectures of Salamet (Am-Timan and Aboudeia sub-préfectures) and Guéra (Melfi sub-préfecture). 10°60'-11°00'N, 19°20'-20°00'E.

Altitude 250-500m

Area 300,000ha. Forms the core zone of the 2,600,000ha Bahr Salamat Faunal Reserve.

Land Tenure Government

Physical Features The park lies in a vast plain, flanked by the Bone and d'Ibir rock outcrops (300-500m) in the west, and drained from north to south by the Bahr Salamat and its numerous tributaries. The watercourses are meandering and in the dry season, when the water level falls, only isolated waterholes are left as the source of water for wildlife. The soils of the plain are halomorphic, hydromorphic and vertisols. The climate is tropical, with a mean annual rainfall between 800 and 950mm.

Vegetation Characterised by a high diversity of plant species encompassing the principal Sudanese savanna associations. The open wooded savanna is dominated by the Leguminosae and Combretaceae (*Combretum*, *Anogeissus*, *Leiocarpus*, and *Terminalia* species). The small islands isolated by the meandering water courses are heavily wooded by Mimosaceae, such as *Acacia seyal*, and Caesalpinaceae. There are also scattered grassy depressions known as 'les bérébérés'.

Fauna The park is notable for the population of several hundred elephant *Loxodonta africana* (T). Other mammals include lion *Panthera leo*, leopard *P. pardus* (T), serval *Felis serval*, spotted hyena *Crocuta crocuta*, buffalo *Syncerus caffer*, giraffe *Giraffa camelopardalis*, topi *Damaliscus lunatus*, waterbuck *Kobus ellipsiprymnus*, oribi *Ourebia ourebi*, gazelles *Gazella* spp., duikers *Cephalophus* spp. and warthog *Phacochoerus aethiopicus*. The rich avifauna includes guineafowl (Numididae), bustard (Otididae), ducks and geese (Anatidae), pelican *Pelecanus* sp., egrets *Egretta* spp., crowned crane *Balearica pavonina*, and marabou stork *Leptoptilos crumeniferus*. Apparently animal populations remain good despite the events of the past 10 years and their effect on the Chad fauna as a whole.

Conservation Management There has been no active management within the park for several years due to military action within the country. However, further staff have now been assigned, and further equipment provided.

Zoning None within the park although the park itself constitutes the core zone of a faunal reserve.

Disturbances or Deficiencies Poaching within the park is an increasing threat aggravated by the rapid increase in weapons available since the start of the fighting in Chad, combined with the inadequacy of staffing and equipment to combat them. Desertification is also a problem, and has resulted in invasion of the park by pastoralists, and even by villagers in search of water.

Visitor Facilities There was a hotel nearby within the park, but this has been destroyed.

Scientific Research There has apparently been no further detailed scientific work done in the park since Gillet and d'Elzius (1964) prepared a preliminary report on the reserve's fauna and nature conservation for the Chad Government in 1963.

Special Scientific Facilities None

Principal Reference Material

- Bernard, S. (1975). Parcs nationaux et réserves de faune.
- Dugabet, R. (1984). Report on Zakouma. Parc national Zakouma *Safaris Vision Brochure* (reprint).
- Gillet, H. and d'Elzius, C. (1964). Preliminary report for the Chad Government on Fauna and its Conservation. FAO, Rome.
- Rombon, O. (1981). Faune tchadienne et la guerre civile.
- Stanguennec, B. (1975). *Parcs nationaux et réserves de faune du Tchad*.

Staff Two foresters in charge of some 20 guards, though 60 new guards are now being posted to the area. Some staff are shared with the Bahr Salamat Reserve.

Budget Salaries are assured by the government. Some 28,000,000 FCFA was granted by the

government to the Department of National Parks and Faunal Reserves in 1983 for operational costs.

Local Park or Reserve Administration East Sector, Division of Management and Conservation of National Parks and Faunal Reserves.

Date April 1985

RESERVE DE FAUNE DE L'ABOUTELFAN

Management Category No category assigned

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Partial

Date Established 20 May 1955 by Federal law No. 1683/CH

Geographical Location In sub-préfecture Mongo of préfecture Guéra. 11°35'-12°18'N, 18°35'-19°07'E.

Altitude 500-1,508m (Mount Guédi)

Area 110,000ha

Land Tenure Government

Physical Features The reserve is dominated by the mountainous massifs in the eastern section of Mongo; the Kadam Massif lies just outside the reserve to the south-east. The highest peak of the Aboutelfan and Guéra massifs is Mt Guédi at 1,508m. The climate is tropical with a mean annual rainfall of between 800 and 950mm.

Vegetation The open savanna woodland is dominated by species of *Anogeissus* and *Boschia* and is interspersed with scattered stands of *Cappariaceae*. Thorny Sahelian species occur at low density on the dry plains. There is little vegetation on the rocky massifs themselves.

Fauna The reserve was established to protect the greater kudu *Tragelaphus strepsiceros* (T). Most other mammal species are characteristic of the Chad fauna, with the exception of several savanna species such as buffalo *Syncerus caffer*, hippopotamus *Hippopotamus amphibius*, and certain antelope species. In general, wildlife density is low.

Zoning Mount Guédi is strictly protected.

Disturbances or Deficiencies The area is densely populated. The greater kudu is protected by the inaccessibility of its habitat in the rocky area, but numbers of other mammals have declined dramatically due to poaching pressure. There has apparently been inadequate surveillance and equipment since 1965.

Visitor Facilities There are organised hunting safaris.

Scientific Research There has reportedly been no further scientific work done in the park since Gillet and d'Elzius (1964) prepared a preliminary report on the reserve's fauna and conservation for the Chad Government in 1963.

Special Scientific Facilities None

Principal Reference Material

- ° Cabot, J. and Bouquet, C. (1972). *Practical Atlas of Chad*. National Institute of Social Sciences. 79 pp.
- ° Gillet, H. and d'Elzius, C. (1964). Preliminary Report for the Chad Government on Fauna and its Conservation. FAO, Rome.

Staff No information

Budget No information

Local Park or Reserve Administration Shared with Siniaka-Minia Faunal Reserve in the Eastern Sector, Division of Management and Conservation of National Parks and Faunal Reserves.

Date April 1985

RESERVE DE FAUNE DU BAHR SALAMAT

Management Category VI (Resource Reserve)

Biogeographical Province 3.12.07/3.04.04 (Western Sahel/West African Woodland/savanna)

Legal Protection Partial

Date Established 29 February 1964 by Decree No. 49/EFC. Lac Iro Controlled Hunting Area was incorporated on 8 November 1967 by Decree No. 262/PR/EF/PNR.

Geographical Location The reserve spans the préfectures of Salamat, Guéra and Moyen-Chari. 9°35'-11°31'N, 18°31'-20°20'E.

Altitude 250-500m

Area 2,060,000ha, including Lac Iro Controlled Hunting Area (1,000,000ha); surrounds Zakouma National Park (300,000ha).

Land Tenure Government

Physical Features The reserve comprises the immense plain, which is drained from north to south by the Bahr Salamat River and its tributaries. The meandering rivers only flow during the rainy season when Lake Iro becomes inundated. Lake Iro, which is situated in the south of the area, is characterized by numerous depressions with hydromorphic and halomorphic soils, hard-pan tropical ferrous soils and, in places, deep tropical ferrous soils. During the dry season some isolated waterholes persist round the lake margin. The climate is tropical with a mean annual rainfall of between 800-950mm in the northern parts and between 950-1100mm in the south.

Vegetation Characterised by a high species diversity, and includes all the major Sudanese savanna associations, from Mimosaceae savanna to Caesalpinaceae savanna. The predominant wooded savanna is characterised by Combretaceae (*Terminalia*, *Anogeissus*, and *Combretum* species) and leguminous savanna species, interspersed with dense forest patches. There are also numerous marshes along the water courses.

Fauna The mammal fauna resembles that found in Zakouma National Park with additional populations of giant eland *Taurotragus derbianus* (T), and hippopotamus *Hippopotamus amphibius*. The resident large mammal fauna is representative of the Sahelian and Sudanese savanna and includes lion *Panthera leo*, leopard *P. pardus* (T), species of hyena, serval *Felis serval*, African civet *Civettictis civetta*, genet *Genetta* sp., elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, kob *K. kob*, giraffe *Giraffa camelopardalis*, roan antelope *Hippotragus equinus*, kongoni *Alcelaphus buselaphus*, topi *Damaliscus lunatus*, bushbuck *Tragelaphus scriptus*, greater kudu *T. strepsiceros*, ourebi *Ourebia ourebi*, common duiker, *Sylvicapra grimmia*, warthog *Phacochoerus aethiopicus*, vervet monkey *Cercopithecus aethiops*, and patas monkey *Erythrocebus patas*. Nile crocodile *Crocodylus niloticus* (V) inhabit the rivers. The diverse avifauna includes ostrich *Struthio camelus*.

Zoning Lac Iro Controlled Hunting Reserve occupies the southern part of the reserve. The whole area is a buffer zone to Zakouma National Park, located in the north.

Disturbances or Deficiencies The greatest threat is from well armed poachers (both local people and nomads passing through the area. The problem is aggravated by the lack of sufficient personnel and equipment, especially when faced with guns acquired from military sources. Some encroaching cultivation and grazing continue within the park boundaries.

Scientific Research Gillett and d'Elzius (1964) produced a preliminary report on the reserve's fauna and its conservation for the Government of Chad.

Special Scientific Facilities None

Principal Reference Material

- ° Cabot, J. and Bouquet, C. (1972). *Practical Atlas of Chad*. National Institute of Social Sciences. 79 pp.
- ° Gillet, H. and d'Elzius, C. (1964). Preliminary Report for the Chad Government on Fauna and its Conservation. FAO, Rome.
- ° Stanguennec, B. (1975). *Parcs nationaux et réserves de faune du Tchad*.

Staff One forest warden and 48 parks guards (shared with Zakouma National Park).

Budget The State provides staff salaries. The running costs of 28,000,000 FCFA was granted by the Government to the Department of National Parks and Nature Reserve for operational costs in 1983.

Local Park or Reserve Administration The main reserve is administered with Zakouma by the East Sector, while the southern part, along with Manda National Park, is administered by the South Sector of the Division of Management and Conservation of National Parks and Faunal Reserves.

Date April 1985

RESERVE DE FAUNE BINDER-LERE

Management Category VI (Resource Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial; traditional use is allowed

Date Established 24 May 1974 by Decree No. 169/PR/EFPC/PNR

Geographical Location In sub-préfecture Léré, Mayo-Kebbi préfecture. 9°30'-9°50'N, 14°10'-14°45'E.

Altitude 280-500m

Area 135,000ha

Land Tenure Government

Physical Features The area is essentially rocky with eroded soils and a granite substrate centred round the Gauthiot Falls on the Mayo-Kebbi River, which flows from east to west across the reserve. There are also two lakes, Léré and Trene. The climate is tropical with a mean annual rainfall of between 800 and 950mm.

Vegetation The reserve lies in the transition zone between the open forest and savanna woodland dominated by Leguminosae to the south, and the *Combretum* woodland to the north. The savanna is very characteristic of this region, with *Anogeissus* and *Boswellia* the dominant genera.

Fauna The reserve was established to protect the hippopotamus *Hippopotamus amphibius* population of the lakes. Other mammals include, lion *Panthera leo*, leopard *P. pardus* (T), African civet *Civettictis civetta* and genet *Genetta* sp., greater kudu *Tragelaphus strepsiceros*, topi *Damaliscus lunatus*, bushbuck *Tragelaphus scriptus*, baboon *Papio* sp., patas monkey *Erythrocebus patas*, and vervet monkey *Cercopithecus aethiops*. The avifauna includes ostrich *Struthio camelus*, guinea-fowl, and francolins, with numerous other species favouring the lake area.

Conservation Management The local inhabitants celebrate a week-long festival (the 'fête of the guinea-fowl'), usually during May when the hunting of wildfowl and rodents is permitted.

Zoning No information

Disturbances or Deficiencies There have been reports of damage by elephants to plantations in the surrounding area, however, there were no traces of elephant where the reserve was surveyed and the local inhabitants have not seen them for 50 years. There are many villages, industries and much cultivation (of millet, peanuts, cotton etc) surrounding the reserve. Poaching is severe both by raiders from Cameroon as well as military personnel. The reserve has not been developed in any way since it was established, although surveillance is carried out.

Visitor Facilities No information

Scientific Research Some pedological and topographical research has been carried out, as well as various ecological and geographical studies by Thal (1973).

Special Scientific Facilities Meteorological stations at Pala, south of the reserve, and Léré and Mombaroua within the reserve.

Principal Reference Material

- * Cabot, J and Bouquet, C. (1972). *Practical atlas of Chad*. National Institute of Social Sciences. 79 pp.
- * Stanguennec, B. (1975). *Parcs nationaux et réserves de faune du Tchad*.
- * Thal, J.A. (1973). *Réserve de faune Binder-Léré*. Institute of Animal Husbandry and Veterinary Medicine for Tropical Countries, N'Djamena.

Staff One technical assistant from the water and forests department, 20 national park guards and three permanent workers

Budget No information

Local Park or Reserve Administration South-west sector, Division of Management and Conservation of National Parks and Faunal Reserves.

Date April 1985

RESERVE DE FAUNE DE FADA ARCHEI

Management Category No category assigned

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Partial

Date Established 7 October 1967 by Decree No. 232/PR/EFPC/PNR

Geographical Location In sub-préfecture Fada of préfecture Borkou-Ennedi-Ti. 16°35'-17°15'N, 21°10'-21°32'E.

Altitude 500-1,000m

Area 211,000ha

Land Tenure National

Physical Features The reserve comprises a rocky area with an eroded substrate interspersed with wadis and barren sand dunes in the south-west. It is within the tropical desert zone and is characterised by 'gueltas', small permanent ponds with rocky bottoms. The mean annual precipitation is less than 50mm.

Vegetation The area is notably barren with a depauperate flora. There are some *Acacia* spp. scattered throughout and *Balanites* spp. near the wadis.

Fauna The reserve was primarily established to protect the barbary sheep *Ammotragus lervia*, but there are also small groups of addax *Addax nasomaculatus* (V), oryx *Oryx* sp., dorcas gazelle *Gazella dorcas*, addra gazelle *G. dama*, leopard *Panthera pardus* (V), caracal *Felis caracal*, aardvark *Orycteropus afer*, cheetah *Acinonyx jubatus* (V), and desert rodents. Ostrich *Struthio camelus* are found in reasonable numbers. There are also some relic crocodiles in the guelta of Archei.

Zoning None

Disturbances or Deficiencies There has been a lack of personnel within the park since 1972 as a result of political instability in the region, and insufficient equipment since establishment. Poaching has become more elaborate with the introduction of modern weaponry to the civilians by the military stationed at Fada.

Scientific Research There has apparently been no further scientific work done in the park since Gillet and d'Elzius prepared a preliminary report on the reserve's fauna and conservation for the Chad Government in 1963.

Special Scientific Facilities None

Principal Reference Material

- ° Cabot, J. and Bouquet, C. (1972). *Practical Atlas of Chad*. National Institute of Social Sciences. 79 pp.
- ° Gillet, H. and d'Elzius, C. (1964). Preliminary Report for the Chad Government on Fauna and its Conservation. FAO, Rome.

Staff None in 1983

Budget None in 1983

Local Park or Reserve Administration This area was administered by the Northern sector station which was in Ouadi Rime-Ouadi Achim Reserve, Division of Management and Conservation of National Parks and Faunal Reserves.

Date April 1985

RESERVE DE FAUNE DE MANDELIA

Management Category No category assigned

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial

Date Established 7 October 1967 by Decree No. 231/PR/EFC/PNR, modified by Decree No. 199/PR/EFPC/PNR of 24 June 1969.

Geographical Location In the sub-préfecture of N'Djamena, Chari-Baguirmi préfecture. The Chari and Logone rivers demarcate the eastern and western boundaries respectively. 11°15'-11°50'N, 15°00'-15°15'E.

Altitude 250-500m

Area 138,000ha

Land Tenure National

Physical Features Although the reserve is situated in the sahelian climatic zone, it is inundated during the wet season by the floodwaters of the Chari River in the east and of the Logone River in the west. The soils are predominately sedimentary. The annual rainfall varies between 500 and 800mm.

Vegetation Fairly dense savanna woodland predominates, characterised by species of *Terminalia*, *Anogeissus*, and *Combretum*. The Sudano-Guinean species of *Isobertlinia* and *Monotes* dominate the strips of vegetation along the watercourses.

Fauna Mammals include elephant *Loxodonta africana* (T), (some 660 individuals when the reserve was established), kob *Kobus kob*, bushbuck *Tragelaphus scriptus*, red-fronted gazelle *Gazella rufifrons*, warthog *Phacochoerus aethiopicus*, and aardvark *Orycteropus afer*. Large numbers of birds gather around the waterholes and the two rivers.

Zoning None

Disturbances or Deficiencies The principal problems are insufficient staff and equipment to combat the illegal grazing, cultivation, and hunting, both by local people as well as intruders

from Cameroon. Large numbers of animals have migrated to Cameroon to escape hunting pressure, although there are reports of elephant and kob returning to Chad. There are several villages within the reserve. Also, several military bridges have been erected over the rivers at strategic points. It has been reported that this protected area may be degazetted.

Scientific Research The only scientific studies were carried out by FAO in 1964.

Special Scientific Facilities None

Principal Reference Material

- ° Cabot, J. and Bouquet, C. (1972). *Practical Atlas of Chad*. National Institute of Social Sciences. 79 pp.
- ° Gillet, H. and d'Elzies, C. (1964). Preliminary Report for the Chad Government on Fauna and its Conservation. FAO, Rome.
- ° Stanguennec, B. (1975). *Parcs nationaux et réserves de faune du Tchad*.

Staff One forester and 22 wardens

Budget No information

Local Park or Reserve Administration South-west Sector, Division of Management and Conservation of National Parks and Faunal Reserves.

Date April 1985

RESERVE DE FAUNE DE OUADI RIME-OUADI ACHIM

Management Category No category assigned

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Partial

Date Established 10 May 1969 by Decree No. 135/PR/EFPC/PNR. Decree No. 150/PR/EFPC/PNR of 27 May 1969 designated the northern half of the reserve as a controlled hunting area.

Geographical Location In the préfectures of Biltine, Batha, Kanem, Borkou-Ennedi and Tibesti. 13°48'-17°35'N, 17°35'-21°45'E.

Altitude 0-250m in the west, 250-500m in the east

Area 8,000,000ha (currently the third largest designated protected area in the world).

Land Tenure Government

Physical Features The reserve lies in a shallow east-west depression which is part of the massive Chad basin. It is basically featureless, consisting of a system of low, fixed sand dunes of quaternary origin located to the north of the 16th parallel. However, there are some areas with typical desert landscapes of shifting sands and groups of crescent-shaped barchans in the north, and outcrops of granitiferous bedrock in the regions of Ganatir and Oum Chewouba. At Eléla, extensive volcanic deposits can be seen. The Goz Kerky contrasts with the rest of the featureless region; it is a long, fairly continuous north to south running dune cordon that marks the 332 metre strandline of the second expansion of the Palaeo-Chad Sea. Wadis, or temporary

water courses, are the most prominent feature of the reserve. There are two climatic zones within the reserve, desert and semi-desert. The rainy season generally lasts from June to October, although rainfall is unpredictable and sporadic and Newby (1978) divided the year into five periods. The mean daily temperature ranges from above 40°C in April, down to only 5°C in January.

Vegetation Three vegetation types have been described: 1) Wooded steppe in the south where the fixed dunes, separated by wadis and depressions, occur. Annual grasses are found on the dunes interspersed with trees such as *Acacia senegal*, *Balanites aegyptiaca*, *Combretum glutinosum*, and *Boscia senegalensis*. Species confined to wetter areas include the perennial grasses *Cymbopogon schoenanthus* and *Antheophora nigritana*, as well as annuals *Sporobolus helvolus* and *Corchorus olitorius*, and the trees *Acacia mellifera*, *Dalbergia melanoxylon*, and *Cordia sinensis*. 2) Sub-desert and steppe, which covers some two-thirds of the reserve. It is characterised by grasses such as *Aristida mutabilis*, *Chloris prieurii* and *Cenchrus biflorus*, and herbs such as *Limeum viscosum*, *Indigofera hochstetteri*, and *Blepharis linariifolia*. Trees are concentrated in dune depressions with *Acacia tortilis* the most adaptable. An abundant species of interest is the wild melon *Citrullus colocynthis*, which provides much of the water for vertebrate species. Around the wadis, grasses are profuse and species such as *Panicum laetum* and *Eragrostis* sp. can be harvested in some years. 3) Desert in the northern section of the reserve where there is very little permanent vegetation. An extremely hardy desert plant is *Cornulaca monacantha* and manages to grow in clumps on open sandy soil.

Fauna The reserve was set up to protect ostrich *Struthio camelus*, cheetah *Acinonyx jubatus* (T), addax *Addax nasomaculatus* (T), and scimitar-horned oryx *Oryx dammah* (T) and the reserve holds one of the last viable, wild breeding populations of the oryx. Three gazelles, dama *Gazella dama*, dorcas *G. dorcas*, and red-fronted *G. rufifrons* also occur here. Thousands of Palaearctic migrant waterfowl visit the wadis during the short rainy season. Newby (1978) describes 34 mammalian species (excluding rodents and bats) and 259 bird species, with 102 species resident, 59 species seasonal visitors and 98 species Palaearctic migrants.

Zoning There were two administrative sections and a northern controlled hunting area known as 'Ouadi Haouach', but this was effectively abolished with the ban on firearms in 1976, and addition of oryx and addax to the totally protected list in 1972-1973.

Disturbances or Deficiencies The most serious problems are poaching by nomads (with horses, dogs and nets), motorised hunters, military personnel, and grazing, the latter resulting in the exclusion of wild grazers from the best pastures. The opening of new deep wells near the wintering quarters of the addax and oryx has increased poaching pressure, as it improves accessibility, as well as increasing the number of domestic animals. Prior to 1979, there was inadequate equipment for surveillance and guard stations sited on the edge of the reserve, but since 1979, because of the security problems which have totally disrupted this region, all personnel have left the area and all equipment has disappeared.

Scientific Research There have been several studies dating from 1962 (Gillet and d'Elzies, 1964; Newby, 1978). The area has potential both for ornithological studies, particularly of the migratory birds and research into commercial utilisation of the oryx.

Special Scientific Facilities None

Principal Reference Material

- ° Bassett, T.H. (1975). Oryx and addax in Chad. *Oryx* XIII(1): 50-51.
- ° Cabot, J. and Bouquet, C. (1972). *Practical Atlas of Chad*. National Institute of Social Sciences. 79 pp.
- ° Gillet, H. and d'Elzies, C. (1964). Preliminary report for the Chad Government on Fauna and its Conservation. FAO, Rome.
- ° Newby, J.E. (1978). Scimitar-horned Oryx the End of the Line? *Oryx* XIV(3): 219-221.
- ° Newby, J.E. (1978). The ecological resources of the Ouadi Rimé - Ouadi Achim Faunal Reserve. Report for WWF/IUCN Project 1327.

° Stewart, C.W.R. (1975). A vegetational survey of the Ouadi Rimé-Ouadi Achim Faunal Reserve. WWF/IUCN Project 1327.

Staff Up to 1978 there were two 'chefs de secteurs' (of whom one was a Frenchman), an IUCN/WWF expert, and 50 guards. All staff have now left.

Budget Prior to 1978, salaries were paid by the government. WWF funded much of the development costs.

Local Park or Reserve Administration Before the recent problems, the reserve was administered from the Northern Sector Headquarters, Division of Management and Conservation of National Parks and Faunal Reserves (Biltine Préfecture).

Date April 1985

RESERVE DE FAUNE DE SINIAKA-MINIA

Management Category No category assigned

Biogeographical Province 3.04.04 (West Africa Woodland/savanna)

Legal Protection Partial. The reserve is considered a national controlled hunting area with hunting allowed, except of rhinoceros and greater kudu.

Date Established 17 May 1961 by Decree No. 97/PG/EF, and modified 4 April 1965 by Law No. 964/PR/T.

Geographical Location In the sub-préfectures of Melfi and Bouso, in Guéra and Chari-Bagurmi prefectures respectively. 10°8'-10°45'N, 17°45'-18°20'E.

Altitude 500-1,613m

Area 426,000ha

Land Tenure Government

Physical Features The reserve lies in an immense plain, broken only by some rocky massifs in the east which form the western boundary. They lie along a north-east axis and the highest peak rises to 1,613m. The reserve is based on the hydrological system of the Siniaka and Doroum rivers, which drain from north to south, finally joining the Minia River which, in turn, flows west in the southern section of the reserve. These meandering rivers flow during the wet season and form waterholes in the dry season. The reserve lies in a transition zone between the Guéra mountains to the north and the floodplain of Chari to the south. The soils are extremely eroded and are principally hydromorphic, halomorphic and ferrous in nature. The climate is tropical with a mean annual rainfall of between 800-950mm in the north, and 950-1100mm in the south.

Vegetation To the north, the flora comprises a number of thorny species which grades slowly into Sudanese savanna, dominated firstly by *Combretum* spp., then by *Daniellia* spp. and *Khaya* spp., or dense clusters of *Anogeissus* spp..

Fauna The reserve is important for its populations of black rhinoceros *Diceros bicornis* (T)(six individuals were recorded in 1974 by aerial survey), greater kudu *Tragelaphus strepsiceros*, and giant eland *Taurotragus derbianus* (T). The mammal fauna is representative of African savanna

with leopard *Panthera pardus* (T), lion *P. leo*, spotted hyena *Crocuta crocuta*, elephant *Loxodonta africana* (T), hippotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, kongoni *Alcelaphus buselaphus*, roan *Hippotragus equinus*, topi *Damaliscus lunatus*, waterbuck *Kobus ellipsiprymnus*, kob *K. kob*, ouribi *Ourebia ourebi*, giraffe *Giraffa camelopardalis*, red-fronted gazelle *Gazella rufifrons*, common duiker *Sylvicapra grimmia*, warthog *Phacochoerus aethiopicus*, African civet *Civettictis civetta*, genet *Genetta* sp., and aardvark *Orycteropus afer*. Birds are abundant around the marshes and along the River Minia.

Zoning None

Disturbances or Deficiencies Lack of staff and equipment is the principal deficiency, especially when the poaching problem is exacerbated by the availability of military arms and vehicles to the hunters. Camping grounds are in need of maintenance.

Scientific Research This reserve apparently has potential for botanical studies. There has been no further scientific work done in the park since Gillet and d'Elzius prepared a preliminary report on the reserve's fauna and conservation for the Chad Government in 1963.

Special Scientific Facilities None

Principal Reference Material

- ° Cabot, J. and Bouquet, C. (1972). *Practical Atlas of Chad*. National Institute of Social Sciences. 79 pp.
- ° Gillet, H. and d'Elzius, C. (1964). Preliminary Report for the Chad Government on Fauna and its Conservation. FAO, Rome.
- ° Stanguennec, B. (1975). *Parcs nationaux et réserves de faune du Tchad*.

Staff Two parks department staff

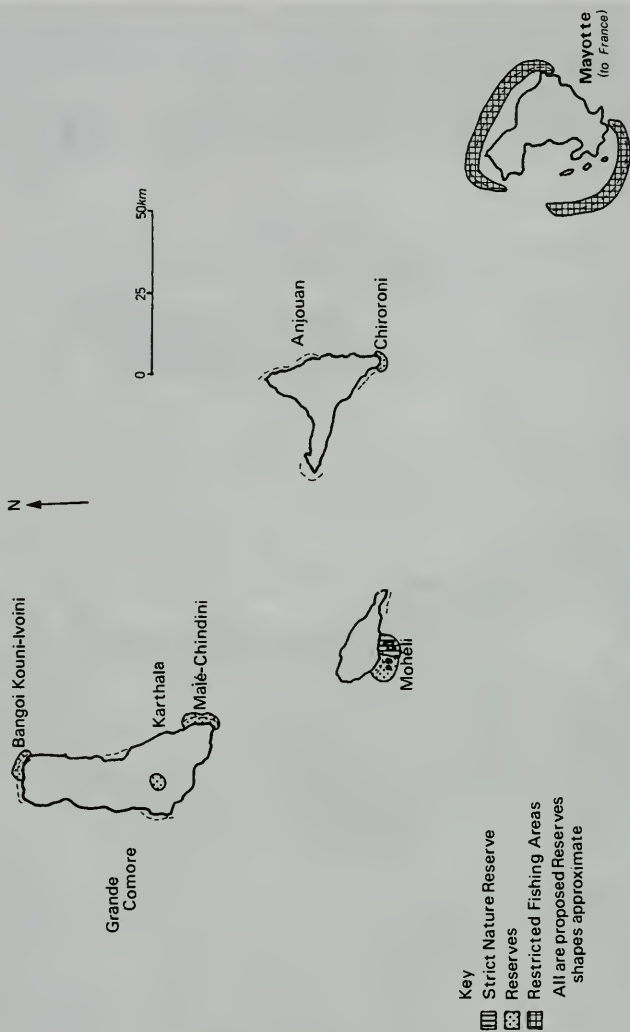
Budget Salaries of two staff members are assured by the government.

Local Park or Reserve Administration Eastern Sector, Division of Management and Conservation of National Parks and Faunal Reserves.

Date April 1985



Comoros



COMOROS

Area 2,274 sq.km

Population 385,000 (1983)

Parks and Reserves Legislation There is no legislation with respect to most reserves, however, for economic reasons, the Government intends to declare certain sites as protected areas. Mayotte is still administered by France and comes under French legislation: Law 60.708 of 22 July 1960, which applies to the establishment of National Parks, and the law of July 1976 (Loi sur la protection de la nature) which applies to all aspects of conservation, including reserves. The Mayotte lagoon is already protected to some extent as fishing is only allowed with government authorisation. Within the Comoros there is a law protecting coral and sand, but this is not enforced and both are used to produce lime and cement to build houses. National monuments are recognised and although there is no legislation for these sites they are respected by the people of Comoros.

Parks and Reserves Administration Environmental problems are dealt with by the Ministry of Equipment, Environment and Urbanisation, and the Ministry of Production, Industry and Art. Agriculture, forestry, fisheries, fauna and flora are managed under this latter Ministry by a Central Federal Directorate for Rural Development (CEFADER). The Forestry Department concentrates on the problem of revegetation to try and control erosion. Exotic species of plant are used due to their rapid growth when compared to native species. The Fisheries Department is managed in conjunction with the Society for Development of Fishing in Comoros (SODEPEC).

Address

° Direction général de l'Environnement de l'Urbanisme et de l'Habitat, BP 12, Moroni.

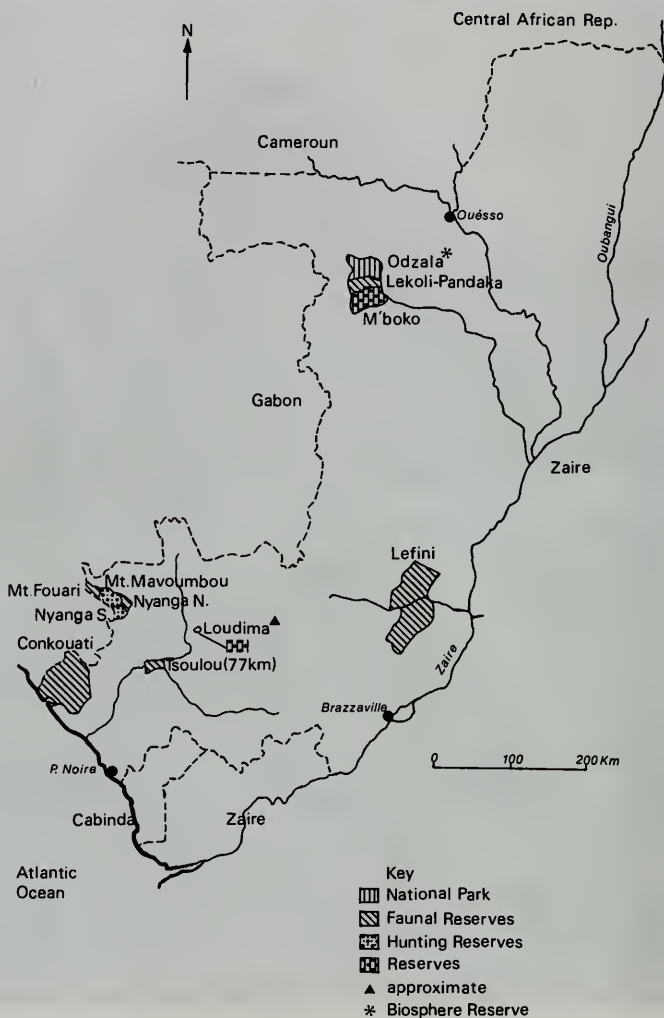
Additional Information Demands for use of natural resources are rapidly expanding and although the areas to be protected have been identified, the government lacks the finance and technical expertise to establish these sites or ascertain priorities.

SODEPEC intends to create marine parks: at Mohéli on the islands of Nisoumachona (5ha) (a strict nature reserve with fishing prohibited and only opened to scientists, surrounded by a buffer zone where artisanal fishing is permitted); marine areas between Bangoi Kouni and Ivoini, and Chindini and Malé (in the north and south of Grand Comore respectively); and Chirononi on Anjouan. The volcano of Karthala on Grand Comore (5,000ha), has also been suggested for protection by the government.

References

° Noman, A.A.B. (1983). Rapport national pour les Comores. Unpublished IUCN report, UNEP Regional Seas Programme.





Congo

CONGO

Area 342,000 sq.km

Population 1,740,000 (1984)

Parks and Reserves Legislation Law 7/62 of 20 January 1961 controls the exploitation and protection of fauna and gives authority to the Hunting and Wildlife Protection Service (Service des chasses et de la protection de la faune) to protect natural sites and create reserves. In order to maintain sufficient density of game animals throughout the country, the regions and rural communes are required to maintain as 'game reserves' at least one fifth of their area. Protected areas are of four kinds: Domaines de chasse - areas where hunting is allowed only with a big game hunting permit which limits the number of animals that can be taken; Réserves de chasse - domaines de chasse that have been closed to hunting for limited periods; Réserves de faune - where hunting is totally prohibited but other traditional rights of usage are allowed (other names such as 'réserve totale de la faune' and 'réserve partielle de la faune' appear to be loose connotations of the same term); parcs nationaux - areas where all human exploitative activities are excluded. It would appear that the designation of areas as domaines de chasses, réserves de chasse and réserves de faune does not necessarily preclude forest exploitation. Classified Forests and Protected Forests can be set up under the Forest Code (Law No. 4 of 4 January 1974), though both are open to controlled exploitation.

Parks and Reserves Administration All problems relating to wildlife and conservation are the responsibility of the Department of Water and Forestry (Département des eaux et forêts), and the administrative framework had been the same for many years. Recently this Department has been reestablished as a Ministry. Protection of reserves is the responsibility of the Hunting and Wildlife Protection Service (Service des chasses et de la protection de la faune) in the regions or districts in which the areas are located. This Service is under the direct control of the Division of Hunting, Fishing and Pisciculture (Direction de chasses, pêche et pisciculture) who also control the Service de la pêche. The Division in Brazzaville is the 'conceptual' side of the operation while the regional offices are the 'executors' (but still generally in a bureaucratic rather than a field sense because of the general lack of field personnel).

Address

- ° Service de la chasse et de la conservation de la nature, Direction de chasses, pêches et pisciculture, Ministère des eaux et forêts BP 2153, Brazzaville.
- ° Direction des eaux et forêts, Ministère des eaux et forêts, BP 98, Brazzaville.

Additional Information The legislation regulating hunting and nature conservation is both complete and very complex, but it is not fully implemented and is in need of revision (having been set up before 1970 and in some cases before 1940). In 1982 there were only nine guards working in the field to cover the entire protected area system, and severe shortages of equipment were reported (Verschuren, 1982). There is still a large area of forest in Congo, covering about 60% of the country (Verschuren, 1984), some is much disturbed, but the northern block is one of the least disturbed in Africa. In contrast, the savanna parts of the country are very disturbed and little of the original fauna remains. As a result of a survey in 1981, Verschuren recognised the forest as a resource of importance second only to the country's oil reserves, and suggested that a ministry especially for water and forests be set up (which has since occurred).

References

- ° Spinage, C.A. (1980). Parks and Reserves in Congo Brazzaville. *Oryx* XV(3): 292-295.
- ° Verschuren, J. (1982). Relance de la Conservation de la Nature. Report for the Ministry of Water and Forests, Brazzaville, Congo. Institut Royal des Sciences Naturelle de Belgique.
- ° Verschuren, J. (1984). En pays plein d'avenir pour la faune forestière d'Afrique: la République du Congo. Extract from *Chasse et Nature* June 1984.

Protected Areas		(hectares)
<i>National Parks</i>		
Odzala		126,600
<i>Faunal Reserves</i>		
Conkouati		300,000
Lefini		650,000
Lekoli-Pandaka		68,200
Mont Fouari		15,600
Nyanga North		7,700
Tsoulou (Km 77)		30,000
	Subtotal	1,071,500
<i>Reserves</i>		
Loudima		6,000
M'boko		90,000
	Subtotal	96,000
<i>Hunting Reserves</i>		
Mount Mavoumbou		42,000
Nyanga South		23,000
	Subtotal	65,000
<i>Biosphere Reserves</i>		
Parc national d'Odzala		110,000

PARC NATIONAL D'ODZALA

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Total (strict reserve)

Date Established First established in 1935 as a strict nature reserve. Gazetted in 1940 as a National Park of 110,000ha by Arrêté No. 2243 of 27 July. This law provided for a more precise definition of the boundaries to be established, but this has never been done. Accepted in January 1977 as a Biosphere Reserve.

Geographical Location Cuvette Region, M'Bomo District, north-west Congo. 30km east of the Gabon border and 120km south-west of Ouesso on the Cameroon border. 0°35'-1°05'N, 14°40'-15°05'E.

Altitude 400-600m

Area National park 126,000ha; biosphere reserve 110,000ha. Odzala is part of a continuous 284,800ha conservation area with Lekoli-Pandaka (68,200ha) and M'boko (90,000ha) reserves.

Land Tenure Government

Physical Features The area comprises an undulating plateau in the south, flattening out to the north. The park contains the blue water Lake Moba and many natural salt pans. Boundaries are defined by the Mambili River from the Odzala-Liouesso trail to the former Zalangoi post,

the Zalangoi-Odzala trail, and the trail from Odzala to Liouesso to the Mambili. Mean annual rainfall is 1595mm falling all year round. Monthly rainfall varies between 30mm (July) and 210mm (October), the driest months are January and June to August.

Vegetation About 90% of the park comprises dense evergreen forest of partly secondary origin with dense underbrush of Marantaceae species. Vegetation varies with relief and denser forest occurs in the south where the relief is greatest. Savanna occurs on the hilltops.

Fauna Typical forest fauna includes leopard *Panthera pardus* (T), lion *P. leo*, spotted hyena *Crocuta crocuta*, elephant *Loxodonta africana* (T), dwarf buffalo *Syncerus caffer nanus*, great forest hog *Hylochoerus meinertzhageni*, bushpig *Potamochoerus porcus*, hippopotamus *Hippopotamus amphibius*, gorilla *Gorilla gorilla* (T), chimpanzee *Pan troglodytes* (T), bongo *Tragelaphus euryceros*, sitatunga *T. spekei*, duiker species including yellow-backed duiker *Cephalophus sylvicultor*, and several monkey species. The rare giant African swallowtail *Papilio antimachus* (R) has been recorded in this area.

Population Pygmies occupy certain areas of the park

Conservation Management No information

Zoning None

Disturbances or Deficiencies Poaching has been reported especially of elephant, gorilla and chimpanzee for meat and trophies. Staff are few and stationed outside the park. The park has never been developed and there is no tourism.

Visitor Facilities No information

Scientific Research No research has yet been carried out but scientific study should be made of the ecosystems. Access is possible by the Mambili River in the north and east and by track from Mbandza to Sembé in the west.

Special Scientific Facilities There are no scientific facilities.

Principal Reference Material

° No information

Staff One keeper (graduate of the wildlife school at Garoua in Cameroon) and four labourers stationed outside the park in the administrative centre of Mbomo. The labourers are used only to maintain the Mbomo-Camp Caravati track.

Budget Presumably covered by the central budget for parks and reserves.

Local Park or Reserve Administration Direction Régional des Eaux et Forêts for Cuvette-Owando.

Date 1983

RESERVE DE FAUNE DE CONKOUATI

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Partial, but there is no means of execution. The fauna of the region is supposed to be protected for a period of five years by order 4432/MEF/DEFNR/BC-17-01 of 20 May 1980 but application of this order depends on adequate management.

Date Established May 1980

Geographical Location Near the Gabon border, Kouilou Region, 150km from Pointe-Noire on the Atlantic coast. 4°00'S, 11°20'W.

Altitude Near sea level

Area 300,000ha

Land Tenure Government

Physical Features The reserve comprises a low-lying area with several lagoons (including Lagune de Conkouati, Lac Kiroka, Lac Tchibenda and Lac Tchimba) connecting with the Atlantic Ocean. There are fine beaches along the coast and mountainous areas inland.

Vegetation The main vegetation types include dense humid forest, stunted scrub, and areas of mangrove.

Fauna Mammals include: buffalo *Syncerus caffer*, bush pig *Potamochoerus porcus*, chimpanzee *Pan troglodytes* (T), mandrill *Mandrillus sphinx* (T), waterbuck *Kobus ellipsiprymnus*, forest duikers *Cephalophus* spp., sitatunga *Tragelaphus spekei*, brush-tailed porcupine *Atherurus africanus*, and manatee *Trichechus senegalensis* (T) in Lake Tchibenda. Gorilla *Gorilla gorilla* (T) have been recorded in the area.

Zoning None

Disturbances or Deficiencies Lack of finance and staff to control poaching has resulted in a noticeable decline in animal numbers. It is hoped that a marine section will be added to the reserve, but due to a shortage of funding, no study has yet been made. There is still a sizeable human population in the reserve and timber felling is gradually reducing the forest islands. Oil exploration is being carried out.

Visitor Facilities There is potential, especially for sport fishing.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

Staff None

Budget No information

Local Park or Reserve Administration Direction Régional des Eaux et Forêts, Point Noire.

Date 1983

RESERVE DE FAUNE LEFINI

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Partial

Date Established 26 November 1951. The reserve was established as a hunting reserve, but is now termed a faunal reserve and was originally set up for a period of 30 years, but there is no information on current status.

Geographical Location 125km north of Brazzaville between Bateke Plateau and Pool Regions. The reserve stretches east to the Congo River which forms the border with Zaire. 2°30'-3°30'S, 15°05'-16°00'E.

Altitude 600-800m

Area 650,000ha

Land Tenure Government

Physical Features The reserve is situated on the vast Bateke sandstone plateau dissected by the Léfini and Nambouli rivers and their tributaries which have cut the plateau to depths of 200-300m, forming some spectacular canyons. The plateau is mainly composed of Kalahari sands with generally black soils except for some sandy areas. The southern part is broken, hilly country. There is a heavy rainfall of 1800-2500mm during a nine month wet season. Temperatures range from 22°C to 30°C.

Vegetation The reserve is situated in an area of dense, dry forest, but comprises mainly open, fire-induced *Trachypogon* and *Hyparrhenia* grassland savanna with islands of forest. The savanna grassland ranges from short to medium height and from open treeless savanna to well-wooded savanna with species including *Hymenocardia* and *Nauclea*. Most of the rivers are bordered by gallery forest which is relatively luxuriant and in places impenetrable.

Fauna The fauna of the plateau is very reduced but species in the gallery forests include elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, warthog *Phacochoerus aethiopicus* (the most common larger mammal in Congo), sitatunga *Tragelaphus spekei*, yellow-backed duiker *Cephalophus sylvicultor* and common duiker *Sylvicapra grimmia*. Hippopotamus *Hippopotamus amphibius* are present along the Louna and Lesio rivers. The area has a rich diversity of waterfowl. Other birds include francolins *Fringilla* spp., bustards *Eupodotis* spp., guinea-fowl, turtledoves, and quail (all protected). The black-chinned weaver *Ploceus nigrimentum* (K) may be protected by this reserve. The only record of it from Congo is from nearby Djambala and there are only a few other records, all from Angola.

Zoning The Blue Lake of Mah area constitutes a buffer zone.

Disturbances or Deficiencies There are plans to dam part of the Léfini River at Imboulou which could flood large areas of the reserve. Poaching of elephant and lion in particular has caused the disappearance of these species from the banks of the Nambouli and Ngawonba rivers. The guard posts at Mbé and Mboka-Léfiri are too far apart and the number of guards too few to control poaching. Game was reported to be hunted out in 1980. Bushfires are common. There are five villages in the reserve, but there is no information on their impact.

Visitor Facilities The planned development of tourism in the Nambouli sector has been halted due to a shortage of guards, and the closure of the airstrip at Mpoh and tracks from Mpoh and Ibou. Lodges at these sites have also been abandoned. The reserve is however, easily accessible from Brazzaville. Facilities at Mah (159km from Brazzaville) could be upgraded to provide visitor accommodation. The Blue Lake of Mah is considered a prime attraction.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff One control station with four temporary guards

Budget Presumably covered by the central budget for parks and reserves.

Local Park or Reserve Administration No information

Date 1983

RESERVE DE FAUNE DE LEKOLI-PANDAKA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Partial

Date Established 3 December 1955, by decree

Geographical Location North-west Congo about 150km south-west of Ouessou on the Cameroon border. Bordered by the Lekoli River in the north, the Mbomo-Mbandza road in the west and the Etoumbi-Mbomo road in the south-west. 0°30'-0°46'N, 14°30'-15°14'E. (The coordinates apply to the combined area with M'boko Reserve).

Altitude 200-300m

Area 68,200ha. The reserve is part of a continuous 284,200ha conservation area with M'boko Reserve (90,000ha) and Odzala National Park (126,600).

Land Tenure Government

Physical Features The Lekoli River is very deep in places, but has some salt pans which are important in attracting fauna to the area. The soils are subject to landslides and washaways when saturated during the long rainy season when up to 60% of the reserve is flooded. Storms are fairly common in the short, dry season from June to August/September. Annual rainfall ranges from 2500mm to 3800mm and mean monthly temperature from 23°C to 28°C.

Vegetation The reserve is located in the transition zone of two major vegetation types, equatorial rainforest and scattered tree grassland savanna dominated by *Andropogon* (about one third of the reserve).

Fauna Forest fauna include: gorilla *Gorilla gorilla* (T), bongo *Tragelaphus euryceros*, sitatunga *T. spekei*, giant forest hog *Hylochoerus meinertzhageni*, forest elephant *Loxodonta africana cyclotis* (T), and dwarf buffalo *Syncerus caffer nanus*. Savanna fauna include lion *Panthera leo* and various antelope.

Zoning None

Disturbances or Deficiencies There is poaching of game and fish, and, in particular, of elephant and buffalo which are poisoned and shot at the salt pans. Access is difficult but is mainly by the Lekoli River.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Two staff who are also responsible for Odzala National Park. There are no control stations.

Budget Presumably covered by the central budget for parks and reserves.

Local Park or Reserve Administration Direction Régional des Eaux et Forêts for Cuvette-Owando.

Date 1983

RESERVE DE FAUNE DU MONT FOUARI

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Partial

Date Established 8 February 1956 by Decree No. 535/CH

Geographical Location On the Gabon border in south-west Congo, 200km from Loubomo (formerly Dolisie) on the main road to Libreville. 2°35'-3°00'S, 11°00'-11°40'E.

Altitude 100-400m

Area 15,600ha. The reserve is part of a continuous 98,600ha conservation area with Mount Mavoumbou Hunting Reserve (42,000ha) and Nyanga North (7,700ha) and South (23,000ha) reserves.

Land Tenure Government

Physical Features Much of the reserve comprises a plain (sometimes flooded) with numerous marshy areas including Lac Bleu which is supplied from underground water. Mount Fouari is an outstanding feature composed partly of calcareous rocks and is the source of a small river, which sometimes dries up in the dry season. The south-west boundary is formed by the Ngonge River which in places forms the border with Gabon. Red lateritic soils are widespread, but there are areas of black cotton soil on the plains. Hot, humid equatorial climate with a dry season from June to mid October and rainy season from October to May is broken by a short, dry season in January/March. The rainfall averages 1200mm and it is one of the driest parts of the country. Mean temperature range is 23°C-28°C.

Vegetation Ninety percent of the reserve comprises tall and short grassland savanna, moderately well wooded. The tall grass *Trachypogon* savanna is burnt annually. Other

fire-resistant species include *Cymbopogon giganteus*, *Hyparrhenia* spp., and *Eragrostis superba*. Common tree species are *Hymenocardia assida* and *Hannonia* with many species of Cyperaceae typical of the margins of marshy areas and banks of watercourses. The remaining area comprises fairly dense limba *Terminalia superba* forest on Mount Fouari (made more impenetrable by liberal growth of lianes), and gallery forest.

Fauna Mammals include: forest buffalo *Syncerus caffer*, bushpig *Potamochoerus porcus*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca arundinum*, common duiker *Sylvicapra grimmia*, and various monkeys. Forest elephant *Loxodonta africana cyclotis* (T) are nomadic in this region and occasionally occur in the reserve. The avifauna includes pelican *Pelecanus* sp..

Zoning None

Disturbances or Deficiencies There is poaching. A large number of buffalo were destroyed in 1970 and since then the area has largely been neglected.

Visitor Facilities Large animals are more numerous here than in other Congo reserves and the reserve is one of the few areas with motorable tracks and where sightings can be guaranteed. Facilities include a 50km tour, an airstrip (opened in 1966) and a visitor camp near the river (though this is reported to be in poor condition).

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff One conservator and six rangers

Budget Covered by a central budget for parks and reserves.

Local Park or Reserve Administration Direction Régional des Eaux et Forêts, Fouari, BP 2 Loubomo.

Date 1983

RESERVE DE FAUNE DE LA NYANGA NORD

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Partial

Date Established 8 February 1956 by Decree No. 535/CH

Geographical Location Divenie District in south-west Congo, on the border with Gabon. 2°20'-3°10'S, 11°30'-12°00'E.

Altitude 150-300m

Area 7,700ha. The reserve is part of a continuous 88,300ha conservation area with Mount Mavoumbou Hunting Reserve (42,000ha), Mount Fouari Faunal Reserve (15,600ha), and Nyanga South Hunting Reserve (23,000ha).

Land Tenure Government

Physical Features The area is separated from Nyanga South Reserve by the Nyanga River. Lac Tsoubou (resembling Lac Bleu in Mount Fouari Reserve) is a prime feature. It is very deep in one area with blue waters that are in constant circulation. Access to the shore is difficult due to jagged limestone rocks dissected by erosion. The reserve also contains the narrow Mitsoubou Gorge consisting of many natural rock formations. Soils are lateritic. The humid equatorial climate has a main dry season from June to September and long rainy season from October to May with a short break in February/March. Annual rainfall is 2500-3000mm and mean temperature range 22°C-28°C.

Vegetation About 70% of the area comprises tall grass savanna in low-lying areas and short grass savanna on slopes. The remaining area is gallery forest. Tree species include *Hymenocardia assida* and *Hannonia* in the savanna areas and limba *Terminalia superba* in the forested areas, but most of the species have yet to be identified.

Fauna Mammals include: waterbuck *Kobus ellipsiprymnus*, Bohar reedbuck *Redunca redunca*, elephant *Loxodonta africana* (T), forest buffalo *Syncerus caffer*, hippopotamus *Hippopotamus amphibius*, and various antelopes.

Zoning None

Disturbances or Deficiencies Poaching

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget Covered by the central budget for parks and reserves.

Local Park or Reserve Administration Direction Régional des Eaux et Forêts, Fouari, BP 2 Loubomo.

Date 1983

RESERVE DE FAUNE DE LA TSOULOU (KM77)

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Partial

Date Established 7 January 1963, by decree

Geographical Location South-west Congo on the south bank of the Niari River, which forms the northern boundary. East of the road from Loubomo (formerly Dolisie) to Gabon and north of the road to Makabana. 3°15'-3°55'S, 12°15'-12°45'E.

Altitude 50-100m

Area 30,000ha

Land Tenure Government

Physical Features The reserve comprises a series of calcareous hills forming a hummocky group over a 3km area. The major watercourses in the area are the Niari River and its tributary the Tsoulou (Blue) River. Soils are mainly lateritic. The humid equatorial climate is characterised by a dry season from June to September and a long rainy season from October to May broken by a short, dry period from January to March. Mean annual rainfall is 2,500-3,000mm and mean temperature range 22°C-28°C.

Vegetation Most of the reserve lies within the woodland savanna zone with species including *Hymenocardia assida*, *Hannonia* and *Nauclea*. Secondary forest occurs along the Niari and Tsoulou Rivers with stands of *Pandanus* around the sluggish pools near the source of the Tsoulou.

Fauna Mammals include: waterbuck *Kobus ellipsiprymnus*, giant forest hog *Hylochoerus meinertzhageni*, bushpig *Potamochoerus porcus*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer nanus*, forest elephant *Loxodonta africana cyclotis* (T), and gorilla *Gorilla gorilla* (T).

Zoning None

Disturbances or Deficiencies Surveillance in the area has been reported as very poor and poaching is common. The reserve is threatened by pressure from the surrounding population. There is uncontrolled sport fishing.

Visitor Facilities Tracks to the Tsoulou River have been opened and a lodge constructed on the bank. However, two camps with cooking facilities have been abandoned due to lack of personnel.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff One game guard. One control station is now abandoned.

Budget Presumably covered by the central budget for parks and reserves.

Local Park or Reserve Administration Direction Régional des Eaux et Forêts.

Date 1983

RESERVE DE LOUDIMA

Management Category VI (Resource Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection None

Date Established 1979

Geographical Location The reserve is near a crossroads between Mossendjo, Sibiti, Nkayi and Loubomo.

Altitude No information

Area 6,000ha

Land Tenure No information

Physical Features No information

Vegetation Savanna

Fauna Mammals include buffalo *Syncerus caffer*, bushpig *Potamochoerus porcus*, and various monkeys.

Zoning None

Disturbances or Deficiencies Planted eucalypts and pine are harvested. The pine provide shelter for the fauna of the savanna and should be protected.

Scientific Research No information

Special Scientific Facilities None

Principal Reference Material None listed

Staff One guard to control hunting in the area, but no control post

Budget No information

Local Park or Reserve Administration None

Date 1983

RESERVE DE GIBIER M'BOKO (AT M'BOMO)

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Partial, with some controlled hunting allowed

Date Established 3 December 1955 by Decree No. 4220

Geographical Location The north-west area of la Cuvette, west of the confluence of the Oubangui and Zaire rivers. 0°30'-0°46'N, 14°30'-15°14'E. (The coordinates apply to the combined area of M'boko and Lekoli-Pandaka Reserves).

Altitude 50-100m

Area 90,000ha. The reserve is part of a continuous 284,400ha conservation area with Lekoli-Pandaka Faunal Reserve (68,200ha) and Odzala National Park (126,600ha).

Land Tenure Government

Physical Features The reserve comprises the upper floodplain of rivers draining into the Congo/Zaire near Mossaka. Soils are black and usually saturated. The climate is seasonal, with a long, rainy season from September to May and a short, dry season from June to August, often broken by scattered thunderstorms. Annual rainfall is 2500-3800mm and mean temperature range 23°C-28°C.

Vegetation The vegetation comprises forest and scattered tree savanna. The forest is characteristic of dense humid equatorial rainforest, but where valuable timber has been extracted there are areas of relatively poor secondary forest.

Fauna Mammals include: elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, lion *Panthera leo*, bongo *Tragelaphus euryceros*, situtunga *Tragelaphus spekei*, waterbuck *Kobus ellipsiprymnus*, and yellow-backed duiker *Cephalophus sylvicultor*.

Zoning None

Disturbances or Deficiencies There is poaching. Access is difficult but there is a 32km track in the reserve.

Visitor Facilities One lodge in good condition

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Control station and one conservator

Budget The salary of the conservator is presumably covered by the central budget for parks and reserves.

Local Park or Reserve Administration Direction Régional des Eaux et Forêts for Cuvette-Owando.

Date 1983

LE DOMAINE DE CHASSE DU MONT MAVOUMBOU

Management Category 1V (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Partial, with some controlled hunting

Date Established 8 February 1956 by Decree No. 535/CH

Geographical Location In Niari Region in the extreme west, north of the point where the main road to Libreville runs along the border with Gabon. 2°40'-3°10'S, 11°40'-11°12'E.

Altitude 200-400m

Area 42,000ha. The reserve is part of a continuous 98,600ha conservation area with the Nyanga North (7,700ha) and South (23,000ha) reserves and Mont Fouari Faunal Reserve (15,600ha).

Land Tenure Government

Physical Features The most outstanding feature is Mont Mavoumbou, which forms the south boundary along the Gabon border. Some small watercourses flow down from the mountain across the reserve. Soils are generally lateritic and red. The humid equatorial climate is characterised by a dry season from June to September/mid October, and rainy season from October to May. Annual rainfall is 2,500-3,000mm and mean temperature range 22°C-28°C.

Vegetation Most of the area comprises tall and medium grass savanna but there are some isolated forest patches. The savanna is more or less wooded and is broadly similar to that of Mont Fouari Reserve.

Fauna Mammals are similar to those in Mont Fouari Reserve and include: elephant *Loxodonta africana* (T), buffalo *Synceus caffer*, sitatunga *Tragelaphus spekei*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca arundinum*, and yellow-backed duiker *Cephalophus sylvicultor*.

Zoning None

Disturbances or Deficiencies Poaching

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Two game guards. Two control stations are now abandoned.

Budget Presumably from the central budget for parks and reserves

Local Park or Reserve Administration Direction Régional des Eaux et Forêts for Niari, BP 2, Loubomo.

Date 1983

LE DOMAINE DE CHASSE DE LA NYANGA-SUD

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Partial, with some controlled hunting

Date Established 8 February 1956 by Decree No. 535/CH

Geographical Location South of the Nyanga River near the point where it crosses the Gabon border. Nyari Region of south-west Congo. 2°40'-3°10'S, 11°30'-11°12'E.

Altitude 200-400m

Area 23,000ha. The reserve is part of a continuous 98,600ha conservation area with Nyanga North (7,700ha), Mont Mavoumbou (42,000ha) and Mont Fouari (15,600ha) reserves.

Land Tenure Government

Physical Features The reserve is separated from Nyanga North Reserve by the Nyanga River. Red lateritic soils occur throughout. The humid equatorial climate is characterised by a dry season from June to September and a long, rainy season from October to May broken by a short dry season in February/March. Annual rainfall is 2,500-3,000mm and mean temperature range 22°C-28°C.

Vegetation About 85% of the reserve comprises fairly well wooded savanna. The remaining area is secondary forest noted for stands of limba *Terminalia superba*.

Fauna Mammals include bongo *Tragelaphus euryceros*, situtunga *Tragelaphus spekei*, bushbuck *Tragelaphus scriptus*, waterbuck *Kobus ellipsiprymnus*, buffalo *Syncerus caffer nanus*, lion *Panthera leo*, and forest elephant *Loxodonta africana* (T).

Zoning None

Disturbances or Deficiencies There is poaching and unauthorised timber felling, particularly of limba.

Scientific Research Some animal surveys

Special Scientific Facilities None

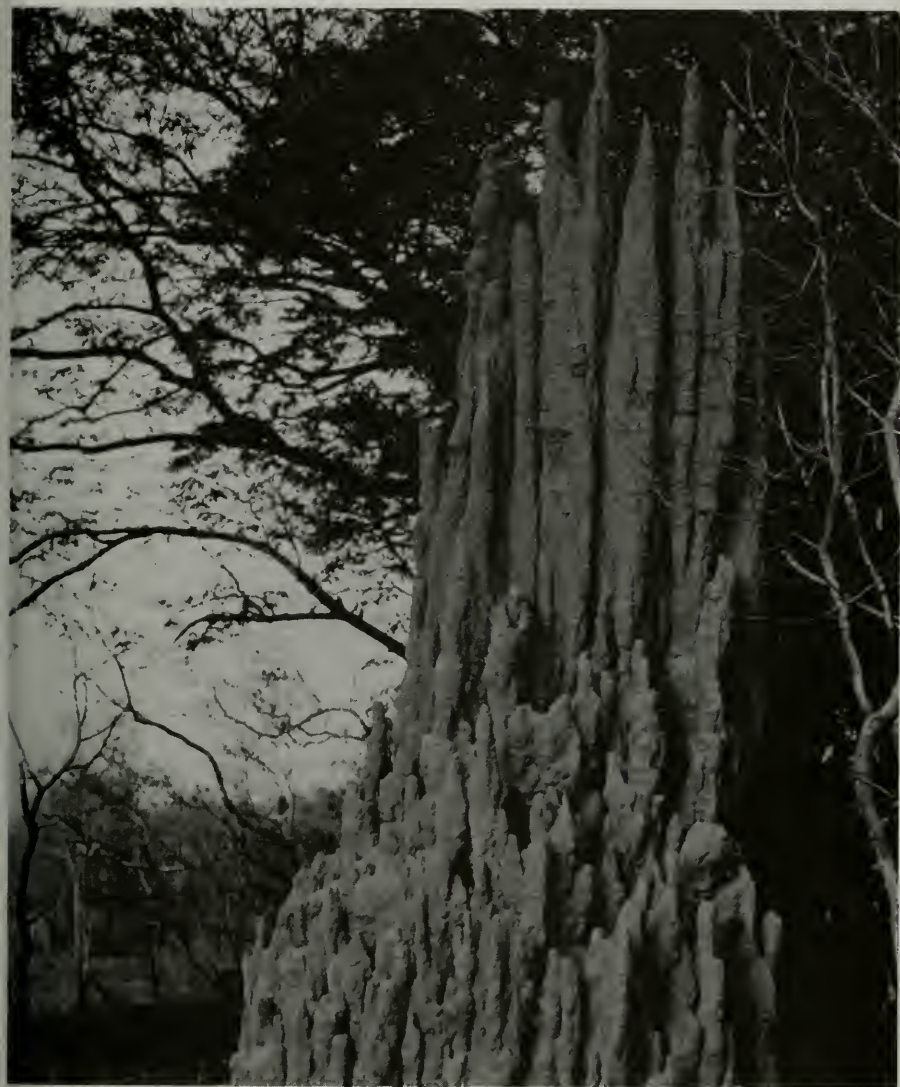
Principal Reference Material None listed

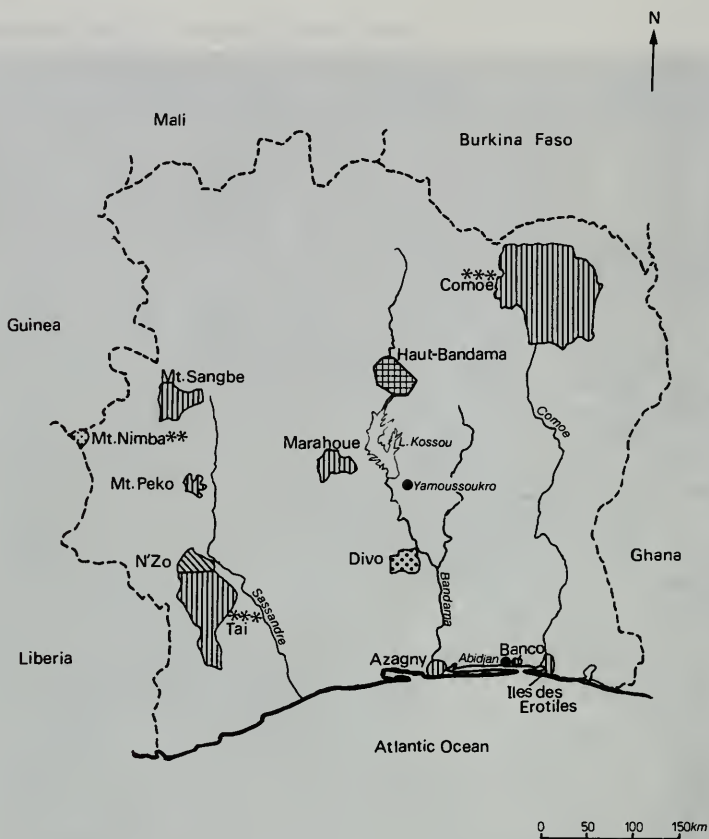
Staff No information

Budget Covered by central budget for parks and reserves

Local Park or Reserve Administration Direction Régional des Eaux et Forêts for Niari, BP 2, Loubomo.

Date 1983





- Key
- National Parks
 - Strict Nature Reserve
 - Botanical Reserve
 - Partial Faunal Reserve
 - Reserve
 - ** World Heritage Site
 - *** Biosphere Reserves & World Heritage Sites

Côte d'Ivoire

COTE D'IVOIRE

Area 322,462 sq.km

Population 8,500,000 (1984); nearly 14% in or near Abidjan

Parks and Reserves Legislation The procedure for declaring areas as national parks or other reserves was fixed by Decree 66-433 of 15 September 1966. Under this Decree, the National Parks Department (Direction des parcs nationaux) of the Ministry of Water and Forests (Ministère des eaux et forêts) presents a study document containing a detailed description of the proposal to the Secretary of State for National Parks. If approved in principle, it is referred to the heads of the prefecture and sub-prefectures concerned for discussion and agreement on the eventual legislative measures required. When agreement has been reached, the area is declared a 'parc national' or 'réserve' by Presidential Decree. Classified Forests, where forest exploitation may continue but where agricultural clearance is prohibited, are set up under the Forest Code of 20 December 1965.

Parks and Reserves Administration Administration of protected areas is the responsibility of the National Parks Department (Direction des parcs nationaux), within the Ministry of Water and Forests (Ministère des eaux et forêts).

Address

° Direction des parcs nationaux, Ministère des eaux et forêts, BP V 178, Abidjan.

Additional Information Although hunting was banned in 1973, poaching is now one of the principal threats to parks. Lack of trained and properly equipped staff exacerbates this problem. The other major threat is encroachment from competing land uses; the natural communities in most of the country have been severely affected by timber extraction, forest clearance, uncontrolled fire and agricultural settlement. 90% of the classified forests (forêt classée) have disappeared, and if clearance continues at the present rate of approximately 500,000ha/year there will be no forests left by 1991. A programme of intense reafforestation has therefore been recommended.

Development of the south-western region of the Ivory Coast within the past 15 years has been one of the fastest in West Africa (Morris, 1979; IUCN/UNEP, 1983). The Ivory Coast invited a WWF/IUCN delegation in June 1983 to discuss the preparation of a National Conservation Strategy for the country. Following the visit, the delegation presented a report to the Ivory Coast authorities, setting out the nature of a national conservation strategy and how it should be prepared, summing up the present situation in the Ivory Coast and recommending measures to follow to prepare the strategy. The report recommends that a pilot demonstration project be carried out at the same time as the national strategy is being prepared. Two examples were put forward as suitable for pilot projects, one focusing on the protection of Tai National Park and the other on the Soubré Dam.

References

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- ° Morris, D. (1979). Report on a Visit to Ivory Coast, West Africa. Internal Report. Nature Conservancy Council, UK.
- ° IUCN/WWF Project 3207. Ivory Coast, Development Plan for Tai National Park.
- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° Thiollay, J.M. (1985). The Birds of the Ivory Coast: Status and Distribution. *Malimbus* 7: 59.

Protected Areas

(hectares)

National Parks

Azagny	17,000
Banco	30,000
Comoe	1,150,000
Marahoue	101,000
Mont Peko	34,000
Mont Sangbe	95,000
Tai	330,000
Subtotal	1,757,000

Strict Nature Reserves

Mont Nimba	5,000
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Botanical Reserves

Divo

Reserves

Haut Bandama	123,000
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Partial Faunal Reserves

N'Zo	73,000
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Biosphere Reserves

Parc national de la Comoe	1,150,000
Parc national de Tai	330,000
Subtotal	1,480,000

World Heritage Sites

Parc national de la Comoe	1,150,000
Reserve naturelle integrale de Mont Nimba	5,000
Tai National Park	330,000
Subtotal	1,488,000

PARC NATIONAL D'AZAGNY

Management Category II (National Park)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Total

Date Established 26 July 1926 under Order No. 1.027 as a strict nature reserve. Declared a National Park by the President in 1981.

Geographical Location An area between the Bandama River (near the mouth) on the west and the Ebrie Lagoon on the east, 75 km west of Abidjan. 5°09'-5°16'N, 4°48'-4°58'W.

Altitude Approximately at sea level

Area 17,000ha; contiguous to Azagny 'zone de protection' (2,500ha) on the north and north-east boundaries.

Land Tenure Government

Physical Features The park contains the Bandama River, Ebrié Lagoon and the Asagny Canal, which links them. Essentially, it is a waterlogged basin bounded by slightly higher land to the north and west. The area has an artificially maintained water system as well as naturally fluctuating water levels. It lies within the sub-equatorial climatic regime with very high rainfall and no marked dry season. Mean annual rainfall is estimated to be 2,300mm.

Vegetation The park includes a small area of mangroves mainly *Rhizophora racemosa* and *Avicennia nitida*, various kinds of swamp formations (occupying about two-thirds of the park area), groundwater forest, and coastal savanna. There are many palms including the wild date *Phoenix reclinata*, borassus *Borassus aethiopum*, and *Raphia*. The savannas are dominated by lalang grass *Imperata cylindrica*.

Fauna The area contains many species of monkey including chimpanzee *Pan troglodytes* (T). Other larger mammals include: West African manatee *Trichechus senegalensis* (T) (only in the lagoon on the boundary), elephant *Loxodonta africana* (T) (especially characteristic of the park), bushpig *Potamochoerus porcus*, and dwarf forest buffalo *Syncerus caffer nanus* (abundant). All three species of crocodile, *Crocodylus niloticus* (V), *Crocodylus palustris* (V) and *Crocodylus cataphractus* (I), are present but in very low numbers. The area has a large avifauna and is possibly of international significance for many migratory species.

Conservation Management A management plan has been prepared. Resettlement of N'Gban people has been carried out. Recommendations have been made to increase the visibility and number of animal populations by increasing protection, ameliorating nutritional conditions, re-introducing species such as chimpanzee, pygmy hippopotamus and antelope, and restocking the presently low populations of crocodile.

Zoning There is a buffer zone on the north and north-east boundaries in which human habitation is prohibited and no new cultivation is allowed. Maintenance of existing plantations of coffee, cocoa, coconut palms and hevea is permitted.

Disturbances or Deficiencies Problems include poaching, forest exploitation and agricultural encroachment. Due to past hunting pressure, animal species are extremely shy and the lack of sightings could discourage tourism. Some populations are at very low numbers. The park is isolated in the middle of developed land and the fauna is cut off from the surrounding dry land when the park area is flooded. There is oil exploration with explosives.

Visitor Facilities The World Bank are providing funding for the development of the area for tourism, which includes the establishment of signs, tracks and camps. The area has been reopened to tourists who can fly over to view elephant and buffalo.

Scientific Research Between 1976 and 1978, a monitoring study of mammal species was carried out by MATA, using indicitive studies only, such as dung and tracks. There are also studies by the 'Centre Néelandaïs d'Adiopoudoumé' to ascertain the best modifications of old plantations and pastures to ameliorate conditions for fauna and forest regeneration.

Special Scientific Facilities None

Principal Reference Material

- ° Bouichou, A. (1978). Etude géographique de la réserve d'Azagny et de son environnement anthropique. Masters thesis, Paris University VIII 79 pp plus annexes.
- ° Roth, H.H. (1983). Programme d'Aménagement et de Reconstitution de la Faune Sauvage du Parc national d'Azagny. Report for Directions des Parcs et Réserves.
- ° Zirimba, S., (undated). Etude du projet d'aménagement de la réserve d'Azagny.

Staff No information

Budget None

Local Park or Reserve Administration Cantonnement de Grand Lahou

Date 1983

PARC NATIONAL DU BANCO

Management Category II (National Park)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Total

Date Established 1953

Geographical Location North bank of the Ebrié lagoon around the mouth of the small Banco River. About 10km west of Abidjan in southern Côte d'Ivoire. Approximately 5°19'N, 4°02'W.

Altitude Sea level to 110m

Area 30,000ha

Land Tenure Classified forest reserve under national ownership.

Physical Features An area of dense rainforest traversed by the River Banco.

Vegetation A remnant of tropical rainforest. Trees include: mahogany *Khaya* spp., avodiré *Turraeanthus africanus*, niangon *Heritiera utilis* (or *Tarrietia*), and azobé (or African oak) *Lophira alata*. An arboretum and a few plantations, especially of teak, have been established in cleared areas.

Fauna Fauna not abundant but recorded species include white-nosed monkey *Cercopithecus nictitans*, black and white colobus *Colobus polykomos*, African civet *Civettictis civetta*, genet *Genetta genetta*, bushbuck *Tragelaphus scriptus*, and Maxwell's duiker *Cephalophus maxwelli*. Chimpanzee *Pan troglodytes* (V) were found in this area, but are now reported to be absent.

Zoning There is a small zone developed for recreational activities with seats, shelters and an arboretum.

Disturbances or Deficiencies Poaching, and extension of the Abidjan road system. There are plans to use the area for breeding forestry animals.

Visitor Facilities There are a number of bitumen tracks within the park. It is a popular area for people from Abidjan.

Scientific Research No information

Special Scientific Facilities The Côte d'Ivoire forest school is located in the park with an arboretum and experimental centre of silviculture.

Principal Reference Material None listed

Staff Insufficient

Budget None

Local Park or Reserve Administration Chef d'Inspection, Abidjan.

Date 1983

PARC NATIONAL DE LA COMOÉ

Management Category II and IX (National Park and Biosphere Reserve)

World Heritage Site (Criteria: ii)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 8 February 1968 by Decree No. 68-81. Originally protected as the 'réserve de faune de Bouna-Komoé' by Decree 1605 of 4 March 1953 though rudimentary protection existed since 1926. Accepted as a Biosphere Reserve and a World Heritage Site in 1983.

Geographical Location Extending from 35km south-west of Bouna, in the north-east préfectures of Bouna and Ferkessedougou, westwards across the Comoé River to the vicinity of Kong. 600km from Abidjan. 8°05'-9°06'N, 3°01'-4°04'W.

Altitude 119-658m (Mont Yévéle)

Area 1,150,000ha

Land Tenure Government

Physical Features The park comprises an interfluvial peneplain of schist and granite between the Comoé and Volta rivers, with mean altitude of 250 to 300m and a series of ridges and granite inselbergs rising to 600m. The River Comoé and its tributaries form the principal drainage and the Comoé runs through the park for 230km. Watercourses also drain to the Volta in the east. Permanent and semi-permanent water occurs in many places. The soils are infertile and unsuitable for cultivation. There is a Sudan-type humid tropical transitional climate with mean annual rainfall of 1200mm and a single dry season of six months in the south and eight months in the north. Mean annual temperature is 26°C.

Vegetation The park contains a remarkable variety of habitats and plant associations found, more often, further south, including savanna, forests and riparian grasslands. It provides an outstanding example of an area of transitional habitat from forest to savanna. Open forest and savanna woodland characteristic of the Sudano-Guinean zone, occupies about 90% of the area, and gallery forest and dense dry forest, about 10%. All types of savanna occur. The forest is composed of many leguminous trees including *Burkea africana*, *Detarium micranthum*, *Azelia africana*, *Daniellia oliveri*, and *Isobertlinia doka*. The savanna grasslands consist mainly of *Panicum*, *Ctenium*, *Andropogon*, *Elionurus* and *Cymbopogon* species varied by some *Bauhinia* spp., *Combretum* spp. and *Gardenia* spp. thicket. The gallery forests are dominated by *Cynometra vogelii*; the patches of dense dry forest by *Isobertlinia doka*, *Anogeissus leiocarpus*, *Cola cordifolia*, *Antiaris africana*, *Chlorophora excelsa*, and the edible 'akee' *Blighia unijugata*; and the flood plains by *Hyparrhenia rufa*. Other forest species recorded include: *Parkia biglobosa*, *Pterocarpus erinaceus*, *Combretum*, *Terminalia*,

including *T. avicennioides*, shea nut *Butyrospermum parkii* and *Uapaca somon*, *Lophira lanceolata*, *Protea elliotii*, *Burkea africana*, *Borassus aethiopum*, *Mitragyna inermis* and *Entada abyssinica*, a grassy ground cover of *Andropogon* spp.. Areas of specialised vegetation occur on the rocky inselbergs and in aquatic habitats. A species list for the park can be found with the biosphere reserve nomination form submitted to Unesco.

Fauna Comoé forms the northerly limit for some species including yellow-backed duiker *Cephalophus sylvicultor* and bongo *Tragelaphus euryceros*. There are a large number of mammal species with 11 species of monkey including: anubis baboon *Papio anubis*, green monkey *Cercopithecus aethiops*, diana monkey *Cercopithecus diana*, mona monkey *C. mona*, lesser white-nosed monkey *C. petaurista*, white collared mangabey *Cercocebus torquatus lunulatus*, black and white colobus *Colobus polykomos* and chimpanzee *Pan troglodytes* (T); 17 species of carnivore including lion *Panthera leo* and leopard *Panthera pardus* (T); giant pangolin *Manis gigantea*, aardvark *Orycteropus afer*, and rock hyrax *Procavia capensis*; and 21 species of artiodactyl including bushpig *Potamochoerus porcus*, warthog *Phacochoerus aethiopicus*, hippopotamus *Hippopotamus amphibius*, elephant *Loxodonta africana* (T), bushbuck *Tragelaphus scriptus*, sitatunga *Tragelaphus spekei*, buffalo *Syncerus caffer aequinoctialis*, red-flanked duiker *Cephalophus rufilatus*, waterbuck *Kobus ellipsiprymnus*, kob *Kobus kob*, roan antelope *Hippotragus equinus* and oribi *Ourebia ourebi*. Birds include 10 species of herons such as grey heron *Ardea cinerea*, goliath heron *Ardea goliath*, yellow-billed egret *Egretta intermedia*, ducks (Anatidae), raptors (Accipitridae), plovers and francolins (Phasianidae), hammerkop *Scopus umbretta*, black winged stilt *Himantopus himantopus*, four of the six West African stork species, and five of the six West African vulture species. Reptiles include all three species of African crocodile, slender-snouted *Crocodylus cataphractus* (I) (9%), Nile *C. niloticus* (V) (90%), and dwarf *Osteolaemus tetraspis* (I) (1%). A species list for the park can be found with the biosphere reserve nomination submitted to Unesco.

Conservation Management A management plan has been produced. 17 patrol posts at 20-30km intervals are planned around the park boundary.

Zoning There is a strict reserve zone where tourism is prohibited. The development of a buffer zone encompassing a contiguous game reserve is currently being studied. There are two tourist zones within the park for short and long-term visits.

Disturbances or Deficiencies Problems include poaching particularly of elephant, roan and waterbuck, though the threat is less serious since implementation of a vigorous anti-poaching campaign in 1974. There is some agriculture, but the area has been little modified, mainly due to the presence of the black fly *Simulium* sp., which causes river blindness in man, and which has discouraged agricultural encroachments or settlements. Uncontrolled burning and grazing of cattle from the south still occurs.

Visitor Facilities The park is only open during the dry season (November to April) when the 500km of tracks are accessible. There are hotels at Kak pin, Ganse and Kafola (safari lodge), which are popular but expensive. Peak periods for visitors from the Cote d'Ivoire are Christmas and Easter.

Scientific Research Research under the MAB programme including work on ungulates was planned to start in 1983. A complete inventory of the natural resources of the park was undertaken in 1974 with further studies financed by bilateral aid in 1977 and 1980. Work on climate, vegetation, soils, hydrology, plant and animal populations and pollution has been completed.

Special Scientific Facilities A scientific research station is due to be built in 1985. Limited accommodation is available for scientists.

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Staff Eighty-two employees including fulltime staff of one park warden, seven assistant wardens, 26 guards and 34 watchmen.

Budget No recent information but known to be insufficient.

Local Park or Reserve Administration Chef d'Inspection, Conservateur du Parc National de la Comoé, Bouna.

Date 1982

PARC NATIONAL DE LA MARAHOUE

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 9 February 1968 by Decree No. 68-80. Also a 'forêt classé'.

Geographical Location West-central Côte d'Ivoire, north of the Bouaflé-Daloa road, along the Bandama Rouge (Marahoué River). 7°17'-7°54'N, 5°46'-6°11'W.

Altitude 90-320m

Area 101,000ha

Land Tenure Government

Physical Features The park comprises a relatively undulating area drained southwards by the Bandama Rouge (Marahoué River) and tributaries. It is separated from the great lake formed by the Bandama Blanc barrage by high ground. There are a number of dome-like hills including Mont Sininglégo and Gobazta. The climate is typical Sudano-Guinean with a mean annual rainfall of 1,100mm.

Vegetation In the east and north-east, Guinean savanna woodland occurs with *Combretum*, *Terminalia*, and *Isoberlinia* species and *Burkea africana*, *Daniellia oliveri*, *Pterocarpus erinaceus*, and *Uapaca somon* predominating (occupying about one-third of the park area). In

the south and south-west, there is dense deciduous forest and some gallery forest including many good timber trees such as mahogany *Khaya grandifolia*, tali or ordeal tree *Erythrophleum ivorense*, iroko *Chlorophora excelsa*, samba *Triplochiton scleroxylon*, aiele *Canarium schweinfurthii*, kapok *Ceiba pentandra*, *Mansonia altissima*, *Pycnanthus kombo*, *Terminalia superba*, *Antiaris welwitschii*, *Antiaris africana*, mulberry *Morus mesozygia* and *Celtis zenkeri*.

Fauna Both savanna and forest species are represented. Mammals include: olive baboon *Papio anubis*, white-collared mangabey *Cercocebus torquatus*, mona monkey *Cercopithecus mona*, red colobus *Colobus badius*, chimpanzee *Pan troglodytes* (T), African linsang *Poiana richardsoni*, elephant *Loxodonta africana* (T)(about 50), hippo *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, bongo *Tragelaphus euryceros*, buffalo *Syncerus caffer*, red-flanked duiker *Cephalophus rufilatus*, bay duiker *Cephalophus dorsalis*, black duiker *Cephalophus niger*, kob *Kobus kob*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca arundinum*, and bubal hartebeest *Alcelaphus buselaphus*.

Conservation Management The savanna is burnt each year, mainly by poachers.

Zoning No information

Disturbances or Deficiencies There is illegal forest exploitation, plantations and heavy poaching. Pesticide pollution (used to poison fish) has wiped out the aquatic life in 'Marigot des Elephants' (Elephants Marsh). The density of game is low, although herds of buffalo are easily seen, as poachers kill mainly antelopes.

Visitor Facilities There has been development of road facilities for visitors and park staff. The town of Yamoussaukros (80km) is being extensively modernised and major tourism facilities have been developed. Officially the park is open all year but the most favourable period is from January to April (dry season).

Scientific Research Workers from Wageningen University are monitoring the side-effects of insecticide spraying against tsetse flies (1983), which is being carried out by the World Health Organisation.

Special Scientific Facilities None

Principal Reference Material

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Staff Insufficient (Three listed in 1977)

Budget Insufficient

Local Park or Reserve Administration No information

Date 1983

PARC NATIONAL DU MONT PEKO

Management Category II (National Park)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Total

Date Established 9 February 1968 under Decree No. 68-79. Also a 'forêt classée'.

Geographical Location West-central region, about 120km south-east of Man and west of the Sassandra river. In the sub-préfectures of Duékoué and Bangolo. 6°53'-7°08'N, 7°11'-21°W.

Altitude 400-1,002m

Area 34,000ha. The 'réserve de faune du N'Zo' (73,000ha) and 'parc national de Taï' (330,000ha) are about 60km south of the park.

Land Tenure Government

Physical Features The region is mountainous, with many summits at or exceeding 1,000m. It is drained by tributaries of the Sassandra River. It has a characteristically Guinean type climate with mean annual rainfall of 1,700mm falling almost entirely between May and October.

Vegetation About 80% of the park is covered by dense deciduous forest of species such as white mahogany *Khaya anthotheca* and large-leaved mahogany *K. grandifolia*, *Entandrophragma* sp., *Triplochiton scleroxylon*, *Terminalia superba*, iroko *Chlorophora excelsa*, wild cacao *Heritiera utilis* and wild rubber *Funtumia* sp., African oak *Lophira lanceolata*, and the monotypic *Piptadeniastrum africanum*. The remaining 20% is savanna woodland of a Guinean type or resulting from degradation of the forest with species such as *Terminalia* spp., *Combretum* spp., *Pterocarpus erinaceus*, *Isobertinia* spp., *Azelia africana*, *Burkea africana*, *Daniellia oliveri*, and *Uapaca togoensis*.Fauna Mammals include: anubis baboon *Papio anubis*, chimpanzee *Pan troglodytes* (T), long-tailed tree pangolin *Manis tetradactyla*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), tree hyrax *Dendrohyrax arboreus*, warthog *Phacochoerus aethiopicus*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, Maxwell's duiker *Cephalophus maxwelli*, and red-flanked duiker *C. rufilatus*, all relatively abundant. Present, but uncommon, are water chevrotain *Hyemoschus aquaticus* and giant pangolin *Manis gigantea*.

Zoning None

Disturbances or Deficiencies There is agriculture, considerable poaching and possibly some threat from mining.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Insufficient (total of 21 reported in 1977).

Budget None

Local Park or Reserve Administration Chef d'Inspection, Mont Peko National Park, Duékoué.

Date 1980

PARC NATIONAL DU MONT SANGBE

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 1975. Also a 'forêt classé'.

Geographical Location West-central Côte d'Ivoire, on the western bank of the Sassandra River in the departments of Biankouma and Toura. Approximately 8°15'N, 7°20'W.

Altitude No information

Area 95,000ha

Land Tenure Government

Physical Features The park is situated in the Toura Mountains, with 14 peaks over 1,000m.

Vegetation Guinean savanna woodland predominates, with a number of endemic species.

Fauna The fauna is abundant and varied. Mammals include elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, kob *Kobus kob*, buffalo *Syncerus caffer*, baboon *Papio* sp., and patas monkey *Erythrocebus patas*. Birds include guineafowl, hornbill and eagle.

Zoning No information

Disturbances or Deficiencies Problems include forest exploitation and poaching.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget None

Local Park or Reserve Administration No information

Date 1980

PARC NATIONAL DE TAI

Management Category II and IX (National Park and Biosphere Reserve)

World Heritage Site (Criteria: ii, iv)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Total. The buffer zone has the legal status of a managed fauna reserve. Tai Forest itself is under the responsibility of the Minister of Forests.

Date Established Declared as a 'Forest and Wildlife Refuge' in 1926 by the French administration. National park status on 28 August 1972 by Presidential Decree 75-545. Reduced by 20,000ha ('réserve de faune du N'Zo') on 21 March 1973 by Decree 73-132. Redefined by Special Decree 77-348 of 3 June 1977, which added a 20,000ha buffer zone around the park. The area was part of a 'forêt classé' under a decree of 16 April 1926, then part of a 425,000ha 'réserve de faune' under a decree of 7 August 1956. Accepted in April 1978 as a biosphere reserve and in 1982 as a world heritage site, in November 1984 it was included in the IUCN list of eleven most threatened areas.

Geographical Location In south-west Côte d'Ivoire about 200km south of Man and 100km from the coast, in the districts of Guiglo and Sassandra. Between the Cavally River (which marks the western border with Liberia) and the Sassandra River on the east. 5°15'-6°07'N, 7°25'-7°54'W.

Altitude 80-623m (Mount Nienokoue)

Area 330,000ha plus 20,000ha buffer zone; contiguous to the 'réserve de faune du N'Zo' (73,000ha)

Land Tenure Government

Physical Features The park comprises an ancient sloping granitic peneplain. This is broken by several inselbergs formed from volcanic intrusions, including the Niénkoué Hills in the south. A large zone of schists runs south-west to north-east across the park, dissected in places by tributaries of the watercourses which run parallel to it. The soils are ferralitic of generally low fertility but there are more fertile gleysoils in the south. There are two distinct climatic zones of an equatorial transitional type. Annual rainfall ranges from a mean of 1700mm in the north to 2200mm in the south, reaching a peak in June with a shorter wet season in September, followed by a marked dry season from December to February. There is only a small temperature range of 24°C-27°C due to oceanic influence and the presence of forests. The relative humidity is high (85-90%).

Vegetation The park is one of the last remaining portion of the vast primary forest that once stretched across present-day Ghana, Côte d'Ivoire, Liberia and Sierra Leone. There is a gradation from north to south, with the southern third of the park being the moistest and richest area, especially of leguminous trees. This humid tropical forest has a high level of endemism with over 150 species (16%) identified as endemic to the Taï region. The park contains some 1,300 species of higher plants of which 54% occur only in the Guinea zone. Vegetation is predominantly dense evergreen ombrophilous forest of a Guinean type characterised by tall trees (40-60m) with massive trunks and sometimes large buttresses or stilt roots. Large numbers of epiphytes and lianes form an important element in the lower horizons including *Platyserium* spp., *Nephrolepis biserrata*, *Drymaria* sp. and *Asplenium africanum*. Two types of forest can be recognized: the poorer soils of the north and south-east support species such as the palm *Eremospatha africana*, ebony *Diospyros mannii*, *Parinari chrysophylla*, *Chrysophyllum perpulchrum* and *Chidlowia sanguinea*; and the 'Sassandrian' forest in the south-west, dominated by water-demanding species such as ebony *Diospyros* spp. and *Mapania* spp. with numerous endemic species, especially in the lower Cavally Valley and the Meno and Hana depressions near Mont Niénokoué. *Gilbertiodendron spendium* occurs in the swamp forest. Plants which were thought to be extinct such as *Amorphophallus staudtii* have been discovered in the area. Since commercial timber exploitation ceased in 1972, the forest has recovered well.

Fauna The fauna is fairly typical of West African forests and the park contains 47 of the 54 species of large mammal known to occur in Guinean rain forest including 5 threatened species. Mammals include: mona monkey *Cercopithecus mona*, white-nosed monkey *C. nictitans* and diana monkey *C. diana*, black and white colobus *Colobus polykomos*, red colobus *C. badius* and

green colobus *C. verus* (T), sooty mangabey *Cercocebus torquatus*, chimpanzee *Pan troglodytes* (T) of which there are 2,000-2,800 in Tai, giant pangolin *Manis gigantea*, tree pangolin *M. tricuspis* and long-tailed pangolin *M. tetradactyla*, golden cat *Felis aurata*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), bushpig *Potamochoerus porcus*, giant forest hog *Hylochoerus meinertzhageni*, pygmy hippopotamus *Choeropsis liberiensis* (T) (the only viable population remaining in the Côte d'Ivoire), water chevrotain *Hyemoschus aquaticus*, bongo *Tragelaphus euryceros*, buffalo *Syncerus caffer* and an exceptional variety of forest duikers including Jentink's duiker *Cephalophus jentinki* (T), banded duiker or zebra antelope *C. zebra*, Ogilby's duiker *C. ogilbyi*, black duiker *C. niger*, bay duiker *C. dorsalis*, yellow-backed duiker *C. sylvicultor* and the royal antelope *Neotragus pygmaeus*. Forest rodents include *Lophuromys sikapusi*, *Malacomys edwardsi* and *Graphiurus murinus*. Also recorded in the park is *Stochomys defua*, which is characteristic of secondary forest. Over 230 bird species have been recorded, 143 typical of primary forest, including white-breasted guineafowl *Agelastes meleagrides* (E), Nimba flycatcher *Melaenornis annamarulae* (I), western wattled cuckoo-shrike *Campephaga lobata* (V), and yellow-throated olive greenbul *Criniger olivaceus* (V). More details about birds are given in Thiollay (1985). Almost 1,000 species of vertebrate have been identified.

Population There are two main groups of inhabitants in the area, the rural Bakoué and Kroumen on the forest edge with only marginal impact on the forest and the Baoule who are responsible for most of the forest destruction.

Conservation Management There is a management plan for the area. Timber concessions have been withdrawn from the large companies. The park was put forward as an example for a pilot project to demonstrate the national conservation strategy being prepared under IUCN/WWF Project 3207. In the light of a major ministerial reorganization in late 1983 and the abandonment of the proposed Soubré dam scheme, further work on this project has been delayed. Tai is also the focus for IUCN/WWF Project 3052, which will provide support towards implementation of the management plan and purchase of a four-wheel drive vehicle, five motorbikes, a motorboat, radio telephones, and other essential equipment.

Zoning The park is almost completely surrounded by a buffer zone, the 'Tai Zone de Protection', of about 5km width. Here, agriculture is allowed, but new plantations or any settlement are theoretically prohibited. To the north, the 'réserve de faune du N'Zo' acts as a buffer.

Disturbances or Deficiencies In the northern part, 70,000ha are temporarily ceded for exploitation. There are some cultivation plots in the buffer zone. Timber exploitation remains a potential threat both in the buffer zone and in the park, particularly in the north and along the road bordering the southern boundary where extensive felling is taking place. Theoretically, this is a 'forêt classée', but vast blocks are being clear-felled with an enormous waste of timber. Crops such as cocoa, coffee, maize, coco yam, sweet potato and okra are then planted, with cash crops taking up more and more land. Since independence, this region has become the principal producer of rough timber. A perimeter road designed to define the boundaries and make protection more effective has had the reverse effect, opening up significant portions of the park to timber contractors, shifting cultivators and poachers. In 1977, there were said to be many elephants, conspicuous even in the buffer zone. Now only a few remain, probably due to a combination of disturbance and poaching. There is insufficient staff to deal with the extensive poaching that takes place. The park has also been severely affected by gold panning activities in the central region. The Soubré dam scheme has now been abandoned. This would not only have affected people who would have been uprooted but would also have affected the local economy and the environment, and Tai would have suffered by the displacement and influx of people to which it would give rise. There is a lack of means to carry out effective management, and research has been more theoretical than management-orientated.

Visitor Facilities Visitor facilities are proposed in only one zone near Djiroutou which comprises mainly secondary forest resulting from previous forestry and agricultural activities.

Scientific Research The park is the site of a MAB project on the effects of human interference within the natural forest ecosystem. This is a vast research project carried out under the auspices of the University Institute for Tropical Ecology, and there is great international scientific cooperation as exemplified by the Côte d'Ivoire, French, Italian, German and Swiss teams presently working together on various research programmes. The site and research project have great potential for training and scientific study. ORSTOM has worked here for a number of years. There is some Ivorian research into forest termites. It is included as a project under IUCN/WWF Plants Campaign 1984-1985. In 1984 there was a Dutch team surveying the area, using an ultra-light aircraft to photograph low altitude in order to identify dying trees for use as timber. From 1979 to 1985, Swiss researchers were studying chimpanzees.

Special Scientific Facilities There is an ecological station in Andrenisrou basin in the core zone and the Federal German team base at Fedfo camp in the buffer zone. There is also a MAB station 18km south-east of Taï village, which consists of several prefabricated houses, a communal kitchen, two well-equipped laboratories, and an electric generator. It is controlled and financed nationally and managed by two-three Ivorian personnel.

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Staff About 100 staff from the Ministry of Water and Forest Resources plus members of the University Institute of Tropical Ecology.

Budget 1981-1985 - 100 million francs CFA. 1982 WWF Tropical Forest Campaign funding - US\$127,350. WWF Funding 1982/1983 (Project 3207) - US\$5,098.

Local Park or Reserve Administration Ministère des Eaux et Forêts, Direction des Parcs Nationaux et Réserves Analogues, BP V 178, Abidjan.

Date 1982

RESERVE NATURELLE INTEGRALE DE MONT NIMBA (COTE D'IVOIRE)
RESERVE NATURELLE INTEGRALE DE MONTS NIMBA (GUINEA)

Management Category I and IX (Strict Nature Reserve and Biosphere Reserve)

World Heritage Site (Criteria: ii, iv)

Biogeographical Province 3.01.01 (Guinean Rain Forest) 3.04.04 (West African woodland savanna)

Legal Protection Legally protected in Guinea as réserve naturelle intégrale Monts Nimba by decree. Prospecting for minerals is allowed and permits can be acquired for sport-hunting in parts of the reserve. Côte d'Ivoire has continued protection through the State Forestry Service.

Date Established Strict nature reserve established by Order No.4190, 1943, in Côte d'Ivoire and by decree in 1944 in Guinea. Côte d'Ivoire nature reserve is a 'forêt classé' under national ownership. Contiguous nature reserve proposed in Liberian section. Guinean sector accepted as a biosphere reserve in 1980. Both reserves form a world heritage site, gazetted in 1981 (Guinea) and 1982 (Côte d'Ivoire).

Geographical Location The massif of Nimba is situated on the border between Guinea, Côte d'Ivoire, and Liberia. Some 20km from the town of Lola and 62km from N'Zérékoré. 7°18'N, 10°35'W.

Altitude 450-1,752m (Mont Richard Molard)

Area Nature reserve (Guinea) 13,000ha; nature reserve (Côte d'Ivoire) 5,000ha; biosphere reserve (Guinea) 17,130ha. Contiguous to a proposed nature reserve in Liberia.

Land Tenure Government

Physical Features Mount Nimba is part of the 'Guinean Backbone', rising 1,000m above the even, almost flat, surrounding glaciis. It forms an immense barrier, cutting across the country from the south-west to the north-east. This area is unequalled as an illustration of the theory of erosion levels. The sharp relief and striking topography of the mountains, with their grass-covered summits and precipitous slopes, is due to a bar of ore-containing quartzites. Since the end of the Primary Era, erosion through weathering has caused a gigantic sheet of this quartzite to jut out of the softer schists and granitogneiss, which form the piedmont. The softer rocks have been gradually weathered and removed. These hard iron-quartzite crusts cover the vast sub-horizontal glaciis of the eastern and northern parts of the piedmont and create very poor soils, which are usually skeletal or non-existent. The soil conditions explain the belt of savanna vegetation at 500-550m around the mountains. The Nimba Mountains contain the sources of the rivers Cavally and Ya (which forms the Mami River of Liberia) and are cut up by deep, richly forested valleys. There is great topographical diversity with valleys, plateaux, rounded hilltops, rocky peaks, abrupt cliffs and bare granitic blocks, and the whole area constitutes a vast water catchment. It is also of archaeological interest. Hewn stone tools and chippings have been discovered in a rock shelter at Blandé at the northern end of the mountain. Mean annual temperature minimum: 15.8°C, maximum: 29.7°C, and mean annual rainfall 2,849mm, occurring over 178.8 days, recorded at 543m.

Vegetation There are three major vegetation types: 1) High altitude grassland with *Loudetia kagerensis* near the summit and endemics including *Blaeria nimbana* and *Dolichos nimbaensis* and woody plants such as *Protea angolensis* on the slopes, which are absent from the ridges. Remnants of forest at high altitudes are likely to be dominated by Myrtaceae species and the ravines by the tree fern *Cyathula cylindrica* var. *mannii*. 2) Plains savanna varying according to the hardness of the soil and supporting numerous herbaceous plant communities. The savanna is broken by gallery forests which grow between 1000m-1,600m. *Parinari excelsa* is dominant above 1,000m, and there are abundant epiphytes. 3) Predominantly primary forest, located mainly on the foothills and in the valleys with dominant species including *Triplochiton*

scleroxylon, *Chlorophora regia*, *Morus mesozygia*, *Terminalia ivorensis*, *Lophira procera*, *Tarrietia utilis*, and *Mapania* spp.. Drier, mid-altitude forests with trees such as *Triplochiton scleroxylon*, *Piptadeniastrum africanum*, and *Parkia bicolor* are found at the northern end of the Mount Nimba chain. Dry forests are rarer than the rainforests because of agricultural pressures, and some of the dry forest species have disappeared from many areas. There are very few endemic plant species at Mount Nimba, probably because altitude is not sufficient for new tree species to have evolved. Montane endemics include a pteridophyte, *Asplenium schnelli*, two phanerogams, *Osbeckia portersi*, and *Blaeria nimbana*.

Fauna More than 500 new species of fauna have been discovered in the Mount Nimba Reserve. Species diversity is exceptionally rich because of the variety of ecotones created by the presence of grasslands laced with forest. Mammals include: bushbuck *Tragelaphus scriptus*, Maxwell's duiker *Cephalophus maxwelli* and particularly black duiker *Cephalophus niger*, bay duiker *C. dorsalis* and forest buffalo *Syncerus caffer nanus*, bush pig *Potamochoerus porcus*, warthog *Phacochoerus aethiopicus*, scaly anteaters such as the white-bellied pangolin *Manis tricuspis*, pygmy hippopotamus *Choeropsis liberiensis* (T), leopard *Panthera pardus* (T), lion *Panthera leo*, golden cat *Felis aurata*, two-spotted palm civet *Nandinia binotata*, African civet *Civettictis civetta*, forest genet *Genetta maculata*, servaline genet *Genetta servalina*, Johnston's genet *Genetta johnstoni*, cane rat *Thryonomys swinderianus*, African clawless otter *onyx capensis*, lesser otter shrew *Micropotamogale lamottei* (a new genus discovered on Mount Nimba), potto *Perodicticus potto*, western black and white colobus *Colobus polykomos*, red colobus *Colobus badius*, diana monkey *Cercopithecus diana*, chimpanzee *Pan troglodytes* (T), and lesser bushbaby *Galago senegalensis*. One of the most noteworthy species is the viviparous toad *Nectophrynoides occidentalis* (V), which occurs in montane grasslands at 1,200-1,600m and is the only tail-less amphibian in the world that is totally viviparous. There are a number of rare and endemic bird species. Upland invertebrate species include gastropod molluscs and various types of insects belonging to the Carabidae, Gryllidae, Acrididae and the Forficulidae (beetles, grasshopper, crickets and earwigs) families, of which more than 20 are endemic to Mount Nimba. The forests contain numerous reptile and amphibian species including West African toad *Bufo superciliaris* and frog *Cassina lamottei*.

Population There has probably never been any village on the actual mountains, but there are ten villages in the immediate vicinity of Nimba with several thousand inhabitants, mainly growing crops.

Conservation Management The reserve does not have a management plan. Awareness of the value of the area and a better degree of protection seems possible following designation of the reserve as a world heritage site.

Zoning The biosphere reserve in Guinea contains a core zone of 10,000ha.

Disturbances or Deficiencies The area has similar problems to Taï National Park (Côte d'Ivoire). There is poaching and some cultivation. The main threat is from the massive iron-ore mining activities in the southern part of the chain in Liberia. About 6,000ha are in danger. Roads, wells, and mineshafts have been built and workshops and townships established in what has been a strict nature reserve since 1944. Hundreds of square metres of soil have been removed over large areas and, as a result, many streams for miles around are fouled with heavy metal run-off, particularly ferruginous rock debris. The areas designated as a world heritage sites exclude both the Liberian sector, already badly degraded by mining and intensive poaching, and the northern Guinean part, already disturbed by mining activities and threatened by more. But these two areas could serve as a buffer zone for the world heritage site if hunting were strictly controlled. It is proposed to study the best way of rehabilitating this zone as an artificial park after the exploitation. There is a lack of resources and management.

Visitor Facilities Tourism is prohibited within the strict nature reserves.

Scientific Research Botanical, zoological, and geological inventories have been completed. More than 500 new species have been described or reported, including several mammals (a new genus of otter shrew), more than 10 amphibians and reptiles, several fish and arthropods (notably centipedes and harvestmen), and molluscs. Research includes phytosociological studies

of high altitude grasslands, primate studies, and the collection of meteorological data. Several international research workers in the fields of biology, ecology, geography, primatology, and meteorology are interested in this area and with appropriate facilities, scientific research in Nimba could form the basis of a tropical ecology station of international importance.

Special Scientific Facilities There are six patrol stations in the reserve which are used to monitor various environmental parameters. The IFAN (French Institute for Black Africa) research station is at the northern tip of the mountain chain. The LAMCO mining company set up a small research station in the Liberian area (outside the reserve) in 1964.

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Staff Total of 17, with two researchers

Budget No information

Local Park or Reserve Administration In Guinea, Station Biologique des Monts Nimba, S/C INRDG, BP 561, Conakry.

Date 1986

RESERVE DU HAUT BANDAMA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total except for mining exploration

Date Established 21 March 1973 under Decree No. 73-133 (123,000ha).

Geographical Location In north-central Côte d'Ivoire on the Bandama Blanc and Bou Rivers. Northwest of Katiola and extending to the sub-prefectures of Dikoudougou. 8°13'-8°40'N, 5°17'-5°42'W.

Altitude Estimated at 250-500m

Area 123,000ha

Land Tenure Government

Physical Features The area is generally flat, with very little change in elevation. The climate is typical of the Sudano-Guinean zone with very marked dry season from November to April and mean annual rainfall of about 1100mm.

Vegetation The vegetation comprises very open savanna woodland with some gallery forest. Trees are similar to those of the 'parc national de Comoé' and include many Leguminosae.

Fauna The fauna is similar to the 'parc national de Comoé'. The area is considered especially important for elephant *Loxodonta africana* (T)(savanna form) and hippopotamus *Hippopotamus amphibius*. It is the only refuge for hippos when they leave the lake to the south to graze.

Zoning None

Disturbances or Deficiencies The area was reduced for agro-industrial developments in 1977. There is no management or delimitation of boundaries and poaching is a problem. The Bandama River was dammed in 1974.

Scientific Research A survey of elephant status was carried out in 1978.

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget None

Local Park or Reserve Administration Chef d'Inspection des Parcs Nationaux, Bouaké.

Date 1984

RESERVE DE FAUNE DU N'ZO

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.1.1 (Guinean Rain Forest)

Legal Protection All hunting, pursuit and disturbance of game and clearing and burning of scrub after agricultural cropping is prohibited. Forest exploitation is permitted (Articles 1 and 2 of the Decree).

Date Established 28 August 1972 under Decree No. 72-546; 20,000ha was added from the 'parc national de Tai' by Decree 73-132 of 21 March 1973.

Geographical Location About 150km south of Man, adjoining the 'parc national de Tai' on the north. the N'Zo river being a tributary of the Sassandra. Approximately centred 6°08'N, 7°15'W.

Altitude 100-250m

Area 73,000ha; contiguous to 'parc national de Tai' (330,000ha).

Land Tenure Government

Physical Features The reserve is similar to the 'parc national de Taï', being generally flat except for a few isolated hills resulting from greenstone intrusions. It has an equatorial climate with two rainy seasons, a longer one at its peak in June, a shorter one in September; the marked dry season lasts from December to February. The mean annual rainfall is 1,700mm.

Vegetation The vegetation comprises dense ombrophilous evergreen forest of Guinean type similar to the Taï Forest. Trees, with buttresses and stilt roots, reach 40-60m in height and are rich in epiphytes and lianes. Dominant species are ebony *Diospyros mannii* and *Eremospatha macrocarpa* palms, and *Parinari chrysophylla*. *Chrysophyllum perpulchrum* and the monotypic *Chidlowia sanguinea* are also common.

Fauna Again similar to that of the Taï Forest, the fauna includes the pygmy hippopotamus *Choeropsis liberiensis* (T) and Jentink's duiker *Cephalophus jentinki* (T). Other uncommon forest duikers which are found include Ogilby's duiker *C. ogilbyi* and the banded duiker or zebra antelope *C. zebra*.

Zoning None

Disturbances or Deficiencies Forest exploitation which is permitted within the reserve, makes it very difficult to control other disturbing activities, especially poaching.

Scientific Research None

Special Scientific Facilities None

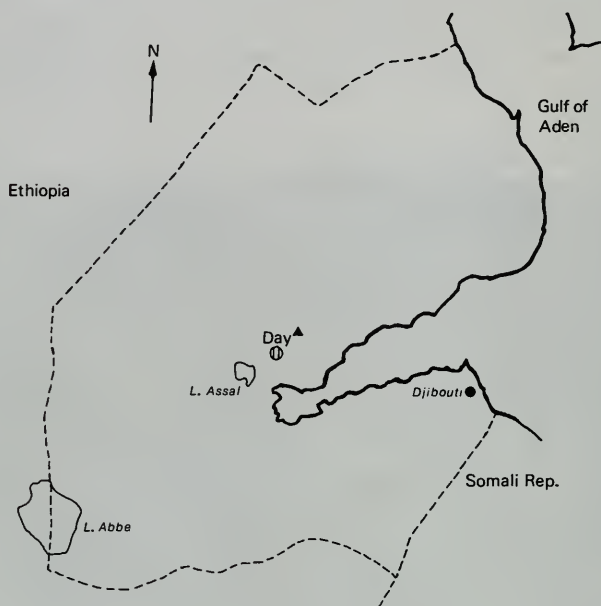
Principal Reference Material None listed

Staff The staff of the 'parc national de Taï' is also responsible for the care of this reserve.

Budget Covered by that of the 'parc national de Taï'.

Local Park or Reserve Administration Chef de l'Inspection des Parcs Nationaux, Soubré.





0 25 50 75 Km

- Key
- ▨ National Park
 - ▲ shape unknown

Djibouti

DJIBOUTI

Area 21,699 sq.km

Population 340,000 (1983); about 39% Afars and 49% Isaas

Parks and Reserves Legislation Current relevant legislation includes the Délibération No. 262/7 of 12 May 1972 relating to the protection of natural wealth (richesses naturelles) and prehistoric remains (gisements préhistoriques), Arrêté No. 72-1363 of 20 September 1972 fixing measures for the protection of marine fauna and habitats, and Decret No. 80-062/PR/MCTT of 25 May 1980 on the protection of marine fauna and habitats. The Forêt du Day and Maskali-Muscha National Parks were apparently classified as such before 1939, and two other areas, Grand et Petit Baras (sandflats) Reserve and the Skoutir and Kourtimala Reserve were at one time proclaimed (IUCN, 1971).

Parks and Reserves Administration The Ministry of Agriculture is in general responsible for conservation action within the country. The Ministry of Commerce, Transport and Tourism (Ministère du commerce, des transports et du tourisme) is the main administrative body concerning application of the decree protecting marine areas.

Address

Service de l'agriculture, de l'élevage, des eaux et des forêts, Ministère de l'agriculture et du développement rural, BP 224, Djibouti.

Additional Information Threats to natural attributes of the country such as Lake Abbe, Ardoukuoba volcano, and Lake Assal were considered by Hancock (1981) to be minimal with no major development schemes planned for them. However, the Day National Park, containing one of the only two relict forested areas of the country, is disappearing at an alarming rate, apparently due to a combination of man-induced degradation and climatic conditions (Welch and Welch, 1984). The Forêt is now further threatened by the planned construction of 30 second homes in one of the less-disturbed parts.

A pilot project for the development of natural resources and combating desertification in the coastal plain, near the town of Djibouti, was established mid 1984.

Musha (Mouscha) Islands Marine National Park protects an area of coral reef extending from the lighthouse at Musha to the Ile du Large (except the Banc Dankali). The South Maskali Islands Integral Reserve is part of this marine National Park and extends from the Musha lighthouse to a large coastal sandbank. Over-collection of shells has been a problem, but all aquatic and subaquatic activities are now forbidden.

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Protected Areas

(hectares)

National Parks

Forêt du Day

Marine National Parks
Musha (Mouscha) Islands

Integral Reserves
South Maskali Islands (within Musha)

PARC NATIONAL DU DAY

Management Category No category assigned

Biogeographical Province 3.14.07 (Somalian)

Legal Protection No information

Date Established Declared in the 1950s

Geographical Location Southern section of the Goda massif, 25km west of Tadjoura; approximately 11°50'N, 42°30'E.

Altitude Approximately 500m

Area Less than 3,000ha - originally 10,000ha declared as National Park

Land Tenure Commissaire of Tadjoura Sect (local government official)

Physical Features The park includes the two small plateaux of Garrab and Adonta on the east face of the Goda Mountains. The mountain slopes are precipitous, weathered into terraces, and are formed of loose grey shaly rock, which supports little vegetation. There are several wadis the principle being Goh. Most contain running water throughout the year and occur in deep ravines. Rainfall is low, between 100 and 200mm per year falling mainly from December to February and from June to September, and temperatures are high.

Vegetation The Forêt du Day and Malba (very degraded) are the only forested areas in the country. 'Forêt du Day' is a relic of the Goda Mountain forest (approximately 42,000ha). It comprises primary forest of about 1,400ha in area, and is of a fairly open character. Juniper forest grows on the plateaux. The dominant tree species is *Juniperus procera* (growing to a height of 5-8m) with *Buxus hildebrandtii* and *Clusia abyssinica* being the main understorey species. *Acacia etbaica* occurs in more open areas and there is the widespread parasitic *Ficus vasta*, which is an important food supply for many animal species. The mountain slopes support little vegetation, except on the terraces where grasses grow, with some young junipers occurring in inaccessible areas with relic populations of *Olea africana* and *Sideroxylon buxifolium*. There are also areas of secondary forest, where all these tree species are replaced by *Acacia seyal* and the understorey is more dense. Other tree species, occurring on both the plateaux and the mountain slopes, include *Tarchonanthus camphoratus*, *Acacia etbaica*, *Teclea nobilis* and *Pittosporum viridiflorum* var. *Kruegeria*. The shrub layer is dominated by *Euryops arabicus*, *Psiadia arabica*, *Solanum incanum*, *Jasminum floribundum*, *Clematis hirsuta*, *Clusia abyssinica*, and *Trema orientalis*. The herb layer, which carpets the floor of the forest in March and April after the winter condensation, contains many species, notably Compositae, which are generally rare elsewhere in the country. The wadis comprise a lush, denser vegetation compared to the juniper forest, with many palms and ferns not seen elsewhere. The wadi at Bankoualé holds a significant proportion of the world's population of the Bankoualé palm *Wissmannia carinensis* (V), with occasional trees scattered throughout the secondary forest. It was formerly recorded from seven localities in the Goda Mountains, but now exists

in very low numbers - there were only 97 trees with no regeneration at the main locality in 1971. There are only about 500 specimens of this species in the world.

Fauna The Djibouti francolin *Francolinus ochropectus* (E) is present in good numbers (1,000-5,000) in the primary forest. Its main requirements are areas of dense cover for roosting and breeding and graminaceous plants for food. Sixty-six other bird species were recorded in this area during a one month survey (Welch and Welch, 1984). Species include rare migrants such as long-legged buzzard *Buteo rufinus* and imperial eagle *Aquila heliaca*, as well as many small Palearctic passerines; scarce residents such as Hemprich's hornbill *Tockus hemprichii*, tropical boubou *Laniarius aethiopicus*, and common residents such as brown woodland warbler *Phylloscopus umbrovirens*, Bruce's green pigeon *Treron waalia*, paradise flycatcher *Terpsiphone viridis* and white-breasted white-eye *Zosterops abyssinica*. Species of secondary forest include grey-headed puff back flycatcher *Batis orientalis*, yellow-rumped seed-eater *Serinus artrogularis*, grey-backed cameroptera *Camaroptera brevicaudata* and yellow-billed hornbill *Tockus flavirostris*. Mammals include: vervet monkey *Cercopithecus aethiops*, hamadryas baboon *Papio hamadryas*, warthog *Phacochoerus aethiopicus*, honey badger *Mellivora capensis*, klipspringer *Oreotragus oreotragus*, leopard *Panthera pardus* (T), white-tailed mongoose *Ichneumia albicauda*, and genet *Genetta tigrina*. The Forêt du Day provides three main habitats - primary forest, secondary forest, and wadis - all are important sites for breeding, feeding and roosting by a wide range of species. However, much of the fauna is unstudied. The steep wadi sides provide nesting sites for the African hawk eagle *Hieraaetus spilogaster*, Verreaux's eagle *Aquila verreauxii*, kestrel *Falco tinnunculus*, and African rock martin *Ptyonoprogne fuligula*.

Conservation Management Blot (1983) has produced a draft management plan for the area, which is already partly implemented. Proposals for protection of this site are now being developed by the International Council for Bird Preservation (ICBP).

Zoning None

Disturbances or Deficiencies The forest is disappearing rapidly (Welch and Welch, 1984) and needs action to ensure its continued existence. If it disappears, 40% of Djibouti's floral genetic potential will be lost. The Djibouti authorities report that degradation of the forest is caused by climatic change and is irreversible. Five years ago, it was twice its current size. Now there are many dead junipers, little in the way of understorey vegetation and virtually no juniper regeneration. Other reasons for the disappearance of the forest are: overgrazing and trampling by stock (this is now the principal problem, cows being the major culprits); cutting trees for firewood; fires (no longer a major problem, but occur now and then on a small scale); destruction of trees for honey; and army occupation during summer. There are potential threats from uncontrolled tourism, water extraction from major wadis, and development of the remaining forested area (e.g. there is a plan for housing construction which appears to be going ahead in 1985). Man-induced influences appear to be exacerbating the drying effect of the climate, which leads to desertification. About 2,000 people depend on this area for their livelihood.

Scientific Research Jacques Blot, a french ecology graduate, is studying desertification of the park for the Djibouti Government (Blot, 1983).

Special Scientific Facilities There is a well-equipped laboratory at Colonie in the Forêt du Day.

Principal Reference Material

- ° Blot, J. (1983). Etude et Restauration de la Forest du Day. Compte-Rendu d'Activities. Unpublished Typescript.
- ° ICBP Field Missions report.
- ° Welch, G.R. and Welch, H. (1984). Djibouti Expedition-March 1984. A preliminary survey of *Francolinus ochropectus* and the birdlife of the country. Privately published. 80 pp.

Staff None

IUCN Directory of Afrotropical Protected Areas

Budget No information

Local Park or Reserve Administration No information

Date April 1985



EQUATORIAL GUINEA

Area 28,051 sq.km, including 2,034 sq.km of Bioko Island (Fernando Poo)

Population 398,000 (1984), including 62,000 on Bioko Island (Fernando Poo)

Parks and Reserves Legislation No current information. Reserves created prior to independence would appear to have been established by Ministerial Decree.

Parks and Reserves Administration No current information

Address Direccion Tecnica Forestal, Bata.

Additional Information There is apparently no protection of the areas established as national parks and reserves prior to 1970. The natural parks of Spanish Guinea were once reported to be very good, especially the Rio Ekuku Game Reserve (7,500ha) protecting sitatunga and the Mont Raices Park (26,000ha) which had chimpanzee, gorilla and buffalo. There were also gorilla in Mont Alen Partial Reserve (95,000ha) (Guggisberg, 1970). A status survey of primates is being carried out, with support from IUCN/WWF, and various surveys are being carried out on Bioko Island (Fernando Poo).

Castroviejo *et al.* (1986) made a number of recommendations concerning the establishment of a network of protected natural areas for cultural, scientific, educational and aesthetic reasons, although they clearly indicated that these would be conservation areas rather than strictly protected areas, without total eradication of human activity but with an emphasis on research and rational use of the resources. Two of these proposed sites are on the island of Bioko, five in mainland Equatorial Guinea, with one further site the Isla de Annobon. In total, if these sites were to be established they would cover more than 10% of the country.

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- ° IUCN/WWF Project 1613. Primate Action Fund.



ETHIOPIA

Area 1,184,000 sq.km

Population 40,000,000 (1984)

Parks and Reserves Legislation The major legislation is Order No. 54 of 1969 (gazetting Awash National Park); Order No. 59 of 1969 (gazetting Simen Mountain National Park); Legal Notice No. 416 of 1972 (Wildlife Conservation Regulations); and Legal Notice No. 445 of 1974 (Amendment Wildlife Conservation Regulations). The Wildlife Conservation Regulations, which were issued pursuant to the Game Proclamation of 1944 and the Wildlife Conservation Order of 1970, include a chapter on National Parks, game reserves, Sanctuaries and Controlled Hunting Areas. All exploitation of natural resources within National Parks is forbidden, unless such activities are used for the development and management of the park. Within Game Reserves, people may be authorised to live and cultivate land and graze domestic animals, though hunting is only permitted under special permit. Hunting is also strictly controlled within game sanctuaries and controlled hunting areas. Several areas are proposed as wildlife reserves, three as a wildlife sanctuaries and eight as national parks. Many of these areas already receive some degree of protection. Proclamation No. 192 of 5 September 1980 "to provide for the conservation and development of forest and wildlife resources" established the Forest and Wildlife Conservation and Development Authority and empowered it to declare, demarcate and legally establish national parks and protected areas. This role has now been taken over by the Natural Resources Conservation and Development Main Department, Ministry of Agriculture. The proclamation also equipped the Authority with powers to seize vehicles, animals, arms or equipment used for any activities contravening the existing wildlife conservation regulations.

Parks and Reserves Administration This is the responsibility of the Wildlife Conservation Organization, Natural Resources Conservation and Development Main Department, Ministry of Agriculture. This organization was originally established in 1968 but has been strengthened by proclamations of 1970, 1972 and 1974. The major target of the organization is for ten national parks, 11 wildlife reserves, three sanctuaries and 17 controlled hunting areas to be brought under direct control. Most national parks already have a warden in charge and support staff of wildlife guards, drivers and mechanics, as well as administrative staff.

Address

- ° Wildlife Conservation Organization, PO Box 386, Addis Ababa. Natural Resources Conservation and Development Main Department, PO Box 1034, Addis Ababa.

Additional Information The scope of the Department's activities is limited by availability of land, complexity of land tenure, political unrest, finance to develop wildlife areas, and lack of trained personnel to implement park developments. A serious bottleneck identified by Ashine (1981) was the general lack of awareness by Ethiopians of the value of conservation areas. The Ten Year Development Plan proposed by the Ethiopian Government provides a framework for future conservation development and includes plans for future research, fund-raising, a review of existing legislation, staff/general public training programmes, and the promulgation of national policies and their incorporation of international conventions and policies. One of the most pressing needs is to prepare viable management plans for all the protected areas. Two have so far been prepared, for the Simen and Bale Mountains National Parks.

An additional responsibility of the Department is public education, and to increase the role of people in "development, protection, rational utilisation and management of the forest and wildlife". A mobile education unit was provided with assistance from IUCN/WWF in January 1984 and has been taken over by the Conservation Education Division of the Wildlife Conservation Organization. There are problems with the vehicle, however, as it is not possible to use it off the road. A rural conservation education scheme was scheduled for 1984.

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- ° Wildlife Conservation Organization (1985). Wildlife Conservation in Ethiopia and Development Priorities. Wildlife Conservation Organization, Addis Ababa.
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Protected Areas

(hectares)

National Parks

Abijatta-Shalla Lakes	88,000
Awash	72,000
Bale Mountain	220,000
Mago	150,000
Nechisar	70,000
Omo	345,000
Simen Mountain	22,500
Yangudi Rassa	200,000
Subtotal	1,167,500

Wildlife Reserves

Alledoghi
Awash West
Bale
Chew Bahar
Chire
Gash Setit
Gewane
Mille Sardo Wild Ass
Nakfa
Tama
Yob

Wildlife Sanctuaries

Harrar	600,000
Senkelle	
Yavello	

World Heritage Sites

Aksum	
Fasil Ghebbi, Gondar region	
Lower Valley of the Awash	
Lower Valley of the Omo	
Rock-hewn churches of Lazibella	
Simien National Park	16,500
Tiya	

Proposed areas

Gambella National Park	200,000
Dahlak Marine National Park	

ABIJATTA-SHALLA LAKES NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.18.12 (Ethiopian Highlands)

Legal Protection Total protection *de facto*

Date Established Under development since July 1971, but not yet gazetted

Geographical Location In the Rift Valley towards the northern end of the lakes, 200km south of Addis Ababa in the Shoa region. 7°33'N, 38°31'E.

Altitude 1,500-4,000m

Area 88,000ha with over 50% comprising lake surfaces

Land Tenure Government

Physical Features Between Lake Abijatta (19,600ha) and Lake Shalla (43,200ha) are plains with 2 hills, and 6 rivers flowing into the lakes. Lake Abijatta is shallow and saline with no outlet. Lake Shalla is deep and alkaline with steep shelving banks and is an important wetland site. There are hot springs along the lakeshore. The depression containing the lakes complex was a single large lake 10,000 years ago.

Vegetation The vegetation surrounding the lakes comprises mainly *Acacia* and *Ficus* savanna, with small areas of riverine forest and open scrub on the rocky slopes. Lakeside pastures comprise short grass. Lake Abijatta is almost bare-banked, but some lakes have a nearly continuous bank of *Phragmites* around their edges with large patches of *Typha* and *Cyperus papyrus*. Senkelle Sanctuary is mainly open grassland with some *Acacia* stands.

Fauna Some 300 bird species including: eastern white pelican *Pelecanus onocrotalus*, of which there is a breeding colony on an island in Lake Shalla, Egyptian goose *Alopochen aegyptiacus*, storks (Ciconiidae), including breeding colonies of Abdim's storks *Ciconia abdimii*, eagles (Accipitridae), flamingoes (Phoenicopteridae), egrets and herons (Ardeidae), sacred ibis *Threskiornis aethiopicus*, breeding colonies of white-necked cormorant *Phalacrocorax lucidus*, sand grouse *Pterocles* sp., plovers (Charadriidae), and ducks (Anatidae). The area is important for migrant birds, particularly northern hemisphere ducks and waders in

December-January. Mammals include: klipspringer *Oreotragus oreotragus*, Grant's gazelle *Gazella granti*, oribi *Ourebia ourebi*, greater kudu *Tragelaphus strepsiceros*, mountain reedbuck *Redunca fulvorufula* and eastern black-and-white colobus *Colobus guereza*, but only baboon, jackal *Canis* sp. and hyena occur in significant numbers. A population of the endemic Swayne's hartebeest *Alcelaphus buselaphus swaynei* (T) is maintained in Senkelle Sanctuary.

Zoning Senkelle Sanctuary is under park jurisdiction.

Disturbances or Deficiencies There is tree cutting, grazing, charcoal burning, and fishing by the local population. There has been commercial lake fishing, but this is no longer occurring.

Visitor Facilities Hotel facilities at Lake Langano adjoining the park along the eastern boundary and at Neghelie and Shashemane.

Scientific Research An ecological survey of the park and adjoining Zwai and Langano Lakes has been completed. The lake avifauna has been studied, photographed and listed fairly extensively. Oxford University expeditions studied the lake invertebrate fauna in 1972/1973.

Special Scientific Facilities A biology laboratory is proposed

Principal Reference Material

- ° Bekele, E. (1981). A description of the conservation status and future outlooks of Ethiopia's Semien mountains, Bale mountains and Abijatta-shalla Lakes National Parks. Unesco's World Heritage Mission to Ethiopia, Addis Ababa.
- ° Bolton, M. (1970). Rift Valley Lakes Ecological Surveys, Report 1 Northern Lakes, Wildlife Conservation Development Department, Addis Ababa.
- ° Urban, E. and Brown, L.H. (1971). A checklist of the birds of Ethiopia. Hailie Selassie I Univeristy Press, Addis Ababa, Ethiopia, 143 pp.

Staff One warden, 30 game guards, and three support staff

Budget US\$6,000

Local Park or Reserve Administration Warden, Abijatta-Shalla Lakes National Park, c/o Wildlife Conservation Organization, PO Box 386, Addis Ababa.

Date April 1985

AWASH NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.18.12 (Ethiopian Highlands)

Legal Protection Total

Date Established 6 January 1969 by Order No. 54 in the Negarit Gazeta

Geographical Location Near the eastern margin of the Rift Valley overlooking the Danakil (Alledeghi) plains, 225km east of Addis Ababa in Shoa Province. 8°55'N, 40°04'E.

Altitude 850m at hot springs to 2,005 (Mount Fantalle)

Area 72,000ha

Land Tenure Government

Physical Features The park is located at the foot of the Shoa escarpment on the eastern edge of the Rift Valley where the valley opens out to form the Danakil plains. The plains are flat to undulating and are crossed by the Awash River, which forms part of the southern boundary. Below Awash Falls, the river flows through an impressive gorge. In the south-west are the volcanic cone and crater of the semi-dormant Mount Fantalle and relatively recent lava flows. There are hot springs and pools near the northern boundary. The climate is hot and dry with low rainfall.

Vegetation This varies from open, semi-arid savanna with occasional *Acacia tortilis*, *A. nilotica* and *Balanites aegyptiaca*, to thornbush dominated by *A. senegal*, *A. nubica*, and *Grewia* spp.. Riverine forest savanna occurs along the course of the Awash and palm forest around the hot springs.

Fauna There are large herds of Beisa oryx *Oryx gazella*, Soemmerring's gazelle *Gazella soemmerringi*, and Defassa waterbuck *Kobus ellipsiprymnus*. Other mammals include: Grevy's zebra *Equus grevyi* (T), warthog *Phacochoerus aethiopicus*, hamadryas baboon *Papio hamadryas*, anubis baboon *P. anubis* (and hybrids), Swayne's hartebeest *Alcelaphus buselaphus swaynei* (T) (first re-established into this area in 1974), greater kudu *Tragelaphus strepsiceros*, lesser Kudu *T. imberbis*, leopard *Panthera pardus* (T), lion *Panthera leo*, cheetah *Acinonyx jubatus* (T), bat-eared fox *Otocyon megalotis*, aardwolf *Proteles cristatus*, spotted-necked otter *Lutra maculicollis*, and four species of mongoose (Viverridae). 450 bird species have been recorded, including ostrich *Struthio camelus*.

Zoning None

Disturbances or Deficiencies There is seasonal cattle grazing. The main Addis Ababa-Dire Dawa road and the railway to Djibouti pass through the park. The recent drought has aggravated conflicts between wildlife and cattle as the park is predominantly a grazing area for nomads and negotiations are going on to provide grazing elsewhere.

Visitor Facilities These include a campsite near park headquarters at Awash Falls, the Kereyou trailer lodge overlooking the gorge, good road access, and an airstrip.

Scientific Research This includes a vegetational study, avifaunal survey, primate study (especially the social organization of hamadryas baboons), and preparation of a management plan.

Special Scientific Facilities A biological laboratory is proposed as a part of the development plan. There is a museum at park headquarters.

Principal Reference Material

- ° Robertson, I.J.M. (1970). Awash National Park Working Plan 1970-1975.
- ° Hay, P. Checklist of the Birds of Awash National Park.

Staff One warden, 41 game guards, and 1 support staff

Budget US\$84,000

Local Park or Reserve Administration Warden, Awash National Park, Wildlife Conservation Organization, Box 386, Addis Ababa.

Date April 1985

BALE MOUNTAINS NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.18.12 (Ethiopian Highlands)

Legal Protection Total protection

Date Established Under development since 1970, but not yet

Geographical Location Located in the Bale Region, south of the Webe Shebele River, 400km south-east of Addis Ababa. 6°29'N, 39°43'E.

Altitude 1,500-4,317m

Area 220,000ha

Land Tenure Government

Physical Features The park contains one of the best preserved high altitude plateau systems in Ethiopia and comprises the tableland surrounding Mount Batu (4,307m) and Tulluy Deemtu (4,377) with several valleys and alpine lakes. The major rivers are the Web and Danka. The spectacular Sof Omar Caves are adjacent to the park. The park can be divided into three subsections on the basis of land forms and altitude. The northern Gaysay area is composed of broad valleys and ridges. The central peaks and Sanetti plateau area comprise the mountainous section of the park, all above the treeline elevation of 3,400m. Portions of this area are heavily dissected with broken rocky areas and relatively recent lava flows. South of the mountains lies the Hareenna area where elevation drops abruptly from the hareenna escarpment and then more gradually to the park boundary at 1,500m. The Bale Mountains were formed from lava outpourings in the Miocene and Oligocene periods. The rock is mainly trachyte that contains some rhyolites, basalts, agglomerates and tuffs. Local glaciation occurred some 2,000 years ago. Rainfall in the park is characterised by an eight-month rainy season followed by a four-month dry season (November-February). Lower altitudes receive 600-1000mm annually and the higher altitudes 1000-1400mm. Temperatures range from -15°C to 26°C (February). The Bale Mountains are an important water catchment area containing the headwaters of four major rivers.

Vegetation Hillman (1985) has classified five vegetation zones with 16 sub-divisions. The zones are delineated by altitude and the sub-divisions by soil type, drainage, slope and aspect. The Northern Grasslands of the Gaysay area lie on flat land with poor drainage. Many places are therefore dominated by swamp grasses and sedges, especially of the *Cyperus* and *Scirpus* genera. Relatively higher parts are covered in low bush vegetation, dominated by *Artemisia afra* and *Helichrysum splendidum* has been almost totally eradicated outside the Park boundaries by domestic sheep and goats. Protection by fences has allowed it to regrow in the park to a point where it appears to be taking over from the *Artemisia*. Both species are important food plants for Mountain Nyala and provide shelter for several species. Above the valley bottoms (3,000m) and the treeline at 3,400m are found the Northern Woodlands. The species that dominate here are *Juniperus procera* and *Hagenia abyssinica*. Most Junipers are relatively small (15-20m tall), since the area is the upper limit to the species growth, and few are found near the upper treeline. Regeneration by *Juniperus* is good, but by *Hagenia* is poor. The reason for this is possibly that the leaves of *Hagenia* are much eaten by Mountain Nyala, and in the Gaysay/Adelay area the density of Mountain Nyala is preventing any regeneration. *Hypericum revolutum*, produces a dense bush growth at the lower edge of the woodlands, while at the upper treeline the species grows as a tall, slender tree to at least 5m. Extensive grass areas occur within the woodlands, especially on the steepest slopes. These contain similar species, to the flat areas below, with the exception of the sedges. Above 3,400m to about 3,800m are found the Heather Moorlands with *Erica* and *Phyllipia* the dominant genera. Afroalpine Moorlands are found at the high altitude regions. Steep rocky slopes and cliffs support very little vegetation growth. Flat swampy areas are dominated by the

sedge *Carex monostachya*. A distinctive feature of the vegetation in this zone is the giant plant *Lobelia rynchopetalum* which reaches a height of 6m when flowering. The Harenn Forest zone comprises almost half of the park area and contains moist forest of which little is known. Dense stands of mountain bamboo *Arundinaria alpina* cover large areas. *Podocarpus gracilior* and *Coffea arabica* are found at the lower elevations.

Fauna 46 mammal species have been recorded including at least 1150 endemic mountain nyala *Tragelaphus buxtoni*, at least 700 endemic Simen fox *Canis simensis* (T), and the endemic giant molerat *Tachyoryctes macrocephalus*, Menelik's bushbuck *Tragelaphus scriptus menelikii*, klipspringer *Oreotragus oreotragus*, olive baboon *Papio anubis*, warthog *Phacochoerus aethiopicus*, leopard *Panthera pardus* (T), serval *Felis serval*, duiker *Sylvicapra grimmia*, golden jackal *Canis aureus*, Abyssinian hare *Lepus capensis* and rock hyrax *Procavia capensis capillosa*. The rich birdlife (160 species) includes 14 of Ethiopia's 23 endemics, and four pairs of the wattled crane *Grus carunculatus*. The rivers have been stocked with rainbow trout *Salmo trutta* (now breeding freely), and brown trout *Salmo gairdneri*.

Zoning None

Disturbances or Deficiencies Some 2500 people currently live in the park along with 10,500 livestock. Plans are being implemented to remove the majority of these. High altitude mineral water sources are used by cattle and heather moorlands are burned in dry years to improve grazing. Poaching is almost non-existent but Simen fox are often struck by vehicles on the Sanetti Plateau road. Two communication towers and a transmission line have been constructed in the park.

Visitor Facilities A large modern hotel is situated in Goba, close to the park and camping is permitted. A new road has been constructed from Goba over the Sanetti Plateau to Mena in the south.

Scientific Research Surveys and studies of the mountain nyala and Simen fox have been carried out. A detailed inventory of park resources has been completed by Hillman (1985) and a management plan has been prepared.

Special Scientific Facilities A research building at Park Headquarters has been provided by the New York Zoological Society.

Principal Reference Material

- ° Bekele, E. (1981). A description of the conservation status and future outlooks of Ethiopia's Semien mountains, Bale mountains and Abijatta-shalla Lakes National Parks. Unesco's World Heritage Mission to Ethiopia, Addis Ababa.
- ° Brown, L.H. (1966). A report on the National Geographic Society/WWF Expedition, to study the Mountain Nyala *Tragelaphus buxtoni*. Nairobi. 118 pp.
- ° Steel, D.T. and Trapper, R.C. (1972). Oxford University Expedition to the Bale Mountains. Report in *Bulletin of Oxford University Exploration Club*, No. 1: 1-4, Includes preliminary plant species lists.
- ° Hillman, J.C. (1985). Bale Mountains National Park Management Plan, Wildlife Conservation Organization, Addis Ababa. 246 p.

Staff One warden, 14 game guards and three support staff

Budget US\$80,000

Local Park or Reserve Administration Warden, Bale Mountain National Park, Dinsho, Bale.

Date April 1985

MAGO NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established Under development since July 1978, but not yet gazetted

Geographical Location East of Maji township, Gamo Goffa Region. 5°40'N, 36°20'E.

Altitude 500-1,000m

Area 150,000ha; contiguous to Tama Wildlife Reserve in the Omo-Tama-Mago complex

Land Tenure Government

Physical Features The Mago River flows southwards into the Omo River, which enters Lake Turkana at its northern end. The Mago valley floor (at about 600m) is very flat with mainly sandy soil and the western wall is formed by the Ngalebong Hills (which seem to constitute a horstblock). The eastern wall of the rift rises steeply to the Baco Highlands. At the southern end of the Ngalebong Hills (known as the Galleb Hills by local people) the land is very dissected with steep eroded slopes. The Plain of Death between the Ngalebong Hills and the Omo River is generally flat.

Vegetation The hills forming the eastern wall of the Mago valley have open broadleaf savanna of *Combretum* and *Terminalia* species with thickets along the gulleys. Other conspicuous savanna trees are *Piliostigma thonningii*, *Stereospermum kunthianum* (when in flower) and *Gardenia lutea*. Grasses are generally tall with *Hyparrhenia* sp., *H. dissoluta*, *Themeda triandra*, and *Setaria triniveria* predominating. On the drier valley floor, the broadleaf savanna is replaced by thornbush with scattered tall *Acacia tortilis* trees. There is a conspicuous density mosaic, probably determined mainly by the drainage pattern. Predominating bush species include *Acacia mellifera*, *Salvadora persica*, *Grewia villosa*, *G. tenax*, *Cadaba farinosa*, *Maerua oblongifolia*, *Euphorbia grandicornis* and *E. scoparia*. *Sansevieria* is abundant and *Adenium obesum* (the desert rose) is frequent in more open areas. The *Hyparrhenia* grass of the hills is replaced with shorter perennials such as *Chloris myristachya*, *Sporobolus* sp., and *Ischaemum brachatherum*. This fairly open association gives way to a belt of dense closed thicket several kilometres wide in the region of the Mago River. The outer zone of the thicket contains most of the above species, with bushes of *Acalypha* sp. particularly abundant. The bushes are frequently hung and interlaced with scandent species such as *Cissus quadrangularis* and *C. rotundifolia*. At the south end of the Mago valley, the thicket merges imperceptibly with the riverine forest along the Omo.

Fauna The area is particularly important for buffalo *Syncerus caffer* and oryx *Oryx gazella beisa*. Other mammals include: zebra *Equus burchelli*, waterbuck *Kobus ellipsiprymnus*, greater kudu *Tragelaphus strepsiceros*, lesser kudu *Tragelaphus imberbis*, topi *Damaliscus lunatus*, Grant's gazelle *Gazella granti*, Lelwel hartebeest *Alcelaphus buselaphus lelwel*, elephant *Loxodonta africana* (T), giraffe *Giraffa camelopardalis*, duiker *Sylvicapra grimmia*, lion *Panthera leo*, leopard *Panthera pardus* (T), and hunting dog *Lycaon pictus* (T). Bird species include ostrich *Struthio camelus*. Crocodiles *Crocodylus* sp. are present.

Zoning None

Disturbances or Deficiencies There is no recent information, but information from Bolton (1971) is as follows. Established settlements at the south end of the Omo River bank belong to the Karo tribe, who are cultivating the seasonally flooded terraces and clearing riverine forest. There are settlements on the hills of the east wall and Murse villages with cattle and goats along the western foothills of the Ngalebong Hills (known as the Murse Hills by the local

people). Murse cattle graze on the Plain of Death, but there are no dwellings there. Poachers operate throughout the Mago valley coming mainly from the hills to the east.

Visitor Facilities Access to the park is difficult, even by Ethiopian standards. It is not open to the public, although there have been proposals for further development.

Scientific Research Some surveys have been completed.

Special Scientific Facilities None

Principal Reference Material

- ° Ash, J.S. (1976). Birds at Omo National Park, August 1976.
- ° Bolton, M. (1971). Mago Valley Ecological Survey.
- ° Stephenson, J. and Mizuno, A. (1978). Recommendations on the conservation of wildlife in the Omo-Tama-Mago Rift Valley of Ethiopia. Report for Provisional Military Government of Socialist Ethiopia. Wildlife Conservation Department, Addis Ababa. (Lists flora and fauna and describes proposed boundary for Omo/Mago).

Staff One warden, six game guards and one driver

Budget Approximately US\$95,000

Local Park or Reserve Administration Warden, Mago National Park, Wildlife Conservation Organization, Box 386, Addis Ababa.

Date April 1985

NECHISAR NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established Under development since July 1972, but yet to be gazetted, Arba Minch Forest Reserve added in 1983.

Geographical Location Situated between Abbaya Lake and Chamo Lake on the border between Gemu-Gofa and Sidamo provinces, north of Gidole township. 6°00'N, 37°45'E.

Altitude 1,500-2,000m

Area 70,000ha

Land Tenure Government

Physical Features The park contains the 'white grass plains', Lake Haro Robi, rocky ridges, and the Kulfo, Sermale, and Mio Rivers.

Vegetation This is mainly open grassland plain with savanna woodland. Riverine forest occurs along the lakeshores, with highland forest in the east.

Fauna Some 38 mammal species have been recorded including large herds of Burchell's zebra *Equus burchelli* and Grant's gazelle *Gazella granti*. Other mammals include: Swayne's hartebeest *Alcelaphus buselaphus swaynei* (T), buffalo *Syncerus caffer*, greater kudu *Tragelaphus strepsiceros*, mountain reedbuck *Redunca fulvorufula*, klipspringer *Oreotragus oreotragus*, Defassa waterbuck *Kobus ellipsiprymnus*, olive baboon *Papio anubis*, black and white colobus monkey *Colobus guereza*, crested porcupine *Hystrix cristata*, white-tailed mongoose *Ichneumia albicauda*, and warthog *Phacochoerus aethiopicus*. Main predators are leopard *Panthera pardus* (T), lion *Panthera leo*, black-backed jackal *Canis mesomelas*, bat-eared fox *Otocyon megalotis*, African wild cat *Felis silvestris*, serval *Felis serval*, and caracal *Felis caracal*. Hippopotamus *Hippopotamus amphibius* and crocodile *Crocodylus* sp. occur in the rivers. Some 190 bird species have been identified. Nile perch is common in the lakes.

Zoning Planned

Disturbances or Deficiencies Cultivation, nomadic grazing, removal of firewood and illegal fishing are prevalent in some parts of the park. But about 90% of the total area had been freed from human occupation in 1983.

Visitor Facilities One tourist hotel in Arbaminch town, an entrance gate, 150 km of track (dry weather road), two ferry docks on the Abaya and Chamo Lakes and motor boats.

Scientific Research There is one biologist for the park starting from 1984 and extensive studies are underway.

Special Scientific Facilities None

Principal Reference Material

- * Ashine, T. (1983). National Parks and Protected Areas of Ethiopia. *Proceedings of the 22nd Working Session of IUCN's Commission on National Parks and Protected Areas*, Zimbabwe, 22-27 May 1983.
- * Bolton, M. Wildlife Survey reports, 1969, 1970.

Staff Warden (one); game guards (13); support staff (a biologist, a chashier, storeman, a driver)

Budget Recurrent budget varies from US\$40,000-\$65,000/year

Local Park or Reserve Administration Warden, Nechisar National Park, Arba Minch, Gamo Gofa.

Date April 1985

OMO NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established Developed since 1969, but not yet gazetted.

Geographical Location In Kaffa Province in the south-west corner of Ethiopia, near the borders with Sudan and Kenya. 5°30'-6°40'N, 35°20'-36°00'E.

Altitude 500-2,000m

Area 345,000ha; contiguous to Tama Wildlife Reserve (east) and Omo West Controlled Hunting Area (west and south), which are contiguous to Mago National Park (220,000ha) and Chew Bahar-Yavello-Borana Reserves

Land Tenure Government

Physical Features There are three open grassy plains, the Sai, Illilbai and Aei, with scattered rocky ridges, on the west bank of the Omo River. The park is surrounded by hills and drained by tributaries of the Omo, which forms the eastern boundary. The climate is hot with the main rainy season from April to July.

Vegetation This is generally savanna bushland but includes several vegetation types: riverine forest of *Ficus sycomorus* and *Tamarindus indica* along the major watercourses; bush dominated by *Acacia mellifera* with *A. elatior* ssp. *turkanae*, *Combretum greenwayi* and *Hibiscus lunariifolius*; scrubland with *Dobera glabra* and *Acalypha fruticosa*; and grassland plains dominated by *Pennisetum mezianum*, *Setaria incrassata*, *Chrysopogon plumulosus*, *Sorghum brevicarinatum*, *Sporobolus fimbriatus* and *Andropogon* sp. with scattered thickets of *Terminalia spinosa*, *Boscia angustifolia*, *Combretum* spp. and *Grewia* spp., and grasses *Eragrostis superba*, *Heteropogon contortus*, and *Sehima nervosa*.

Fauna Some 29 wildlife species have been recorded. There are large herds of buffalo *Syncerus caffer* and eland *Taurotragus oryx*, elephant *Loxodonta africana* (T), giraffe *Giraffa camelopardalis*, lion *Panthera leo*, leopard *Panthera pardus* (T), greater kudu *Tragelaphus strepsiceros* and lesser kudu *Tragelaphus imberbis*, oryx *Oryx gazella*, topi *Damaliscus lunatus*, warthog *Phacochoerus aethiopicus*, hyrax (Procaviidae), Lelwel hartebeest *Alcelaphus buselaphus lelwel*, hunting dog *Lycaon pictus* (T), white-tailed mongoose *Ichneumia albicauda*, large spotted genet *Genetta tigrina*, and African civet *Viverra civetta civetta*. The 306 bird species include: ostrich *Struthio camelus*, fish eagle *Haliaeetus vocifer*, harrier hawk *Polyboroides typus*, pied kingfisher *Ceryle rudis*, malachite kingfisher *Alcedo cristata*, sacred ibis *Threskiornis aethiopicus*, hadada ibis *Hagedashia hagedash*, carmine bee-eater *Merops nubicus*, little egret *Egretta garzetta*, darter *Anhinga rufa*, goliath heron *Ardea goliath*, and Namaqua dove *Oena capensis*. Crocodile *Crocodylus* sp. are present.

Cultural Heritage An important archaeological find in the area was the discovery of a 2.5 million year old *Australopithecus* jaw bone.

Population The Hamar, Geleb, Bume, Caro, Mursi, and Surma nomadic tribes live in the area.

Conservation Management Administrative headquarters are in the centre of the park on the Mui River with a wireless link to the Wildlife Conservation Organisation in Addis Ababa.

Zoning None

Disturbances or Deficiencies No information

Scientific Research An air survey in 1978 to determine the density of wildlife by vegetational-types and behavioural studies have been carried out.

Special Scientific Facilities A biological laboratory is proposed

Principal Reference Material

- ° Ash, J.S. (1976). Birds at Omo National Park, August 1976.
- ° Ikeda, H. *et al.* (1982). Ranging and Activity patterns of three nocturnal viverrids in Omo National Park. *African Journal of Ecol.* 20(3).

- * Kyushu University Scientific Team. Preliminary report of the ecological study on several species of ungulates and carnivores in Omo National Park.
- * Stephenson, J. and Mizuno, A. (1978). Recommendations on the conservation of wildlife in the Omo-Tama-Mago Rift Valley of Ethiopia. Report for Provisional Military Government of Socialist Ethiopia. Wildlife Conservation Department, Addis Ababa. (Lists flora and fauna and describes proposed boundary for Omo/Mago).
- * Urban, E.K. and Brown, L.H. (1968). Wildlife in an Ethiopian valley. *Oryx* 1: 342-353.

Staff One warden, 30 game guards and four support staff

Budget 1979/1980 - approximately US\$8,000

Local Park or Reserve Administration Warden, Omo National Park, Wildlife Conservation Organization, Box 386, Addis Ababa.

Date April 1985

SIMEN MOUNTAIN NATIONAL PARK

Management Category II (National Park)

World Heritage Site (Criteria: iii, iv)

Biogeographical Province 3.18.12 (Ethiopian Highlands)

Legal Protection Total

Date Established 31 October 1969 by Order No. 59 in the Negarit Gazeta. Accepted as a World Heritage Site in 1978. Boundary changes were proposed in 1983 to exclude some cultivated land in Wazla Valley and to include Bwahit Mountain summit.

Geographical Location In the western Simen Mountains, 120km north-east of Gondar in Begemder Province. 13°11'N, 38°04'E.

Altitude 3,500-4,624m

Area 22,500ha

Land Tenure Government

Physical Features The park occupies a broad undulating plateau of vast grassy plains bordering the northern edge of the Ethiopian Amhara plateau. The area is part of the Simen Massif which includes the highest peak in Ethiopia, Ras Dashan. The massif was formed some 25 million years ago and the igneous basalts have since been eroded to form precipitous cliffs and deep gorges. Some cliffs reach 1,500m in height and extend for long distances (the north scarp extends 35km). The plateau is bounded on the south and north-east by the deep valleys of the Tacazze River and its tributaries. It is bisected from north to south by the Mayshasha River, for which it is the principal catchment area. There are two wet seasons, from February to March, and July to September; the mean annual rainfall is 1,400mm. There are often drying winds during the day; frosts may occur at night, and snow sometimes settles on the summit of Ras Dashan.

Vegetation This is a mixture of Afro-Alpine woods, heath forest and montane moorland with tree heath *Erica arborea*, giant lobelia *Lobelia rhynchopetalum*, *Solanum* sp., *Rosa abyssinica*,

yellow primrose *Primula verticillata*, everlastings *Helichrysum* spp., lady's mantle *Alchemilla*, *Thymus*, *Urtica*, and mosses (Grimmiaceae). Lichen *Usnea* spp. drapes the high altitude forest trees. The alpine moss originated in the Pleistocene epoch. Ridge tops and gorge sides support coarse grassland with the herbs *Thymus* spp., *Trifolium* spp., *Geranium arabicum*, thickets of *Rumex nervosus*, scattered *Otostegia minucii*, and creepers *Clematis simensis* and *Galium spurium*. Forests of St. John's wort *Hypericum* spp. once flourished at 3,000-3,800m, but few still remain. There are high, but unquantified, levels of endemism.

Fauna The Walia ibex *Capra ibex waliae* (T) on the north scarp of the massif, is endemic to Simen Mountain, with most of the population occurring in the park, and the Simen fox *Canis simensis* (T), is endemic to Ethiopia. Other mammals include: gelada baboon *Theropithecus gelada*, hamadryas baboon *Papio hamadryas*, colobus monkey *Colobus* sp., serval *Felis serval*, leopard *Panthera pardus* (T), caracal *Felis caracal*, wild cat *F. silvestris*, spotted hyena *Crocuta crocuta*, jackal *Canis aureus*, and several large herbivores including bushbuck *Tragelaphus scriptus*, common duiker *Sylvicapra grimmia*, and klipspringer *Oreotragus oreotragus*. The 400 bird species include lammergeier *Gypaetus barbatus*, Verreaux's eagle *Aquila verreauxii*, kestrel *Falco tinnunculus*, lanner falcon *F. biarmicus*, and augur buzzard *Buteo rufofuscus*.

Conservation Management The management plan proposed at the Unesco/World Heritage Workshop 1983 comprises: 1) resource management 2) population relocation 3) tourism, improved access, and expansion of facilities 4) conservation education 5) research and monitoring, and 6) administration and maintenance, including staff training. A farming community of 1,500 farmers previously living in the park has now been relocated. Rangers protect Walia ibex from poaching. IUCN/WWF Project 1241 aims at establishing a qualified warden to assure proper management and survival of the Walia ibex and other rare species.

Zoning Four zones have been defined, but not yet implemented: Prime Protection Zone (6,500ha) to include the least disturbed woodland habitat of the Walia ibex with only non-destructive and administrative use permitted; Extensive Use Zone (6,000ha) with grazing prohibited, but some tourist access, recreation, and environmental education; Recovery Zone (9,500ha) from which inhabitants will be relocated and where selective reforestation will be implemented; and Development Zone (500ha) for the main tourist, education, and administrative facilities.

Disturbances or Deficiencies About 80% of human interference has been eliminated since March 1980. The main problems were grazing, agriculture, burning, hunting, and collection of firewood. These resulted in serious gulley erosion and destruction of the Walia ibex's habitat (mainly the 'giant heath'). However, there is insignificant documentation on actual impacts. Little is known of the status of the Walia ibex population or the maintenance of the park management infrastructure. Recently, there has been a report of a take-over by the Tigray People's Liberation Front (TPLF).

Visitor Facilities There are 100-200 international visitors annually and three simple camps, but access routes are reported to be poor.

Scientific Research Studies have been made of Walia ibex, habitat conservation, and the ecology of Gelada baboon.

Special Scientific Facilities None

Principal Reference Material

- Ashine, T. (1984). What the World Heritage Convention has meant to Ethiopia. In: McNeely, J.A. and Miller, K.R. (Eds) *National Parks, Conservation, and Development. The Role of Protected Areas in Sustaining Society*. Smithsonian Institution Press, Washington, D.C.
- Bekele, E. (1981). A description of the conservation status and future outlooks of Ethiopia's Semien mountains, Bale mountains and Abijatta-shalla Lakes National Parks. Unesco's World Heritage Mission to Ethiopia, Addis Ababa.
- CNPPA Summary Status Report (1984). Threatened Protected Areas of the World (draft).
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- Klotzli, F. Ecological survey on habitat conservation.
- Masao Kwai (Ed.) Ecological and sociological studies of Gelada baboon.
- Nievergelt, B. (1981). Ibexes in an African Environment (Simien Mountains). *Ecological Studies* 40.
- Schaerer, O. (1979). A bibliography on Nature and Man of the Simien Mountains (Ethiopia). Compiled on behalf of the Pro-Simien Foundation and WWF, University of Zurich, Switzerland.
- Wildlife Conservation Organisation (1983). Management Planning Considerations for Simien Mountain National Park. Unesco/World Heritage Workshop, Ethiopia.

Staff One warden, 30 game guards and seven support staff

Budget 1979/1980 - approximately US\$15,000

Local Park or Reserve Administration Warden, Simen Mountains National Park, Debark, Gondar.

Date April 1985

YANGUDI RASSA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.18.12 (Ethiopian Highlands)

Legal Protection Total

Date Established The area was declared in July 1978 and has been under development since 1976, but has yet to be gazetted.

Geographical Location Harrarghe and Wollo Regions, 350km north-east of Addis Ababa. 8°03'N, 34°00'E.

Altitude 500-600m

Area 200,000ha. Bordered by Gewane and Mille Sardo Wildlife Reserves and Afdem-Gewane Controlled Hunting Area.

Land Tenure Government

Physical Features The park area is mainly plains, but also contains Mount Galato Daba, Mount Yangudi and the Awash River on the western boundary.

Vegetation Open grassland, riverine forests and savanna

Fauna Mammals include: Somali wild ass *Equus asinus somalicus* (T), oryx *Oryx gazella*, Soemmerring's gazelle *Gazella soemmerringi*, warthog *Phacochoerus aethiopicus*, gerenuk *Litocranius walleri*, Grevy's zebra *Equus grevyi* (T), greater kudu *Tragelaphus strepsiceros* and lesser kudu *T. imberbis*, serval *Felis serval*, cheetah *Acinonyx jubatus* (T), leopard *Panthera pardus* (T), and golden jackal *Canis aureus*. Very few bird species. Ostrich *Struthio camelus*.

Zoning None

Disturbances or Deficiencies Poaching

Scientific Research Some surveys have been completed.

Special Scientific Facilities None

Principal Reference Material

- ° Ashine, T. (1983). National Parks and Protected Areas of Ethiopia. *Proceedings of the 22nd Working Session of IUCN's Commission on National Parks and Protected Areas*, Zimbabwe, 22-27 May 1983.
- ° Klingel, Hans (1970). The Somali Wild Ass in Ethiopia - Status Survey.

Staff One warden, 12 game guards, and two support staff

Budget 1979/1980 - approximately US\$140,000

Local Park or Reserve Administration Warden, Yangudi Rassa National Park Gewane.

Date April 1985

GAMBELLA NATIONAL PARK

Management Category V (Protected Landscape)

Biogeographical Province 3.13.07 (Eastern Sahel)

Legal Protection Total

Date Established It was established as a wildlife reserve and not gazetted, but has been under legal protection and development since 1973. Now under development as a national park.

Geographical Location Illubor Province in the extreme west of Ethiopia. Approximately 8°00'N, 34°00'E.

Altitude Up to 515m

Area 200,000ha. Bordered to the north by the controlled hunting areas of Jikao and Tedo.

Land Tenure Central Government

Physical Features The lowland plains flanking the Gilo and Itang Rivers constitute the eastern extreme of the Upper Nile marshlands of neighbouring Sudan.

Vegetation Deciduous woodland predominates with some areas of dense forest. The remaining areas are open savanna grassland and marshes.

Fauna The park is of particular importance for the migration of large herds of white-eared kob *Kobus kob leucotis*. Other mammals include: a remnant elephant *Loxodonta africana* (T) population, buffalo *Syncerus caffer*, Nile lechwe *Kobus leche* (T), rhinoceros *Diceros bicornis* (T), oryx *Oryx gazella*, Burchell's zebra *Equus burchelli*, topi *Damaliscus lunatus*, hyrax (Procaviidae), waterbuck *Kobus ellipsiprymnus*, warthog *Phacochoerus aethiopicus*, klipspringer *Oreotragus oreotragus*, bushbuck *Tragelaphus scriptus*, roan antelope *Hippotragus equinus*, oribi *Ourebia ourebi*, bush pig *Potamochoerus porcus*, giraffe *Giraffa camelopardalis*, lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), spotted

hyena *Crocuta crocuta*, genet *Genetta* sp., serval *Felis serval*, and mongoose (Viverridae). Over 150 recorded bird species have been recorded. Crocodile *Crocodylus* sp. are present.

Zoning None

Disturbances or Deficiencies No information

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Ashine, T. (1983). National Parks and Protected Areas of Ethiopia. *Proceedings of the 22nd Working Session of IUCN's Commission on National Parks and Protected Areas*, Zimbabwe, 22-27 May 1983.
- ° Duckworth, F. (1973). The wildlife situation in the Gambella Awraja, south-west Ethiopia. IEG Wildlife Conservation Organization.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date April 1985

DAHLAK ISLANDS MARINE NATIONAL PARK

Management Category Proposed National Park

Biogeographical Province 3.14.07 (Somalian)

Legal Protection None

Date Established The area has been proposed and is under development, but has yet to be gazetted.

Geographical Location Part of the Dahlak Archipelago, at the southern end of the Red Sea, off the north-east coast of Ethiopia. 15°40'N, 40°10'E.

Altitude 0-15m

Area The archipelago covers an area of about 300,000ha, but only part of this is proposed as a national park.

Land Tenure Government

Physical Features The Dahlak Islands form a large archipelago of some 130-360 islands. The larger islands are made of limestones, deposited during the Upper Pleistocene, then faulted to produce the present pattern of islands and troughs. These islands are interspersed with coralline islands and patch reefs, and sandy stretches composed of marine sediments. Tidal ranges of 50-120cm have been recorded. The climate is mainly arid, and there is little freshwater input.

Vegetation The islands have arid vegetation of scattered *Acacia* trees, *Euphorbia*, palms, thorn bush and scrub, and open grassland. Mangroves are found on several islands, with *Avicennia marina* the most common species, *Ceriops* and *Rhizophora*. *Sargassum* tops a number of isolated rocks, and *Sargassum* flats surround some of the islands, while on low saline sandy stretches outside the mangrove zones, zones of *Suaeda* and *Statice* are found, with *Atriplex* and *Zygophyllum* further down the beach.

Fauna Mammals which have been seen in the area include the threatened dugong *Dugong dugon* (T). Some of the islands support camels *Camelus* sp. and Soemmerring's gazelle *Gazella soemmerringi*. Both the green turtle *Chelonia mydas* (E) and hawksbill turtle *Eretmochelys imbricata* (E) have also been recorded, the former breeding. Birdlife on the islands is diverse with 56 recorded species, including osprey *Pandion haliaetus*, pink backed pelican *Pelecanus rufescens* and white pelican *P. roseus*, brown booby *Sula leucogaster*, red-tailed tropic bird *Phaethon rubricauda*, crab plover *Dromas ardeola*, sooty falcon *Falco concolor*, Arabian bustard *Choriotis arabs*, flamingoes (Phoenicopteridae), herons and egrets (Ardeidae), as well as many waders (Charadriiformes), terns and gulls (Laridae). A variety of corals occur including small delicate branching corals, lace coral (Stylasteridae), and mushroom coral (Fungiidae). Small stagshorn coral *Acropora* sp. is typical of some of the patch reefs in shallow water. There are also coral heads with *Porites* (interspersed with *Sargassum*). Corals increase with depth and a high diversity of species is attained. The reefs support a rich fish fauna: *Caranax*, milkfish *Chanos*, *Dascyllus* (Pomacentridae), barracuda (Sphyraenidae), black bass *Micropterus salmoides*, pipefish (Syngnathidae), moray eels (Muraenidae), snappers and bream (Sparidae), tuna and mackerel (Scombridae), butterflyfish (Chaetodontidae), parrotfish (Scaridae), scorpionfish (Scorpaenidae), triggerfish (Balistidae), boxfish (Ostraciontidae), and pufferfish (Tetraodontidae) have all been recorded.

Conservation Management The large area of mangrove swamps is critical for the productivity of the region. Commercial fishing occurs on a small scale, and this could be boosted by development of the park, as this should ensure protection of fish breeding grounds.

Zoning None

Disturbances or Deficiencies The coral reefs and tropical fish stocks are exploited for commercial trade. Overgrazing and subsequent erosion is occurring on some of the inner islands, but most of the islands are uninhabited.

Visitor Facilities It is proposed to develop the area as a tourist park, and the potential is quite high. Development is currently at Mits'iwa, the nearest coastal town.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- * African Wildlife Leadership Foundation (1972). Red Sea and Island Resources of Ethiopia. Typescript report. 24 p.
- * Berhanu, A. (1973). A report on Dahlac Islands Marine Park. Wildlife Conservation Organisation. 8 p.
- * Berhanu, A. (1976). Ethiopia: A Report on the Dahlac Islands Marine Park. In: *Promotion of the Establishment of Marine Parks and Reserves in the Northern Indian Ocean including the Red Sea and Persian Gulf*. Papers and Proceedings of the Regional Meeting held at Tehran, Iran, 6-10 March 1975. IUCN Publications New Series No. 35: 45-49.
- * Blower, J.H. (1970). Report on a visit to the Dahlak Islands: 18-25 March 1969 plus Appendix I to Annex E of Dahlak Quest Expedition Report December 1969 - January 1970. (Wildlife Conservation Report 63 p.)

Staff No information

IUCN Directory of Afrotropical Protected Areas

Budget No information

Local Park or Reserve Administration No information

Date April 1985





- Key
- Protected Areas
 - * Biosphere Reserve

Gabon

GABON

Area 267,667 sq.km

Population 1,370,000 (1984)

Parks and Reserves Legislation Parks and reserves are declared by the President of the Republic, after a proposal has been made by the Ministry of Agriculture, Water and Forestry and Rural Development (Ministère de l'agriculture, de l'élevage et du développement rural). The principal terms used are 'réserve de chasse', 'domaine de chasse', 'réserves intégrale' and 'parc national', though according to Alain (1976) these terms are not well defined in the existing legislation. One of the main acts is the decree fixing the forestry regime, and its modifying acts (notably the Deliberation 33 of 16 October 1957).

Parks and Reserves Administration This is now primarily the responsibility of the Department of Hunting and Fauna (Département de chasse et de la faune) within the Ministry of Agriculture, Water and Forestry and Rural Development (Ministère de l'agriculture, de l'élevage et du développement rural). Previously faunal reserves, hunting reserves and integral reserves were controlled by this department, while national parks come under the Ministry of Tourism. Forestry is the responsibility of the Département des eaux et forêts.

Address

- ° Département de chasse et de faune, Ministère de l'agriculture, de l'élevage et du développement rural, Direction des chasses et faune, BP 1128, Libreville.
- ° Département des eaux et forêts, Ministère l'agriculture de l'élevage et du développement rural, BP 2275, Libreville.

Additional Information Several of the reserves have yet to be implemented. Additional areas in need of protection include primary forest north and south of Ogooué and a region of savanna woodland near Franceville where the last lions in the country are to be found. Gabon is considered to have adequate resources to manage its natural environment; however, sufficient commitment to this task has reportedly been lacking in the past (IUCN/UNEP, 1983).

In the mid-1970s an FAO/UNDP project was carried out in Gabon with the broad aim of improving the management of wildlife resources within the country. The principal objectives were evaluation of the information available on natural resources; study of the relevant legislation and administrations; and study and evaluation of the existing system of protected areas, with the aim of improving management, administration and legislation. The report by Alain (1976) makes a number of recommendations and proposes a plan of action.

In 1986 IUCN and WWF provided consults to Gabon to conduct a review of the system of protected areas. The long-term objectives of this project are the promotion of protected area establishment within the country, and promotion of efficient conservation management of these areas. In addition to reviewing the areas currently protected, the report also outlines a management plan for the Lopé reserve (Nicoll and Langrand, 1986).

References

- ° Alain, G. (1976). Conservation de la faune et aménagement des parcs nationaux. Gabon. Rapport de mission. FO: GAB/74/012. FAO, Rome.
- ° Brédo, H.L. and de Vos, A. (1969). Rapport au Gouvernement du Gabon sur la faune et le tourisme. FO: SF/GAB/1. FAO, Rome.
- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° IUCN/WWF Project 1613. Primate Action Fund.
- ° Nicoll, M. and Langrand, O. (1986). The conservation of forest ecosystems in Gabon. Report prepared for IUCN/WWF Project 3247. IUCN, Gland.
- ° WWF Project 3247. Gabon, Review of System of Protected Areas.

Protected Areas

(hectares)

National Parks

Wonga-Wongué

358,000

Strict Nature Reserves

Ipassa-Makokou

15,000

Other Reserves

Lope

500,000

Moukalaba-Dougoula

100,000

Sétté-Cama

700,000

Subtotal 12,000,000

Other reserves and hunting reserves are included within those sites listed above. These included Iguela Petit Louango, Ounga, Iguela and Ngoué-Ndogo.

Biosphere Reserves

Reserve naturelle integrale d'Ipassa-Makokou

15,000

PARC NATIONAL DE WONGA-WONGUE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection The flora and fauna are totally protected, and cultivation prohibited. Access within the reserve is strictly limited to those invited by the president.

Date Established The area was designated a National Park 30 March 1967 by Order No. 362/MEF/DEF/CHPP (confirmed by Decree No. 172/PR/MEF title 1, article 5 of 13 April 1971). Earlier, Order No. 1488/SF-5225 of 17 November 1962 set up the Domaines de chasse of Wonga-Wongué (25,000ha), Grand Bam-Bam (20,000ha) and Petit Bam-Bam (35,000ha), and Decree No. 7329 of July 1966, and a provisional order of 30 November 1966 also dealt with protection of the area.

Geographical Location In the coastal region of Gabon, between Libreville and Port Gentil, 99km south of the equator. 0°30'-1°00'S, 9°10'-9°40'E.

Altitude From sea level to around 260m

Area 380,000ha (the originally designated area only amounted to 80,000ha).

Land Tenure Government

Physical Features Much of the area is flat, comprising parts of the plains, gently rolling hills and plateaux of the coastal plain. Soils are principally pramitic and ferrallitic. With the Atlantic coast to the west, the park is bounded by the Aouagne and Pambo-Nyango rivers to the north, by Lake Azingo to the south-east, and by the Gongoué, Oranga, Wanga, Bembelié and Mpogoué rivers, and the Inyongo and Nguélié lakes to the south. A number of small coastal rivers cross the park, some giving rise to erosion features such as the amphitheatre of the Cirque du Grand Bam-Bam. The coastline is flat and straight. Average temperature is

26°C, and annual rainfall varies between 2000mm and 2200mm, with two dry seasons each year. During the longer dry season (June - September) there is almost continuous cloud cover.

Vegetation The vegetation varies from humid tropical forest to stunted woodland savanna, covered in grass species during the rains, with thickets of stunted *Aucoumea klaineana* and other ligneous species. The rainforest includes ebony *Diospyros* spp. and other hardwoods such as the purpleheart *Copaifera mopane*, interspersed with climbing palm *Calamus* and rubber vine *Landolphia*. Other species of interest in the area include: Gabon mahogany *Aucoumea klaineana* (a resin yielding species), limba *Terminalia superba*, ilomba *Pycnanthus angolensis*, iroko *Chlorophora excelsa*, and acajou mahoganies *Khaya* spp.

Fauna The two most notable mammal species in the park are the chimpanzee *Pan troglodytes* (T), and the western race of the gorilla *Gorilla gorilla gorilla* (T). Also found in the area are elephant *Loxodonta africana* (T), buffalo *Syncerus caffer* (some 30,000 individuals), warthog *Phacochoerus aethiopicus*, sitatunga *Tragelaphus spekei*, bongo *Tragelaphus euryceros*, yellow-backed duiker *Cephalophus sylvicultor*, blue duiker *Cephalophus monticola*, aardvark *Orycteropus afer*, giant pangolin *Manis gigantea*, and monkeys of the genus *Cercopithecus*. Birds include white pelican *Pelecanus onocrotalus*, bustards (Otididae), and parrots (Psittacidae), and amongst the reptiles are python *Python* sp. and the Gabon viper *Bitis gabonica*. The area is also noted for its species of Lepidoptera.

Conservation Management The area is essentially managed as a Presidential reserve, where hunting parties are organized for guests of the president. Access is therefore strictly limited (and only really possible by light aircraft from outside the area). Anti-poaching activity is undertaken.

Zoning There were three basic sections within the area now covered by the parc national, but there is now no zoning.

Disturbances or Deficiencies Intensive poaching has been reported in the past, though poaching control instigated by the present Guide de chasse is apparently very effective. Forestry exploitation has occurred within the reserve. There have been a number of introductions of exotic species to the area, including Burchell's zebra *Equus burchelli*, black-tailed gnu *Connochaetus taurinus*, peccary *Tayassu* sp., wild boar *Sus scrofa*, and pony *Equus caballus*. All but the zebra have established themselves within the park.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- ° Nicoll, M and Langrand, O. (1986). The Conservation of Forest Ecosystems in Gabon. IUCN/WWF Project 3247, Systems review of protected areas in Gabon.
- ° Tutin, C. and Fernandez, M. (1983). Recensement des Gorilles et des Chimpanzés du Gabon. CIRMF, Gabon.

Staff No information, but likely to be relatively large.

Budget No information

Local Park or Reserve Administration Direction de la faune et de chasse, Ministère des eaux et forêts, BP 1128, Libreville

Date June 1986

RESERVE NATURELLE INTEGRALE D'IPASSA-MAKOKOU

Management Category IV and IX (Managed Nature Reserve and Biosphere Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Hunting, fishing and cultivation is forbidden in the reserve, and nothing may be killed or collected except for scientific research. Surrounding lands are unprotected.

Date Established 2 October 1970 by decree. Approved as a Biosphere Reserve in 1983.

Geographical Location On the northern bank of the Ivindo River in north-east Gabon, 600km from the sea and 10km southwest of Makokou in the province of Ogooue-Ivindo. 0°31'N, 12°48'E.

Altitude 450-550m, averaging 500m

Area 15,000ha, with a core area of 10,000ha

Land Tenure Government

Physical Features The reserve lies on the Precambrian Peneplaine de l'Ivindo, and the base rocks of the region are mostly Precambrian crystalline formations of leptinite, basic lava, granites and gneisses, with sedimentary formations composed of muds, conglomerates and clays. A succession of clay alluvia lines the forested valley floors. The River Ivindo forms the southern limit of the reserve, and several river islands fall within the reserve boundaries. A number of small streams drain into the Ivindo, and small areas of hydromorphic soils that are seasonally flooded are scattered throughout the reserve. Mean annual temperature is 23.9°C, with mean monthly temperatures ranging between 21°C and 24°C. Relative humidity is about 80%. Mean annual rainfall is 1755mm with two wet seasons, but during the long dry season (June - September) there is almost continuous cloud cover.

Vegetation The vegetation comprises humid dense evergreen lowland forest of the Congo-Guinean phytogeographic region, though there are local differences resulting from proximity to the river, and strong winds cause more frequent treefall than in forest further from the river. On the hydromorphic soils, the forests are seasonally flooded. Some 1,200 plant species have been recorded, though it is estimated that there may be some 4,000 in total. Diversity of trees and lianes is approximately 200 species per hectare. There are several rare or endemic species found within the reserve, including *Ardisia belingaensis* and *Rhaptopetalum belingensis*.

Fauna The vertebrate fauna is relatively rich, with 130 mammals recorded, 401 birds (with 356 recorded within an area of 200ha), 65 reptiles and 47 amphibians. Particularly worthy of mention are the mandrill *Papio sphinx* (T), bushpig *Potamochoerus porcus*, and water chevrotain *Hyemoschus aquaticus*, although this latter species is now reported to be locally extinct. Also present are blue duiker *Cephalophus monticola*, white-bellied duiker *Cephalophus leucogaster*, black-fronted duiker *Cephalophus nigrifrons*, Peter's duiker *Cephalophus callipygus*, bay duiker *Cephalophus dorsalis*, sitatunga *Tragelaphus spekei*, bongo *Tragelaphus euryceros*, and buffalo *Syncerus caffer*.

Conservation Management This reserve is reported to be the only protected area in Gabon where forest exploitation does not occur, and in the past the area has been largely undisturbed except by traditional subsistence hunting. There are also two contiguous blocks of largely undisturbed forest.

Zoning There is a core zone of 10,000ha with a fixed quadrat site (of 200ha), and a surrounding buffer zone (which still contains some plantations). Only research is allowed within the core zone.

Disturbances or Deficiencies There are a number of neighbouring villages along the southern bank of the River Ivindo, and it has been reported that poaching within the reserve is on the increase. Apart from the natural boundary along the Ivindo, the only marked section of the boundary is a 2km track cut on the eastern edge, and there is some encroachment. There are no buffer zones outside the reserve. It has recently been reported that there are no effective management plans, and that active management and law enforcement are currently inadequate.

Visitor Facilities School parties have visited the research station.

Scientific Research The reserve and surrounding forests are the best studied areas in Gabon, with the core area being particularly well studied. Most research takes place within a 200ha zone near the research station. Research has concentrated on the relationship between forest dynamics and diversity, plant-animal interactions, animal ecology and behaviour, liane ecology, and agroforestry. More specifically, animal research has been concentrated on primates, small ungulates, pangolins, rodents, fish and insects. There are continuous monitoring programmes, and a comprehensive species list has been compiled. Much of the research has been carried out by foreign institutes.

Special Scientific Facilities A research station, the Laboratoire de Primatologie et d'Ecologie Equatoriale, was built in the reserve in 1968 by the Centre National de Recherche Scientifique Tropicale in France (CENAREST). It was nationalised in the late 1970s by the Gabonese Government to become the Institut de Recherche en Ecologie Tropicale (IRET) but is still part of CENAREST. Research facilities include a 100m grid of paths within the 200ha research zone. There is accommodation for 12 scientists, a library, laboratory facilities, herbarium (with specimens of all identified plant species), canteen and water tower.

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- Dubost, G. (1978). Un aperçu sur l'écologie du chevrotain africain *Hyemoschus aquaticus* Ogilby, Artiodactyle, Tragulidae. *Mammalia* 42: 1-62.
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- Nicoll, M and Langrand, O. (1986). The Conservation of Forest Ecosystems in Gabon. IUCN/WWF Project 3247, Systems review of protected areas in Gabon.

Staff There is a director based in Libreville, and a permanent local staff of twenty who maintain buildings, access paths and vehicles. The director is only able to visit the reserve for a few weeks each year. A botanical technician, and two scientists are also resident within the reserve.

Budget The maintenance of the reserve is paid by the Ministère de l'Enseignement Supérieur, while funding for research comes from MAB sources and amounts to some US\$20,000 to US\$30,000 per year.

Local Park or Reserve Administration Centre National de Recherche Scientifique Tropicale, BP 180, Makokou.

Date June 1986

RESERVE DE FAUNE DE MOUKALABA-DOUGOULA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Hunting and cultivation is illegal, but although total protection is intended, some forestry permits still apply and the remaining undisturbed forest will be logged by 1988.

Date Established 17 November 1962, by Decree No. 1484

Geographical Location In the Moukalaba river valley of southern Gabon, lying between the Dougoua and Moukalaba Rivers in the east, and the peaks of the hills to their west. Approximately centred 2°10'S, 10°20'E.

Altitude 120-250m

Area 100,000ha

Land Tenure Government

Physical Features Mainly comprises the eastern slopes of the hills behind the coastal plains, with streams draining to the Dougoua and Moukalaba Rivers which form the eastern borders of the reserve. Hot, humid equatorial climate, with two dry seasons, though the long dry season (June - September) is almost continuously cloudy.

Vegetation The reserve contains a mosaic of secondary grassland, gallery forest, and rain forest (both undisturbed and selectively logged). The grasslands, which are burned each year during the long dry season, are dominated by *Pobeguinea* species that grow to about 2m tall. Wooded formations occur on the better drained soils.

Fauna Mammals include: buffalo *Syncerus caffer*, elephant *Loxodonta africana* (T), water chevrotain *Hyemoschus aquaticus*, waterbuck *Kobus ellipsiprymnus*, as well as gorilla *Gorilla gorilla* and other primate species. The avifauna is rich with many strictly grassland species such as the uncommon *Merops bullockoides*, as well as forest species such as *Bombylonax breweri*.

Conservation Management There is currently no management plan, and activities have recently been directed towards building facilities for management/ protection staff, and anti-poaching activities have yet to begin. The presence of representatives of the Ministère des eaux et forêts in the area has reduced poaching to some extent, however. There is an urgent need to begin anti-poaching activity, and to mark boundaries.

Zoning The area was previously divided into a 80,000ha réserve de faune and 20,000ha domaine de chasse, with clearly differing management objectives. There is currently no zoning.

Disturbances or Deficiencies The area has been heavily hunted in the past, and is still under pressure from poaching. The western boundary is unclear, and there are insufficient signs delimiting reserve boundaries. Perhaps more seriously, some forestry permits still apply and it is likely that no undisturbed forest will remain after 1988. Forestry activities have changed the structure of the rain forest, and on some steep slopes have caused severe local damage. There are currently no qualified reserve personnel, though this will change when the facilities are completed.

Visitor Facilities None

Scientific Research A permanent one hectare plot has been established in rain forest to examine forest dynamics and diversity, otherwise there is no research within this area.

Special Scientific Facilities None, although accomodation and use of a vehicle will be available later.

Principal Reference Material

- ° Fontes, J. (1978). Les formations herbeuses du Gabon. *Ann. Univ. Nat. Gabon* 2: 127-153.
- ° Nicoll, M and Langrand, O. (1986). The Conservation of Forest Ecosystems in Gabon. IUCN/WWF Project 3247, Systems review of protected areas in Gabon.

Staff There are two agents forestières, and seven locally employed workers involved in construction. Staff will be increased when facilities are completed.

Budget So far funds have been primarily directed to building.

Local Park or Reserve Administration Direction de la faune et de chasse, Ministère des eaux et forêts, BP 1128, Libreville

Date June 1986

RESERVE DE FAUNE ET DOMAINES DE CHASSE DE SETTE CAMA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Depending on location

Date Established Decree No. 1571 of 29 December 1966 includes the domaine de chasse de Iguéla, the réserve de faune du Petit-Louango, the domaine de chasse de Nbove-Ndogo, and the domaine de chasse de Sétte-Cama. Protection of the whole 'Aire d'exploitation rationnelle de faune de Sétte-Cama' dates from Arrête 1487/SF-5225 of 17 November 1962.

Geographical Location Coastal zone of south-west Gabon to the north and south of the lagoon behind Sétte Cama and Gamba. 2°15'S, 9°56'E.

Altitude From sea level to 100m

Area 700,000ha. (Réserve de faune d'Iguéla Petit Louango 80,000ha; réserve de faune de la plaine d'Ouanga 20,000ha; domaine de chasse d'Iguéla 150,000ha; domaine de chasse Ngoué-Ndogo 250,000ha; domaine de chasse de Sétte-Cama 200,000ha)

Land Tenure Government

Physical Features The reserve is a weakly undulating, sandy plain, penetrated by an extensive lagoon and several lakes. The small rivers that cross the area mainly spring from the low Mayombe hills to the east of the reserve. The soils are largely a mosaic of hydromorphic clay-sand and sand-clay mixtures. Average temperature is 26°C, and rainfall varies between 2200mm and 2400mm. There are two dry seasons, though during the long dry season (July - September) there is persistent cloud cover.

Vegetation Open savanna with thickets along the littoral zone, but with rain forest with Okoume covering the majority of the reserve. Most of the forest was exploited some 20 years ago. Several of the forest areas are subject to regular flooding.

Fauna There are large populations of elephant *Loxodonta africana* (T) and buffalo *Syncerus caffer*, but the reserve is particularly important for the African manatee *Trichechus senegalensis*, Bate's dwarf antelope *Neotragus batesi*, and the leatherback turtle *Dermochelys coriacea* (V). Other species include: blue duiker *Cephalophus monticola*, chimpanzee *Pan troglodytes* (T), gorilla *Gorilla gorilla gorilla* (T), leopard *Panthera pardus* (T), aardvark *Orycteropus afer*, and monkeys *Cercopithecus* spp..

Conservation Management There is a permanent presence in both the Sétte-Cama and Iguela areas, but otherwise management and protection would appear to be minimal. Several recommendations on management are made by Nicoll and Langrand (1986).

Zoning Divided into two réserves de faune and three domaines de chasse, with different management objectives.

Disturbances or Deficiencies There is oil exploration in the region, despite the fact that this is illegal, and this is causing a number of problems. There are Guides de chasse in both the Iguela and Sétte-Cama areas, but otherwise there is no organized protection. There are no representatives of the Ministère des eaux et forêts at Gamba, the only town within the reserve.

Visitor Facilities Although the area is remote, several safaris are organized each year for foreign non-resident clients.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

* Nicoll, M and Langrand, O. (1986). The Conservation of Forest Ecosystems in Gabon. IUCN/WWF Project 3247, Systems review of protected areas in Gabon.

Staff There is a guide de chasse with two assistants in the domaine de chasse de Sétte-Cama, and one guide de chasse in the domaine de chasse d'Iguela. However these staff are appointed by the Ministère du tourisme, and although their activities are supported by the Ministère des eaux et forêts there is no representative of the latter within the reserve.

Budget No information

Local Park or Reserve Administration Direction de la faune et de chasse, Ministère des eaux et forêts, BP 1128, Libreville.

Date June 1986

RESERVE DE FAUNE DE LA LOPE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Hunting, fishing and cultivation is forbidden, and the flora is completely protected.

Date Established 17 November 1962, by Decree No. 1486. The area has had previous designations as Lopé-Okanda (1949), 'parc national de l'Okanda/réserve intégrale de l'Ofoué' (Arrêté 2668, 27 September 1946) and 'réserve de chasse de Lopé-Okanda' (Arrêté 2604, 26

September 1946). The most recent designation is as a 'réserve intégrale' in 1982, but this is equivalent to the Reserve de faune status. There is an intention to declare the area a national park, and to link it to a domaine de chasse on the north bank of the Ogooué.

Geographical Location Central Gabon, bounded to the east by the Offoué River, to the north by the Ogooué River, and to the north-west by the Mingoué River. Approximately centred at 0°30'S, 11°40'E.

Altitude 200-550, with an average of 250m

Area 500,000ha

Land Tenure Government

Physical Features The reserve includes both mountainous areas (including Mount> the Lopé-Okanda plain. Base rocks are part of the Francevillian peneplaine, and soils are generally argillaceous, shallow and stony, though there are small pockets of seasonally flooded hydromorphous soils. Major rivers bound the reserve to the east, north and northwest. The Lope-Okanda plain is one of the driest areas in Gabon, with mean monthly temperatures of 25.7°C, and annual rainfall of 1598mm (both measured at nearby Bououé). There are two dry seasons, and during the longer dry season (June - September) skies are usually overcast.

Vegetation Around 80% of the reserve is Congo rain forest (more than half of which is undisturbed), with small pockets of swamp forest. Secondary grassland/forest is the predominant vegetation type in the north, while there are small areas of grassland or fern throughout the centre and south of the reserve which may be natural. Grassland formations have been described by Descoings (1978) and Fontes (1978).

Fauna Forty-seven mammal species are found within the reserve, and 150 birds, though both figures are likely to be underestimates. The area is a stronghold of forest buffalo *Syncerus caffer* and elephant *Loxodonta africana* (T), and a range of carnivores including the golden cat *Profelis auratus*. At least 12 primate species are also present, including an estimated 900 gorilla *Gorilla gorilla gorilla* (T) and 1750 chimpanzee *Pan troglodytes troglodytes* (T)(Tutin and Fernandez, 1983), and the drill *Mandrillus sphinx* (T)(only recently confirmed in Gabon). Reptiles include at least two crocodile species (both of which are threatened in Africa), the monitor *Varanus niloticus*, and the forest tortoise *Kinixys erosus*.

Conservation Management The surrounding forest extends for hundreds of kilometres south of the reserve, and is largely undisturbed. The same is true of much of the reserve itself. The presence of protection staff at Lopé village has reduced poaching in this area, and large mammals are gradually recovering from periods of heavy hunting both in this region and around the Trans-Gabon railway. Nicoll and Langrand (1986) make a number of proposals for improved management of the area.

Zoning Although the area has been split into various types of conservation unit at one time, it is currently unzoned.

Disturbances or Deficiencies Although strictly illegal, forestry is reported to be a major industry in the north of the reserve where high densities of Okoumé occur. There is a small amount of traditional fishing and agriculture, but much more serious is the effect of hunting in certain areas.

Visitor Facilities There are no official facilities yet, though the area is visited by tourists.

Scientific Research Census of gorilla and chimpanzee (Tutin and Fernandez, 1983), and research on these species and on black colobus is ongoing. All vertebrate species are recorded, and the relative abundance of some monitored. New studies are under-way on grassland management and buffalos, and a permanent study plot is being set up to study diversity in undisturbed forest.

Special Scientific Facilities There are facilities for research at the Station d'Etudes des Gorilles et Chimpanzés (SEGC), which was established in the reserve in 1983. The centre is run under the auspices of the Centre Internationale de Recherche Médicale de Franceville, and includes laboratory/office and accomodation facilities.

Principal Reference Material

- ° Descoings, B. (1974). Les savanes du Moyen-Ogooué, region du Booué (Gabon). CNRS/Centre d'Etudes Phytosociologiques et Ecologiques Document 69. 76 p.
- ° Fontes, J. (1978). Les formations herbeuses du Gabon. *Ann. Univ. Nat. Gabon* 2: 127-153.
- ° Nicoll, M and Langrand, O. (1986). The Conservation of Forest Ecosystems in Gabon. IUCN/WWF Project 3247, Systems review of protected areas in Gabon.
- ° Tutin, C. and Fernandez, M. (1983). Recensement des Gorilles et des Chimpanzés du Gabon. CIRMF, Gabon.

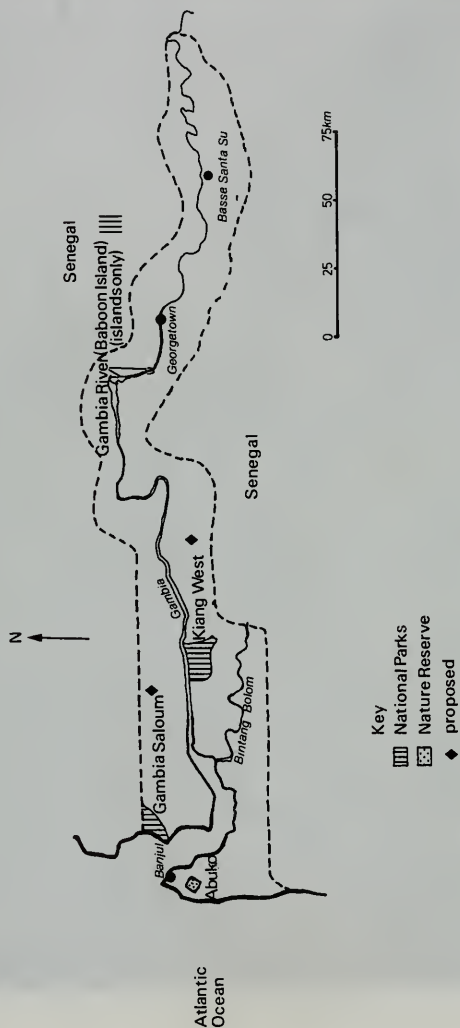
Staff There are several 'agents forestières', 'gardes-chasses' and other workers.

Budget No information

Local Park or Reserve Administration Direction de la faune et de chasse, Ministère des eaux et forêts, BP 1128, Libreville

Date June 1986





The Gambia

GAMBIA

Area 10,368 sq.km

Population 695,886 (1983)

Parks and Reserves Legislation The Wildlife Conservation Act was passed by Parliament on 3 February 1977, and repealed the preceding conservation act, the Wild Animals (Birds and Fish) Preservation Act of 1916, though not the regulations applying that act, some of which continue to be in force. The 1977 act provides for the conservation and rational management of wildlife in the Gambia, for establishment of National Parks and Reserves and Local Sanctuaries, and for a Department of Wildlife Conservation. It also includes the outlawing of hunting, and a ban on the trading and export of animal products. National Parks are defined as areas set aside for the propagation, protection, conservation and management of vegetation and wild animals, as well as for geological formations of scientific or aesthetic value. Activities disruptive to wildlife are prohibited or strictly controlled. National reserves are areas also set aside for propagation, protection, conservation and management of vegetation or wild animals, where hunting and certain other human activities are prohibited. Local sanctuaries may also be set up to protect particular plants, animals or communities. While national parks are declared (or declassified) by the Minister after approval of Parliament, national reserves or local sanctuaries can be established directly by the Minister. The Director of the Wildlife Conservation Department also has the power to control hunting in areas adjacent to national parks and reserves. The Wildlife Conservation Regulation, 1978, outlines regulations and rules applicable to all national parks and reserves, and conditions attached to the issue of hunting licences. There are a number of Forest Parks, covering in total about 5% of the land area. These reserves have a productive function, and some are forest plantations with exotics, some, however, are protected from human interference. The Banjul Declaration by His Excellency Sir Dawda Jawara, launched 18 February 1977, declared the Government's commitment to conservation of fauna and flora.

Parks and Reserves Administration The Department of Wildlife Conservation operates under the aegis of the President's office and in particular is the responsibility of the Deputy Secretary-General. The Department of Forests within the Ministry of Water Resources and Environment is responsible for forestry administration.

Address

- ° Forestry Department, Ministry of Water Resources and Environment, 5 Marina Parade, Banjul.
- ° Wildlife Conservation Department, c/o President's Office, Abuko Nature Reserve, Abuko.

Additional Information Because of the geographical position of the country, it is considered essential that the Gambia co-ordinates its policy on nature conservation with Senegal, particularly with regard to migratory animals. Establishment of the Gambia Saloum National Park as an extension of Senegal's Saloum National Park is a high priority to this end (IUCN/UNEP, 1983). This area is a major spawning ground for many fish caught off the Gambia and Senegal coasts, and the park would also protect breeding sites of the manatee, four species of turtle and thousands of waterbirds.

The Abuko Nature Reserve is Gambia's first and so far only nature reserve open to the general public. A large number of 'Forest Parks' cover about five per cent of the total land area, some are forest plantations with foreign tree species, while others are forest reserves intended for protection against human interference. As is to be expected in a small country with such a relatively high population density, a big effort is put into making the general public aware of the importance of nature conservation. As a part of this effort, photographs, films, and various publications are used, as well as organised visits to the Abuko Nature Reserve.

The whole of the Gambia River Basin was surveyed in 1983/84 to provide baseline data for a projected construction of a barrage across the river, 160km upstream.

References

- ° Diom, M. (1981). Parcs nationaux et aires protégées du Sénégal, de la Gambie et de la Guinée-Bissau. In: *Conserving Africa's Natural Heritage*, IUCN, Gland. Pp 80-86.
- ° Edberg, E. (1982). *A naturalist's guide to The Gambia*. J.G. Sanders.
- ° IUCN/WWF Project 1078. Gambia, Conservation Education. (Continued by project 3675.)
- ° IUCN/WWF Project 3113. Proposed Senegambian Saloum National Park.
- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° Wildlife Conservation Department (1985). The Gambia. Abuko Nature Reserve. Wildlife Conservation Department, Banjul.

Protected Areas

(hectares)

National Parks

Gambia River (Baboon Island)	627
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Nature Reserves

Abuko	113
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Proposed areas

Gambia Saloum National Park	2,000
Kiangs West National Park	10,000

GAMBIA RIVER (BABOON ISLAND) NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 24 October 1978 by legal Notice 33. (The Wildlife Conservation (River Gambia National Park) Order).

Geographical Location A group of islands in a loop of the River Gambia, 240km east of Banjul, 5km south of Kuntaur. Approximately 13°30'N, 15°00'W.

Altitude Near sea level

Area 627ha

Land Tenure Government

Physical Features The park comprises a group of five islands within the River Gambia, with Baboon as the largest. There are red lateritic cliffs on the south bank of the river, which enhance the aesthetic quality of the area.

Vegetation Islands comprise high riverine forest with areas of *Dracaena*, particularly around the small southern coast island.

Fauna The most numerous large animals are warthogs *Phacochoerus aethiopicus*, and savanna baboon *Papio papio*, however two other primate species have been observed: vervet monkey *Cercopithecus aethiops*, and red colobus *Colobus badius*. Unconfirmed reports suggest

that antelope species are well represented - there have been sightings of waterbuck *Kobus ellipsiprymnus*, western sitatunga *Tragelaphus spekei gratus*, solitary roan antelope *Hippotragus equinus* and bushbuck *T. scriptus*. Of particular interest is the presence of armadillo *Orycteropus afer*. Reliable sightings have been made of manatee *Trichechus senegalensis* (T), clawless otter *Aonyx capensis*, and hippopotamus *Hippopotamus amphibius* (threatened in Gambia) in the river close to Baboon Island. There are many species of bird including large flocks of waders during the European winter months and resident pink-backed pelican *Pelecanus rufescens*, spur-wing goose *Plectropterus gambensis*, knob-billed goose *Sarkidiornis melanotos*, white-faced tree duck *Dendrocygna viduata*, garganey *Anas querquedula*, fishing owl *Scotopelia peli*, crowned crane *Balearica pavonina*, and fish eagle *Haliaeetus vocifer*. Both sacred ibis *Threskiornis aethiopicus* and the hadada ibis *Bostrychia hagedash* are resident and regularly seen. The day-time bat *Lavia frons* is also a feature of the river bank. At least one species of crocodile, *Crocodylus niloticus* (V), has been observed in the area, as well as river turtles.

Conservation Management Boat landing facilities have been improved by the Royal Engineer volunteers of the British Army.

Zoning None

Disturbances or Deficiencies Occasional intrusion by local fishermen, though this is not a serious problem.

Visitor Facilities The park is not open to the general public.

Scientific Research A chimpanzee rehabilitation project was initiated on the second largest island in 1978-1980, and is still in operation (Brewer, 1985). These animals are either confiscated or donated specimens.

Special Scientific Facilities A small base-camp for research workers was established on Baboon Island, and another small building on the second largest island. Only observation cages now remain on the islands, while the base camp has been relocated onto the south bank of the river facing the second island.

Principal Reference Material

- ° Brewer, F.E. (1985). *The Gambia Abuko Nature Reserve*. Wildlife Conservation Department, Banjul, Gambia.
- ° Gore, M.E.J. (1981). *Birds of the Gambia* B.O.U. Checklist No. 3. B.O.U. London.

Staff Two national park guards and five research staff

Budget No information

Local Park or Reserve Administration Wildlife Conservation Department

Date May 1985

ABUKO NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 1968, as a nature reserve of 78ha. Extension of 35ha in 1978. First established as Abuko Water Catchment Area in 1916.

Geographical Location Near the village of Lamin, on the Brikama road, about 20km from Banjul. Approximately 13°15'N, 16°40'W.

Altitude Near sea level

Area 113ha

Land Tenure Government

Physical Features The reserve is transected by the Lamin Stream, which usually flows eastward and has been dammed to form a series of small pools at the lower end of the reserve, the largest of which is known as Bamboo Pool. However, because of the prevailing drought, and the exacerbating effect of vegetation removal around the park, this stream has not flowed for the past few years. The reserve is still used as a water catchment area; ground water is pumped up at a water works by the main road.

Vegetation The most interesting part of the reserve is a narrow strip of dense evergreen riverine forest bordering the Lamin Stream. Forest is now very uncommon in the Gambia. The forest gives way to open Guinean savanna some 50-100m from the water course.

Fauna The value of the forest at Abuko is evident from, among other things, the records of species whose main distribution is in the rainforest zone further south. Examples are emerald snake *Gastrophysus smaragdina*, two spotted palm civet *Nandinia binotata* and green turaco *Tauraco persa*. Other mammal species include bushbuck *Tragelaphus scriptus*, sitatunga *T. spekei* (introduced, about five individuals), duiker, porcupine, civet *Viverra civetta*, mongoose *Mungos gambianus*, genet *Genetta* sp., serval *Felis serval*, lesser bushbaby *Galago senegalensis*, cane rat *Thryonomys swinderianus*, Gambian sun squirrel *Heliosciurus gambianus*, striped ground squirrel *Xerus erythropus*, western red colobus monkey *Colobus badius*, vervet monkey *Cercopithecus aethiops*, patas monkey *Erythrocebus patas*. Some 203 species of bird have been recorded (see Jensen and Kirkeby, 1980). Black crane *Porzana flavirostra*, lily trotter *Actophilornis africana*, palm-nut vulture *Gypohierax angolensis*, squacco heron *Ardeola ralloides*, pied kingfisher *Ceryle rudis*, giant kingfisher *C. maxima*, and hammerkop *Scopus umbretta* can be seen along the stream. Reptiles include the Nile crocodile *Crocodylus niloticus* (V), West African crocodile *Osteolaemus tetrapis* (I), rock python *Python sebae*, green mamba *Dendroaspis viridis*, black cobra *Naja melanoleuca*, African beauty snake *Psammophis sibilans*, and Nile monitor. Butterflies are well represented.

Conservation Management Abuko Conservation Education Centre (sponsored by WWF/IUCN Project 1078) was completed and inaugurated by the President following launching of the Banjul Declaration in 1977. A 2.5m high double chain-linked fence encloses the reserve to protect it from bush fires, hunters and domestic animals. Water is piped to the north-eastern section.

Zoning Visitor facilities are concentrated in the animal orphanage area. The 1978 extension is separated from the older reserve by a fence.

Disturbances or Deficiencies Some of the 1978 extension was used for agriculture in the past, but this area is now enclosed by a chain-linked fence and there is no further agricultural disturbance.

Visitor Facilities No vehicles are permitted. This park is one of the main attractions of Gambia. There is a rest house at Bamboo Pool with an education centre, exhibition and a film room. By the other two pools there are observation hides. The 'Animal Orphanage' contains cages with chimpanzees, spotted hyenas, lion etc.. There is also a guide book and nature trail, with labelled trees and shrubs. Refreshments are available. A bus service from Banjul stops nearby on the main road and most hotels organise trips to Abuko.

Scientific Research A botanical survey was carried out in 1975. There is some work on chimpanzee rehabilitation. Red colobus have been studied.

Special Scientific Facilities Visiting scientists can arrange to utilise access roads to the orphanage and the extension.

Principal Reference Material

- ° Brewer, F.E. (1985). *The Gambia Abuko Nature Reserve*. Wildlife Conservation Department, Banjul, Gambia.
- ° Edberg, E. (1984). *A Naturalist's Guide to The Gambia*. J.G. Sanders.
- ° IUCN/WWF Project 1078. Gambia, Conservation Education.
- ° Jensen, J.V. and Kirkeby, J. (1980). *The Birds of the Gambia. An annotated checklist and guide to localities*. Hostrup Film-Grafik, Arhus, Denmark. 284 pp.

Staff Fourteen staff (including Watchmen) and eight daily employed personnel.

Budget There is no separate budget for the reserve.

Local Park or Reserve Administration Wildlife Conservation Department, Lamin.

Date May 1985

KIANGS WEST NATIONAL PARK

Management Category Proposed

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection No information

Date Established Proposed in 1977

Geographical Location Bordered to the north by the River Gambia. Approximately 13°15'N, 15°55'W.

Altitude Near sea level

Area 10,000ha; includes Faba Forest Park

Land Tenure No information

Physical Features The Ngakingkoi Bolon, tributary to the River Gambia, flows through this area.

Vegetation Major vegetation types in the southern part are dry deciduous woodland and Guinean savanna with species such as: *Pterocarpus erinaceus*, *Parkia biglobosa*, *Terminalia macroptera*, *Prosopis africana*, *Ficus* spp., *Adansonia digitata*, *Acacia seyal*, *Cassia sieberana*, *Crossopteryx febrifuga*, and *Piliostigma thonningii*. There is also a patchy zone of *Acacia* tree savanna between the two former types, mangrove swamps and lagoons.

Fauna Hyena *Crocuta crocuta*, warthog *Phacochoerus aethiopicus*, red river hog *Potamochoerus porcus*, Grimm's duiker *Sylvicapra grimmia*, bushbuck *Tragelaphus scriptus*, West African manatee *Trichechus senegalensis* (T), red colobus monkey *Colobus*

badius, and crocodile *Crocodylus niloticus* (V) were recorded from the area in 1975, while roan antelope *Hippotragus equinus* had been seen prior to 1973.

Zoning None

Disturbances or Deficiencies There is deforestation, agriculture and poaching, although manatee, are now too rare to be regularly hunted. Warthog are hunted by farmers, although this is illegal, as they damage crops.

Visitor Facilities The reserve has good potential for tourism. A road has been constructed to the area and there are good possibilities for access by boat.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Bijleveld, M. (1975). Report on conservation mission to the Gambia. WWF/IUCN Project 1078.

Staff One ranger resident in the area

Budget No information

Local Park or Reserve Administration Wildlife Conservation Department

Date May 1985





- Key
- National Parks
 - Strict Nature Reserve
 - Wildlife Sanctuaries
 - Game Production Areas
 - * Biosphere Reserve

Ghana

GHANA

Area 238,538 sq.km

Population 12,210,000 (1984)

Parks and Reserves Legislation Under the Wild Animals Preservation Act No. 43 of 1961, the President is empowered (section 11) to establish reserves within which it is unlawful to hunt, capture, destroy or collect any wild animals except those exempted. Legislative Instrument 710 of 20 September 1971 sets out the Wildlife Reserves Regulations stating that the consent of the Chief Game and Wildlife Officer is necessary for entry into those areas and that conditions for such entry may be determined by him. Any exemption given for capturing, killing or collecting plants or animals is only made for conservation or management purposes. The Chief Game and Wildlife Officer may seize and confiscate equipment which in his view can be used to kill or capture animals, and only with his consent may any cultivation or clearing be carried out in a reserve. Regulations also control lighting of fires, water pollution and litter. This legislative instrument also sets up the first reserves, Mole, Digya, Bui, Shai Hills, Kogyae and Owabi. No separate definition is given for each of the terms (National Park, Game Production Reserve, Strict Nature Reserve and Wildlife Sanctuary) in either the 1961 Act or the regulations. Other relevant laws are the Legislative Instruments 1022 of 1975, 1085 of 1976, 1105 of 1977 and 1283 of 1983, PNDC Law 42 and Act 405, the Ghana Forestry Commission Act, 1980. In practise both categories of reserve, Strict Nature Reserve and Wildlife Sanctuary, are protected in the same way as national parks. Game Production Areas differ from these areas in that compatible forms of land use such as logging may be permitted, and hunting may also be allowed (though entry into these areas without a permit is still punishable). To establish a conservation area, the land must be compulsorily acquired by the Government with compensation paid to the owner. Regulations within Forest Reserves are contained in the Forest Protection Decree of 1974; traditional hunting rights, access and collection of minor forest products are allowed.

Parks and Reserves Administration This is the responsibility of the Department of Game and Wildlife, which is a part of the Ministry of Lands and Natural Resources. Forest reserves come under the jurisdiction of the Forestry Department. There are plans to reorganise offices dealing with wildlife and forestry, and to integrate four previously separate departments, Game and Wildlife, Forestry Products Research Institute, Timber Marketing Board and the Forestry Department.

Address

- ° Chief Game and Wildlife Officer, Department of Game and Wildlife, PO Box M.239, Accra.
- ° Forestry Department, Ministry of Lands and Natural Resources, PO Box 527, Accra.

Additional Information The Government of Ghana has a specific conservation plan, the aim of which is to protect representative samples of the flora and fauna within the country. The impetus behind conservation has not been based on tourism but rather on a desire to protect the country's heritage. There is, however, a shortage of trained wildlife personnel and field equipment, and vehicles are also in short supply. The communication problem is aggravated by the lack of a serviceable radio system within the Department of Game and Wildlife. Conservation education has been severely handicapped by a lack of facilities and trained staff (Gartlan, 1982), though in some areas this will be improved by recent initiatives between the International Council for Bird Preservation, Royal Society for the Protection of Birds and the Ghana Government. Projects to supply protein have been initiated whereby the general public can appreciate the benefits of conservation, though these efforts are hampered by personnel and equipment shortages.

A particular problem affecting the conservation of Ghana's native habitats is the increasing demand for fuel. The destruction of vegetation for conversion to charcoal is most serious within the transitional zone between forest and savanna. Prospects for conservation of flora and fauna within the forest reserves are not good at present, even though some of these protect

important water catchment areas. Apparently there is little control over what species are felled and on the size classes of trees taken.

The recent drought has increased fire hazards in most conservation areas, including part of some high forest, where primates were serious victims. Animal numbers are generally very low. Human conflicts, mainly with elephants, have been intensified by drought. There is an identified need to develop water points in all wildlife conservation areas and to continue efforts to improve habitat management.

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Protected Areas

	(hectares)
<i>National Parks</i>	
Bia	7,776
Bui	307,360
Digya	312,595
Mole	492,100
Nini-Suhien	10,427
Subtotal	1,130,258
<i>Strict Nature Reserves</i>	
Kogyae	32,375
<i>Wildlife Sanctuaries</i>	
Bomfobiri	7,258
Owabi	5,184
Subtotal	12,442
<i>Forest Reserves</i>	
Krokosua	
<i>Game Production Areas</i>	
Ankasa	20,736
Bia	22,810
Gbele	32,400
Kalakpa (Kolor)	32,400
Shai Hills	5,443
Subtotal	113,789

Biosphere Reserves
Bia National Park

7,770

Proposed areas
Sukusuku Forest Reserve

BIA NATIONAL PARK

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Total within the national park (only tourism and ecological research permitted). Controlled exploitation of flora and fauna is allowed in the game production area to the south, but fauna is strictly protected at present. The park is protected under Act 43, Wild Animals Preservation Act of 1961, and Legislative Instrument 1105, 1977.

Date Established 1974 as a national park of 30,600ha (Legislative Instrument 881); modified 1976 (Legislative Instrument 1084); reduced to 23,000ha in 1979 and further reduced to the present size of 7,770ha in 1980. The 22,800ha excised from the park has been established as a 'Game Production Area'. Approved as a Biosphere Reserve in 1983. First established as Bia Tributaries South Forest Reserve in 1935, demarcated between 1937 and 1939, and legally constituted a forest reserve in 1940.

Geographical Location In the western region, near the Ghana-Ivory Coast border, in the south-west corner of the Southern Ashanti Uplands. Approximately 240km north-west of Sekondi-Takoradi and 120km west of Kumasi. 6°32'-6°37'N, 3°02'-3°08'W.

Altitude 145-230m

Area 7,770ha (national park and Biosphere Reserve); contiguous to the Bia Game Production Area (22,810ha) and the proposed Bia Tawya Forest Reserve to the south and the proposed Sukusuku Forest Reserve to the west.

Land Tenure Government

Physical Features Bia lies in the south-west corner of the Southern Ashanti Uplands. Topography is undulating, and the geology mixed, with Lower Birrimian (middle Pre-Cambrian) to the east, granites to the west, and Upper Birrimian forming a north-south strip through the middle. The soils derived from the mixture are Acrisols, locally classified as forest ochrosols. The park protects the headwaters of the Panabo and Sukusuku rivers which flow into the Ivory Coast, and the Tawya which is a tributary of the Bia. The climate is humid tropical, with a distinct dry season from December to March. Temperatures are estimated to vary from a maximum of 29-34°C (July/August) to a minimum of 20-22°C (February/March). Rainfall peaks are in June and October and the mean annual total is between 1500-1700mm. At 250m, means of 25°C and 1600mm are recorded.

Vegetation In general the vegetation of the park is relatively untouched, this, together with Nini-Suhien, being perhaps the only areas in Ghana where virgin rain forest (0.6% of Ghana's original high forest) still exists. The park straddles moist evergreen and moist semi-deciduous

tropical forest. The area was originally described as belonging to the *CeltisTriplachiton* association of humid semi-deciduous forest, but later found to be a separate unit, dominated by species in families other than the Ulmaceae and Sterculiaceae, such as *Tieghemella heckelii*, *Entandrophragma angolense*, *Strombosia glaucocense* and the two palms *Raphia vinifera* and *R. gigantea*. There is a high density of valuable timber species and 627 vascular plants have been recorded, of which 169 are trees reaching heights of more than 8m in the centre of the park. Tallest emergents reach heights of about 70m. Climbers, epiphytic orchids, mosses and liverworts abound. A list of species recorded in the park was produced for the Biosphere Reserve nomination form sent to Unesco.

Fauna All the mammalian species typical of unencroached Guinean high forest zone are found in the Bia area, including red colobus *Colobus badius*, western black-and-white colobus *C. polykomos* and olive colobus *Procolobus verus* (T)), diana monkey *Cercopithecus diana*, lesser white-nosed monkey *Cercopithecus petaurista*, Campbell's monkey *Cercopithecus campbelli*, mangabey *Cercocebus torquatus*, and chimpanzee *Pan troglodytes* (T). Other species include leopard *Panthera pardus* (T), golden cat *Felis aurata*, elephant *Loxodonta africana cyclotis* (T), giant forest hog *Hydrochoerus meinertzhageni*, bush pig *Potamochoerus porcus*, bongo *Tragelaphus euryceros*, bushbuck *Tragelaphus scriptus*, forest buffalo *Syncerus caffer nanus*, yellow-backed duiker *Cephalophus sylvicultor*, Maxwell's duiker *Cephalophus maxwelli*, bay duiker *Cephalophus dorsalis*, royal antelope *Neotragus pygmaeus*, African giant squirrel *Protoxerus stangeri*, Beecroft's flying squirrel *Anomalurus beecrofti*, long-footed rat *Malacomys longipes*, giant pangolin *Manis gigantea* (very rare in the park) and honey badger *Mellivora capensis*. Dry season concentrations of animals which have been observed in the centre of the area are unusual and give the reserve an added importance. The forest elephant population is one of the few viable groups existing in the eastern part of the Guineo-Congolian Forest Region. There is a diverse avifauna, including white-breasted guineafowl (E) *Agelastes meleagrides* as well as some forms which may be rare or of limited range, such as the Ghanaian form of the black-collared lovebird *Agapornis swinderniana*, Chapin's spine-tailed swift *Telacanthura melanopygia* and Sharpe's apalis *Apalis sharpii*. Bia is also the only known natural site for the newly described lizard *Agama sylvanus*. A list of species found in the park was sent to Unesco with the Biosphere Reserve nomination.

Conservation Management The Ministry of Agriculture Forestry Division produced a working plan for Bia Group Forest Reserve in 1970. The fauna of the park is protected by rangers and technical staff carry out census work on a regular basis.

Zoning The areas removed from the park now constitute the Bia Game Production Area, which acts as a buffer zone to the park to the south. The core zone of the biosphere reserve occupies 300ha.

Disturbances or Deficiencies Selective logging takes place in the game production area. It has been demonstrated that many of the economically valuable trees are important food species for forest primates. There are unconfirmed reports that large areas of the game production area have been felled. If these reports are true, they are serious as the south of the park is apparently very important for dry season water supplies to elephants. Although exploitation of fauna is allowed, it is strictly controlled at present. Many hunting licenses have now been issued and the police have tightened their control on firearms licences. However, poaching and illegal hunting within the park still continues and has considerably reduced the fauna. Evidence from reconnaissance surveys indicates that in the recent past (most probably between 1940 and 1961) there were timber exploitations in the area. Other indicators of past human disturbances are the plantations of *Mitragyna stipulosa*, *M. ciliata*, *Entandrophragma angolense*, *Tectona grandis*, *Terminalia ivorensis*, *T. superba* and *Cedrela odorata* found in various parts of the park. The only settlements in the park are the research centre units. Tourism and recreation has also had some impact on the park.

Visitor Facilities No information

Scientific Research This reserve is one of the best studied forest areas in Ghana. Research includes work on the status and rehabilitation of chimpanzee and there is currently a survey of other primates within the park (IUCN/WWF Project 1613). Inventories of species have been

produced. Research is proposed in a number of fields, including assessment of changes in the structure and composition of the flora and fauna and the effects of human impact on natural ecosystems.

Special Scientific Facilities There are two field research stations, one in the park and one in the game production area, the latter to be developed into a field centre. Only foot trails penetrate the park area with the exception of permanent transect lines for faunal surveys. Sites are ready for park headquarters (including a school for primary education and a clinic) and additional scout camps. The authorities of Ghana propose the establishment of a Bia Ecological Research and Education Centre for which international assistance is needed. A building does already exist, with 40 single rooms for junior staff and two bungalows for senior staff. There is a climatic station, at which rainfall only is currently recorded. It is to be upgraded to a full meteorological station for recording most climatic variables.

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Staff Seventy-seven personnel (two university trained)

Budget Provided by the Ghana Government. Additional funds have been provided on two occasions from IUCN/WWF in support of specific projects.

Local Park or Reserve Administration The Senior Game Warden, Bia National Park, PO Box 171, Sefwi-Wiaaso.

Date 1983

BUI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total, but not yet fully implemented

Date Established 1971, by Legislative Instrument 710

Geographical Location 400km inland, on the Ghana-Ivory Coast border. 8°00'-8°25'N, 2°15'-2°30'W.

Altitude 122-244m

Area 307,360ha

Land Tenure Government

Physical Features The park comprises the undulating catchment of small tributaries of the Black Volta River, which roughly bisects the park. Soils are mainly lateritic. There is a long dry season from October to July and a rather shorter wet season from June to September. Temperature ranges from 10-40°C.

Vegetation Guinea savanna woodland with gallery forest along rivers

Fauna Mammals include olive baboon *Papio anubis*, patas monkey *Erythrocebus patas*, vervet monkey *Cercopithecus aethiops*, western black-and-white colobus *Colobus polykomos*, hippopotamus *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, red-flanked duiker *Cephalophus rufilatus*, grey duiker *Sylvicapra grimmia*, waterbuck *Kobus ellipsiprymnus*, Buffon's kob *Kobus kob*, roan antelope *Hippotragus equinus* and hartebeest *Alcelaphus buselaphus*. There is a rich and varied birdlife.

Zoning Not yet applied

Disturbances or Deficiencies Human settlements have still to be moved outside the park boundaries.

Scientific Research None

Special Scientific Facilities No information

Principal Reference Material None listed

Staff An assistant game warden, two game rangers, a clerical officer, five senior game assistants, four senior game scouts, 20 game assistants, 20 game scouts, ancillary staff and labour force were reported in 1977.

Budget No recent information

Local Park or Reserve Administration No information

Date 1983

DIGYA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total, but not fully implemented

Date Established 1971, by Legislative Instrument 710

Geographical Location Situated on a peninsula of the west central shore of Lake Volta. 7°05'-7°45'N, 0°10'E-0°45'W.

Altitude 91-812m

Area 312,595ha

Land Tenure Government

Physical Features The park is bounded to the north and south by two tributaries of the Volta, the Sene and Obosum rivers, whose lower sections are flooded by arms of Lake Volta, which borders the east of the park. It comprises a fairly level section of the Voltaian (Palaeozoic) system, with a few hills and rocky outcrops. The climate is in the transition area between the single rainy season of the savanna and two wet seasons of the forest zone. The hottest months are between February and April (15-40°C) and the coolest month is August (mean of 25°C), although colder minima (around 9°C) occur during December-January.

Vegetation Guinea savanna woodland predominates with transitional high and gallery forest occurring along major drainage lines. Dominant species of the savanna are *Anogeissus leiocarpus*, *Ceiba* and *Albizia* spp., *Ricinodendron heudelotii*, *Antiaris africana*, *Sterculia* spp., and *Triplochiton scleroxylon*.

Fauna Primates include olive baboon *Papio anubis*, vervet monkey *Cercopithecus aethiops*, mona monkey *Cercopithecus mona*, spot-nosed monkey *Cecopithedus nictitans*, the short-haired race of the black-and-white colobus *Colobus polykomos abyssinicus* and patas monkey *Erythrocebus patas*. Also found are elephant *Loxodonta africana* (T), bush pig *Potamochoerus porcus*, warthog *Phacochoerus aethiopicus*, hippopotamus *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, red-flanked duiker *Cephalophus rufilatus*, grey duiker *Sylvicapra grimmia*, waterbuck *Kobus ellipsiprymnus*, Buffon's kob *Kobus kob*, roan antelope *Hippotragus equinus*, hartebeest *Alcelaphus buselaphus* and oribi *Ourebia ourebi*. Crocodiles have been reported from the area.

Zoning None yet applied

Disturbances or Deficiencies There are some human settlements (about 1,000 people) which have still to be moved outside the park boundaries.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

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Staff An assistant game warden, two game rangers, a clerical officer, five senior game assistants, four senior game scouts, 20 game scouts, 20 game assistants, ancillary staff and labour force were reported in 1977.

Budget No recent information

Local Park or Reserve Administration No information

Date 1983

MOLE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 1971 as a national park by Legislative Instrument 710. First established in 1961 as a game reserve.

Geographical Location Northern Region, west of the White Volta. 9°00'-10°13'N, 1°22'-2°20'W.

Altitude 180-360m

Area 492,100ha

Land Tenure Government

Physical Features Geologically, the area is part of the Voltaian system (Palaeozoic). A north-south ridge runs along the eastern side of the park, cut near its southern end by the Mole River. Plateaux and steep scarps give way to the lower Birrimanian system in the central area, and in the west to pre-Cambrian granites in undulating country with gentle slopes. Streams below the eastern scarp show reversed drainage, although in the dry season these and all other water courses cease to flow. Soils are mainly savanna ochrosols, groundwater laterites and lithosols. Average annual rainfall is 1,000mm, with March and April (before the rains) the hottest months (about 30°C); lowest temperatures (about 25°C) occur towards the end of the rains in August.

Vegetation Guinean woodland savanna predominates with gallery forest along rivers. Much of the park is of the 'orchard bush' type savanna in which the following communities may be recognized: middle slope *Burkea africana*-*Hyparrhenia* spp., upper slope *Detarium microcarpum*-*Loudetia simplex*, top slope *Isobertinia doka*-*Loudetia* *scaetiae*, and scarp *Strychnos spinosa*-*Ischaemum hirsutum*. The scarps also support a denser woodland community of *Diospyros mespiliformis*-*Monodora tenuifolia*. There are significant areas of 'iron-pan' grass-savanna *Terminalia macroptera*-*Loudetia* *thoroldii*. *Daniellia oliveri*-*Andropogon tectorum* woodland and *Berlinia grandiflora*-*Cola laurifolia* forest are the chief riparian communities, the latter constituting gallery forest in which *Borassus* palms and 'sausage trees' *Kigelia aethiopum* are noticeable.

Fauna Mammals include the Guinea baboon *Papio papio*, olive baboon *Papio anubis*, vervet monkey *Cercopithecus aethiops*, patas monkey *Erythrocebus patas*, western black-and-white colobus *Colobus polykomos*, side-striped jackal *Canis adustus*, wild dog *Lycaon pictus* (T), spotted hyena *Crocuta crocuta*, lion *Panthera leo*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), and a variety of ungulates such as bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, Buffon's kob *Kobus kob*, reedbuck *Redunca arundinum*, roan antelope *Hippotragus equinus* and oribi *Ourebia ourebi*. Reptiles include the Nile crocodile *Crocodylus niloticus* (V), slender-snouted crocodile *Crocodylus cataphractus* (I), Nile monitor *Varanus niloticus*, Bosc's

monitor *V. exanthematicus*, and several terrapins and river turtles. Birdlife is plentiful. The termite *Duplidentitermes furcatidens* was discovered in the area in 1983.

Zoning Not yet applied

Disturbances or Deficiencies None reported

Scientific Research Studies of animal populations, habitats and ornithology are being undertaken.

Special Scientific Facilities There is a field laboratory at Samoli.

Principal Reference Material

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Staff A game warden, three senior assistant wardens, four assistant wardens, two senior game protection officers, two game protection officers, two senior rangers, 15 rangers, five senior game scouts, 65 game scouts, 55 game assistants and 15 guards, making a total of 169, plus labour force of 300 were reported in 1977.

Budget No recent information

Local Park or Reserve Administration No information

Date 1983

KROKOSUA FOREST RESERVE

Management Category No information

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection No logging, hunting or timber extraction allowed.

Date Established No information

Geographical Location On the east bank of the River Bia, bisected by the road from Sefwi Wiawso west to the Ivory Coast border.

Altitude Up to 549m

Area No information

Land Tenure No information

Physical Features Steep sided hills. Underlain by rocks of the Birrimian series, classified as phyllites, schists, tuffs and greywackes. Soils include heavily weathered gravelly latosols. There are two peak rainfall periods; May-June and September-October with mean annual rainfall of over 1450mm. Temperatures and relative humidity remain uniformly high throughout the year, with increased diurnal fluctuations on cleared land.

Vegetation The reserve is in the *Celtis-Triplochiton* zone (Taylor, 1960) of moist semi-deciduous tropical forest. Commercial timber species include *Triplochiton scleroxylon*, *Entandophragma utile* and *E. cylindrium* with the climbing palms *Ancistrophyllum secundiflorum* and *Calamus deerratus* being characteristic of swampy areas.

Fauna Mammals recorded include, hammerheaded fruit bat *Hypsignathus monstrosus*, Veldkamp's bat *Nanonycteris veldkampii*, tree pangolin *Manis tricuspis*, spot-nosed monkey *Cercopithecus petaurista*, mona monkey *Cercopithecus campbelli*, black-and-white colobus *Colobus polykomos*, red colobus *Colobus badius*, chimpanzee *Pan troglodytes* (T), civet *Civettictis civetta*, forest genet *Genetta genettoides*, Maxwell's duiker *Cephalophus maxwelli* and royal antelope *Neotragus pygmaeus*.

Conservation Management No information

Zoning No information

Disturbances or Deficiencies The area west of the reserve has been logged since the road was constructed in 1963. Much primary high forest outside the reserve has been cleared and pressure on the reserve is increasing. Human influence is confined to timber extraction, hunting, trapping and snail collection.

Visitor Facilities No information

Scientific Research Mammal survey

Special Scientific Facilities No information

Principal Reference Material

- * Jeffrey, S.M. (1975). Notes on mammals from the high forest of western Ghana. *Bulletin de l'Institut fondamental d'Afrique Noire*. 37(4): 950-973.
- * Taylor, C.J. (1960). *Synecology and Silviculture in Ghana*. London.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date 1975

SUKUSUKU FOREST RESERVE

Management Category Proposed

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Hunting allowed

Date Established Proposed

Geographical Location The reserve is between Bia National Park on the eastern boundary and the Ghana-Ivory Coast border on the west.

Altitude 152-183m

Area No information

Land Tenure Contiguous with Bia National Park (formerly Bia Tributaries South Forest Reserve) and Bia Tawya Forest Reserve (Proposed)

Physical Features Gently undulating country dissected by several tributaries of the Panabo and Sukusuku rivers which drain westward into the Ivory Coast. Area is underlain by rocks of the Birrimian Series, which are classified as phyllites, schists, tuffs and greywackes. Mean annual precipitation of about 1450mm falling mainly during the two peak rainfall periods; May-June and September-October.

Vegetation The reserve is classified as lying in the *Celtis-Triplochiton* zone of the moist semi-deciduous tropical forest (Taylor, 1960). Commercial timber species include *Triplochiton scleroxylon*, *Entandophragma utile* and *E. cylindrium*. In swampy areas the upper canopy is very open with a dense, impenetrable undergrowth characterised by the climbing palms *Ancistrophyllum secundiflorum* and *Calamus deerratus*.

Fauna Mammals recorded include African giant squirrel *Protoxerus stangeri*, Derby's flying squirrel *Anomalurus derbianus*, brush-tailed porcupine *Atherurus africanus*, giant ground pangolin *Manis gigantea*, tree pangolin *Manis tricuspis*, long-tailed pangolin *Manis tetradactyla*, white-collared mangabey *Cercocebus torquatus*, spot-nosed monkey *Cercopithecus petaurista*, mona monkey *Cercopithecus campbelli*, black-and-white colobus *Colobus polykomos*, olive colobus *Procolobus verus*, chimpanzee *Pan troglodytes* (T), honey badger *Mellivora capensis*, forest genet *Genetta genetta*, golden cat *Felis aurata*, elephant *Loxodonta africana* (T), forest hog *Hylochoerus meinertzhageni*, yellow-backed duiker *Cephalophus silvicultor*, black duiker *Cephalophus niger*, Maxwell's duiker *Cephalophus maxwelli* and royal antelope *Neotragus pygmaeus*.

Conservation Management No information

Zoning No information

Disturbances or Deficiencies The reserve contains new and established villages and farming is spreading rapidly since the area was opened up to settlements by the road from Sefwi Wiawso in 1963.

Visitor Facilities No information

Scientific Research Mammal survey

Special Scientific Facilities No information

Principal Reference Material

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Staff No information

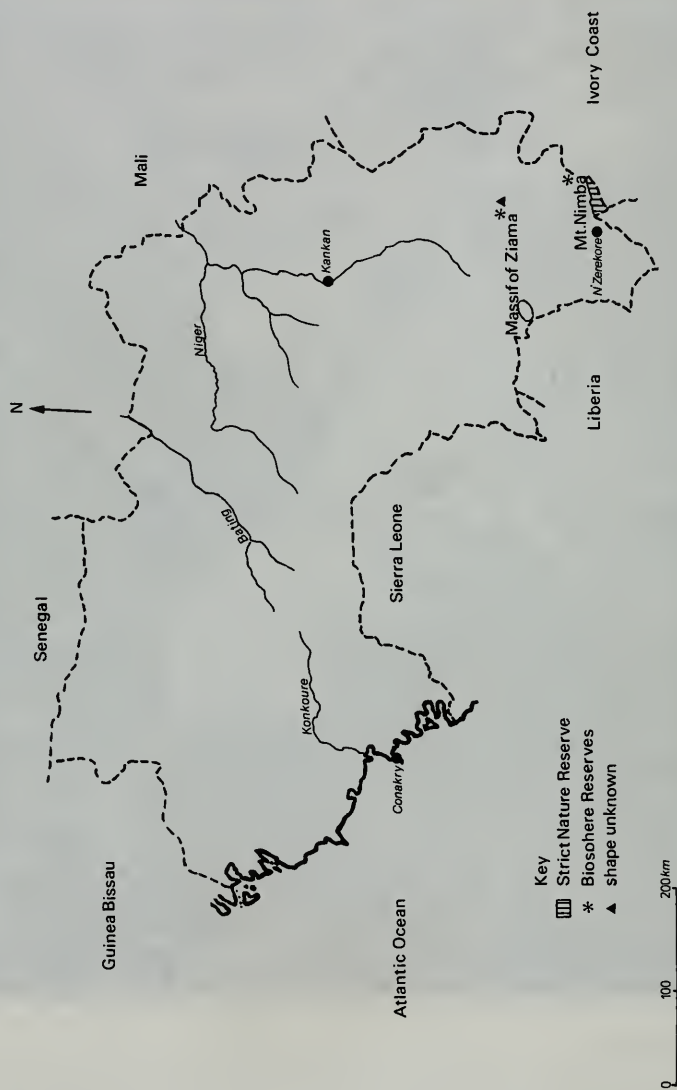
Budget No information

Local Park or Reserve Administration No information

Date 1975



Guinea



GUINEA

Area 245,855 sq.km

Population 5,410,000 (1983)

Parks and Reserves Legislation There are classified forests covering some 4-5% of the country, though their current status is unclear. These areas are, in principal, protected from certain activities such as clearance for agricultural purposes. Other reserves would presumably be protected by separate decrees. A new national park called Badiar has recently been gazetted.

Parks and Reserves Administration This is the responsibility of the Department of Water, Forests and Rural Management in collaboration with the National Institute for Research and Documentation (Institut national de recherches et de la Documentation de Guinea, INRDG).

Address

° Direction général aux eaux et forêts et à l'aménagement rural, PO Box 624, Conakry.

Additional Information According to IUCN/UNEP (1983), the proceedings of a meeting which actually took place in 1980, nature conservation was afforded very low priority in Guinea and there appeared to be little effective protection afforded to any area. However, Kaba and Diallo (1983) report that the protection and rational management of natural resources is now a cornerstone of development policy within the country. Several of the administrative agencies dealing with resource use have been grouped in a new structure to implement this policy and a coordinated education programme has been set up. Measures for improving protection and management of natural resources include reorganisation of agriculture and pasturage (with the aim of reducing land clearance, controlling soil erosion and managing water resources) and further development of forest management activities including forest protection, reafforestation, and development of an inventory of forest resources.

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Protected Areas

	(hectares)
<i>National Parks</i>	
Badiar	
<i>Strict Nature Reserves</i>	
Mount Nimba	13,000
<i>Biosphere Reserves</i>	
Reserve de la biosphere des Monts Nimba	17,130
Reserve de la biosphere du Massif du Ziama	116,170
Subtotal	133,300

RESERVE NATURELLE INTEGRALE DE MONT NIMBA (COTE D'IVOIRE)
RESERVE NATURELLE INTEGRALE DE MONTS NIMBA (GUINEA)

Management Category I and IX (Strict Nature Reserve and Biosphere Reserve)

World Heritage Site (Criteria: ii, iv)

Biogeographical Province 3.01.01 (Guinean Rain Forest) 3.04.04 (West African woodland savanna)

Legal Protection Legally protected in Guinea as réserve naturelle intégrale Monts Nimba by decree. Prospecting for minerals is allowed and permits can be acquired for sport-hunting in parts of the reserve. Côte d'Ivoire has continued protection through the State Forestry Service.

Date Established Strict nature reserve established by Order No.4190, 1943, in Côte d'Ivoire and by decree in 1944 in Guinea. Côte d'Ivoire nature reserve is a 'forêt classée' under national ownership. Contiguous nature reserve proposed in Liberian section. Guinean sector accepted as a biosphere reserve in 1980. Both reserves form a world heritage site, gazetted in 1981 (Guinea) and 1982 (Côte d'Ivoire).

Geographical Location The massif of Nimba is situated on the border between Guinea, Côte d'Ivoire, and Liberia. Some 20km from the town of Lola and 62km from N'Zérékoré. 7°18'N, 10°35'W.

Altitude 450-1,752m (Mont Richard Molard)

Area Nature reserve (Guinea) 13,000ha; nature reserve (Côte d'Ivoire) 5,000ha; biosphere reserve (Guinea) 17,130ha. Contiguous to a proposed nature reserve in Liberia.

Land Tenure Government

Physical Features Mount Nimba is part of the 'Guinean Backbone', rising 1,000m above the even, almost flat, surrounding glacia. It forms an immense barrier, cutting across the country from the south-west to the north-east. This area is unequalled as an illustration of the theory of erosion levels. The sharp relief and striking topography of the mountains, with their grass-covered summits and precipitous slopes, is due to a bar of ore-containing quartzites. Since the end of the Primary Era, erosion through weathering has caused a gigantic sheet of this quartzite to jut out of the softer schists and granitogneiss, which form the piedmont. The softer rocks have been gradually weathered and removed. These hard iron-quartzite crusts cover the vast sub-horizontal glacia of the eastern and northern parts of the piedmont and create very poor soils, which are usually skeletal or non-existent. The soil conditions explain the belt of savanna vegetation at 500-550m around the mountains. The Nimba Mountains contain the sources of the rivers Cavally and Ya (which forms the Mami River of Liberia) and are cut up by deep, richly forested valleys. There is great topographical diversity with valleys, plateaux, rounded hilltops, rocky peaks, abrupt cliffs and bare granitic blocks, and the whole area constitutes a vast water catchment. It is also of archaeological interest. Hewn stone tools and chippings have been discovered in a rock shelter at Blandé at the northern end of the mountain. Mean annual temperature minimum: 15.8°C, maximum: 29.7°C, and mean annual rainfall 2,849mm, occurring over 178.8 days, recorded at 543m.

Vegetation There are three major vegetation types: 1) High altitude grassland with *Loudetia kagerensis* near the summit and endemics including *Blaeria nimba* and *Dolichos nimbaensis* and woody plants such as *Protea angolensis* on the slopes, which are absent from the ridges. Remnants of forest at high altitudes are likely to be dominated by Myrtaceae species and the ravines by the tree fern *Cyathula cylindrica* var. *mannii*. 2) Plains savanna varying according to the hardness of the soil and supporting numerous herbaceous plant communities. The savanna is broken by gallery forests which grow between 1000m-1,600m. *Parinari excelsa* is dominant above 1,000m, and there are abundant epiphytes. 3) Predominantly primary forest,

located mainly on the foothills and in the valleys with dominant species including *Triplochiton scleroxylon*, *Chlorophora regia*, *Morus mesozygia*, *Terminalia ivorensis*, *Lophira procera*, *Tarrietia utilis*, and *Mapania* spp.. Drier, mid-altitude forests with trees such as *Triplochiton scleroxylon*, *Piptadeniastrum africanum*, and *Parkia bicolor* are found at the northern end of the Mount Nimba chain. Dry forests are rarer than the rainforests because of agricultural pressures, and some of the dry forest species have disappeared from many areas. There are very few endemic plant species at Mount Nimba, probably because altitude is not sufficient for new tree species to have evolved. Montane endemics include a pteridophyte, *Asplenium schnelli*, two phanerogams, *Osbeckia portersi*, and *Blaeria nimba*.

Fauna More than 500 new species of fauna have been discovered in the Mount Nimba Reserve. Species diversity is exceptionally rich because of the variety of ecotones created by the presence of grasslands laced with forest. Mammals include: bushbuck *Tragelaphus scriptus*, Maxwell's duiker *Cephalophus maxwelli* and particularly black duiker *Cephalophus niger*, bay duiker *Cephalophus dorsalis* and forest buffalo *Syncerus caffer nanus*, bush pig *Potamochoerus porcus*, warthog *Phacochoerus aethiopicus*, scaly anteaters such as the white-bellied pangolin *Manis tricuspis*, pygmy hippopotamus *Choeropsis liberiensis* (T), leopard *Panthera pardus* (T), lion *Panthera leo*, golden cat *Felis aurata*, two-spotted palm civet *Nandinia binotata*, African civet *Civettictis civetta*, forest genet *Genetta maculata*, servaline genet *Genetta servalina*, Johnston's genet *Genetta johnstoni*, cane rat *Thryonomys swinderianus*, African clawless otter *Aonyx capensis*, lesser otter shrew *Micropotamogale lamottei* (a new genus discovered on Mount Nimba), potto *Perodicticus potto*, western black and white colobus *Colobus polykomos*, red colobus *Colobus badius*, diana monkey *Cercopithecus diana*, chimpanzee *Pan troglodytes* (T), and lesser bushbaby *Galago senegalensis*. One of the most noteworthy species is the viviparous toad *Nectophrynoides occidentalis* (V), which occurs in montane grasslands at 1,200-1,600m and is the only tail-less amphibian in the world that is totally viviparous. There are a number of rare and endemic bird species. Upland invertebrate species include gastropod molluscs and various types of insects belonging to the Carabidae, Gryllidae, Acrididae and the Forficulidae (beetles, grasshopper, crickets and earwigs) families, of which more than 20 are endemic to Mount Nimba. The forests contain numerous reptile and amphibian species including West African toad *Bufo superciliaris* and frog *Cassina lamottei*.

Population There has probably never been any village on the actual mountains, but there are ten villages in the immediate vicinity of Nimba with several thousand inhabitants, mainly growing crops.

Conservation Management The reserve does not have a management plan. Awareness of the value of the area and a better degree of protection seems possible following designation of the reserve as a world heritage site.

Zoning The biosphere reserve in Guinea contains a core zone of 10,000ha.

Disturbances or Deficiencies The area has similar problems to Taï National Park (Côte d'Ivoire). There is poaching and some cultivation. The main threat is from the massive iron-ore mining activities in the southern part of the chain in Liberia. About 6,000ha are in danger. Roads, wells, and mineshafts have been built and workshops and townships established in what has been a strict nature reserve since 1944. Hundreds of square metres of soil have been removed over large areas and, as a result, many streams for miles around are fouled with heavy metal run-off, particularly ferruginous rock debris. The areas designated as a world heritage sites exclude both the Liberian sector, already badly degraded by mining and intensive poaching, and the northern Guinean part, already disturbed by mining activities and threatened by more. But these two areas could serve as a buffer zone for the world heritage site if hunting were strictly controlled. It is proposed to study the best way of rehabilitating this zone as an artificial park after the exploitation. There is a lack of resources and management.

Visitor Facilities Tourism is prohibited within the strict nature reserves.

Scientific Research Botanical, zoological, and geological inventories have been completed. More than 500 new species have been described or reported, including several mammals (a new genus of otter shrew), more than 10 amphibians and reptiles, several fish and arthropods (notably centipedes and harvestmen), and molluscs. Research includes phytosociological studies

of high altitude grasslands, primate studies, and the collection of meteorological data. Several international research workers in the fields of biology, ecology, geography, primatology, and meteorology are interested in this area and with appropriate facilities, scientific research in Nimba could form the basis of a tropical ecology station of international importance.

Special Scientific Facilities There are six patrol stations in the reserve which are used to monitor various environmental parameters. The IFAN (French Institute for Black Africa) research station is at the northern tip of the mountain chain. The LAMCO mining company set up a small research station in the Liberian area (outside the reserve) in 1964.

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- * World Heritage Nomination submitted to Unesco.

Staff Total of 17, with two researchers

Budget No information

Local Park or Reserve Administration In Guinea, Station Biologique des Monts Nimba, S/C INRDG, BP 561, Conakry.

Date 1983

RESERVE DE LA BIOSPHERE DU MASSIF DU ZIAMA

Management Category IX (Biosphere Reserve)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Protected under decree No. 1168/AE of 25 June 1932, No. 3272/SE/F of 12 September 1943, and No. 1215/SE/F of 20 April 1945 (extending the protected area). Core area is strictly protected and hunting is prohibited in the surrounding buffer zone.

Date Established Accepted as a Biosphere Reserve in November 1980.

Geographical Location In the Sérédou Arrondissement, Macenta Administrative Region, 40km from the town of Macenta and 100km from N'Zérékoré. The western boundary is formed by the Liberian frontier, and eastern boundary by the Macenta-N'Zérékoré road. Approximately centred 8°20'N, 9°20'W.

Altitude 500-1,387m

Area 116,170ha

Land Tenure Government

Physical Features The reserve lies in an area of mountainous landscape characterised by rugged relief with notable features including the mountain passes of Zombromai and Voroa and a magnificent uninterrupted view from Sérédou of valleys, plateaux, rounded ridges, rocky peaks, sheer cliffs, and bare granite outcrops. Mean annual temperature is 23°C and mean annual rainfall 2,849mm.

Vegetation The four principal vegetation types are: primary mountain forest; secondary mountain forest; secondary forest in the valleys, plains and swamps; and savanna on lateritic outcrops of the elephant grass-covered plateaux. Principal species are azobé *Lophira procera*, fraké *Terminalia altissima*, framiré *Terminalia ivorensis*, samba *Triplochiton scleroxylon*, iroko *Chlorophora excelsa*, raphia *Raphia*, rattan palm, and umbrella tree.

Fauna Fauna are reported to include elephant *Loxodonta africana* (T), various species of antelope and monkey, fish *Silurus* spp., and a rich insect fauna.

Population The reserve has a population of 29,000 living in 23 villages and the town of Sérédou.

Conservation Management No information

Zoning Core zone 60,000ha and buffer zone

Disturbances or Deficiencies Timber extraction is permitted in the buffer zone with a forestry concession of 30,000ha containing a forestry station and chipboard factory. There is also a quinine plantation, processing station and an 8ha palm grove.

Scientific Research There is monitoring of climate, vegetation, soils, and hydrology. Some experimental plots exist. Further research could be carried out on botany, tree associations, and wood-working technology. The Faculty of Sylviculture has a department within the reserve with a 3-year undergraduate course.

Special Scientific Facilities There is also an Agronomical Research Laboratory concerned with medicinal plants and the forest station concerned with timber extraction and carpentry activities.

Principal Reference Material Various reports, studies and general information on file at the Direction Générale des Eaux et Forêts (Conakry), and various reports and technical studies at the Quinine Research Centre.

Staff Total of 129, mainly engaged in administration and control

Budget No information

Local Park or Reserve Administration Centre Forestier de Sérédou, S/C INRDG, BP 561, Conakry.

Date 1983



GUINEA-BISSAU

Area 36,125 sq.km

Population 844,000 (1984)

Parks and Reserves Legislation Guinea-Bissau achieved independence from Portugal in 1973, but has not, as yet, developed her own protected area legislation. However, under the hunting regulations (Decree No. 21 of 1980) there are six areas established as hunting reserves where all hunting is "permanently" prohibited. In 1981, it was reported that five people within the Government were trying to establish a national parks programme, however there are as yet no protected areas other than these hunting reserves, and no classified forests.

Parks and Reserves Administration Hunting reserves are delimited and controlled by the Directorate of the Service of Forestry and Hunting, within the Ministry of Rural Development and Fisheries.

Address

* Direcção das Floristas e Caça, Ministerio do Desenvolvimento Rural CP 179, Bissau.

Additional Information According to Diom (1981), the flora and fauna of Guinea-Bissau still appears to be virtually undisturbed, especially in the south, with the Bijagos Archipelago being of particular interest. There are many wetland areas, and the coastal areas (and islands) are particularly important for migrant birds, and in particular wintering shorebirds. During the winter of 1982/3 many of the areas were surveyed. Results indicated that there were over one million shorebirds using the coastal zone, making it one of the most important wintering areas in Africa for Palaearctic shorebirds. More recently a study of the current uses of mangroves has been initiated, with the aim of preparing proposals for the development of multiple-use protected mangrove reserves.

As a result of the general economic situation in the country (Guinea-Bissau is recognised as being amongst the least developed countries) there is an urgent need to develop agriculture, forestry and fisheries. In addition natural resources are threatened by brush-fire, clearance, inappropriate agricultural practice, overgrazing, forest exploitation, and hunting. The situation is potentially fairly serious, and this has led IUCN (Portas and Oliveira Costa, 1985) to stress the importance of developing a more rigorous approach to reconciling conservation with development within the country. This report also indicates the importance of establishing protected areas, and makes particular mention of the Bijagos Archipelago.

References

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- * Portas, P. and de Oliveira Costa, J.P. (1985). Vers l'élaboration d'une Stratégie nationale de conservation des ressources naturelles. Rapport de mission 25 mars-2 avril 1985, IUCN, Gland.
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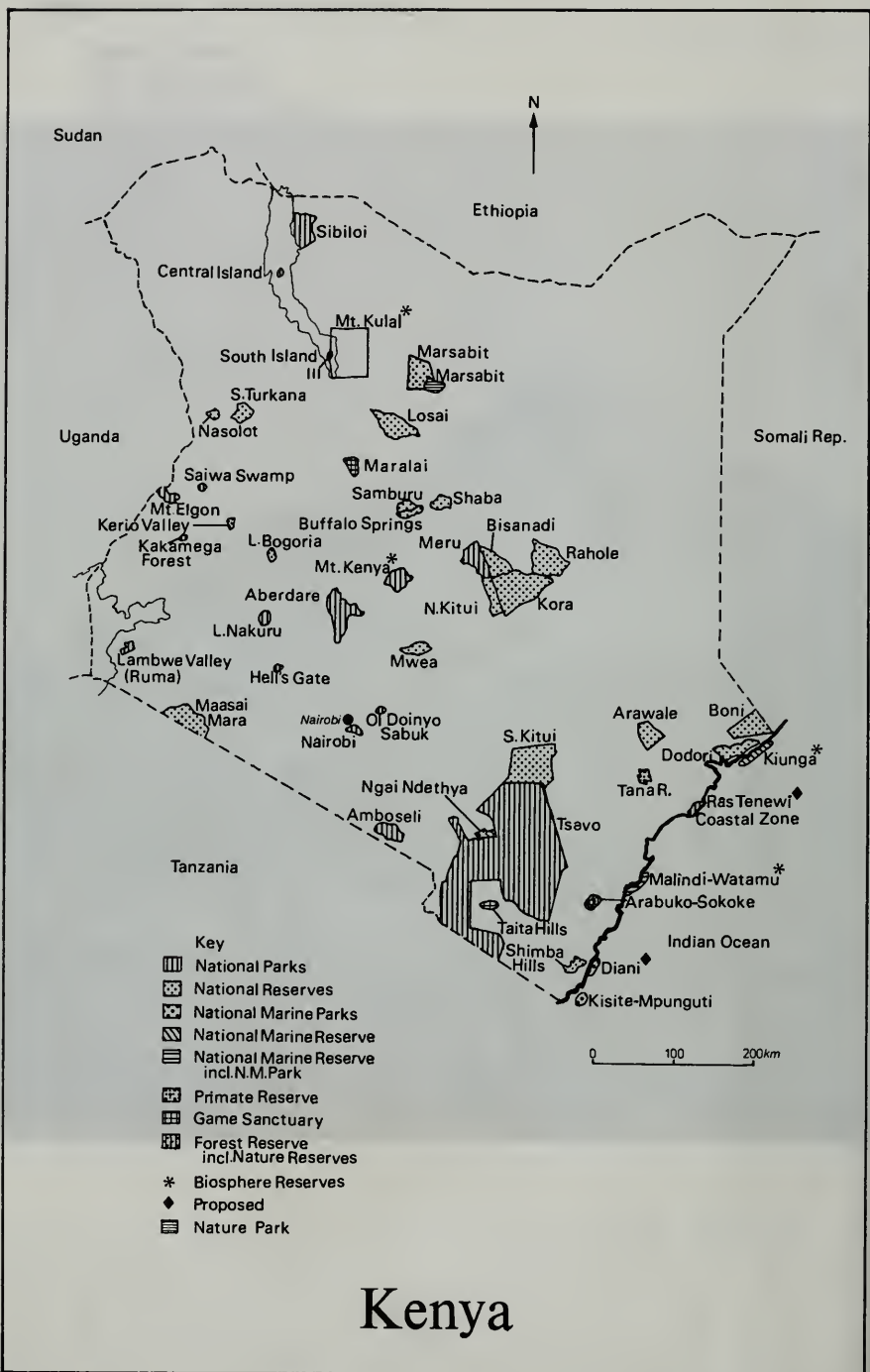
Protected Areas

Hunting Reserves

Arquipelago dos Bijagos
Ilha de Cofra

Lagoa de Cufada
Mata de Cantanhez
Rio Geba/Rio Mansoa
Sector Administrativa de Boe





KENYA

Area 582,600 sq.km (including 13,530 sq.km of water)

Population 19,500,000 (1985)

Parks and Reserves Legislation The former National Parks administration set up by Ordinance 9 of 1945 (the Royal National Parks of Kenya Ordinance) was combined with the former Game Department under the Wildlife (Conservation and Management) Act 1976 (contained in *Kenya Gazette* Supplement 8 (Act 1) of 13 February 1976) and Legal Notice 219 (in *Kenya Gazette* Supplement 57 Legislative Supplement 43 of 22 October 1976). National Parks and National Reserves may be established under the Act on any type of land, and are declared by the Minister for Tourism and Wildlife with the consent of the appropriate authority; or without consent of the authority but through approval by the National Assembly with acquisition of private land or separation of trust land. Within National Reserves, land uses other than nature conservation may be specifically allowed; the conditions controlling such uses are included in regulations agreed to by the authority at the time of gazettment. County Council Game Reserves have the same status as National Reserves except that the County Council (or other local government body) constitutes the competent authority. Such reserves are declared by the Ministry with consent of the appropriate authority. Marine National Parks and Reserves are also legislated under the Wildlife (Conservation and Management Act) 1976. Passage and anchorage of boats is permitted but a free permit must be obtained for the period required. Certain other activities such as swimming, water skiing and sailing are allowed. All fishing in the parks and reserves is illegal although traditional methods have been allowed to continue in the reserves. Government Forest Policy is defined in Sessional Paper 1 (1968) which provides guidelines for the development, management, utilisation and regulation of forest resources. Forest Reserves and Nature Reserves are declared under the Forest Act for the protection of forest, coastal and watershed resources. Nature reserves are separately gazetted. Establishment of Forest Reserves can be initiated at any level from local through the County Council to the Minister in charge of forests.

Parks and Reserves Administration National Parks, National Reserves and all other wildlife areas are the responsibility of the Director of the Wildlife Conservation and Management Department (WCMD) of the Ministry of Tourism and Wildlife. National reserves are actually administered by the District Council, with the exception of the Shimba Hills which is managed directly by WCMD. The Wildlife Panning Unit was created in 1979 to develop management plans for the parks and reserves. County Council reserves are administered by a representative of the Director of WCMD assisted by a management committee appointed by the County Council concerned. Nature reserves and forest reserves are managed by forestry staff of the Forest Department within the Ministry of Environment and Natural Resources. There are four levels of administration, National Headquarters, Provincial Forest Office, District Forest Office and individual Forest Station.

Address

- * Wildlife Conservation and Management Department, Ministry of Tourism and Wildlife, Langata Road, PO Box 40241, Nairobi.
- * Marine National Parks, PO Box 109, Malindi.
- * Forest Department, Ministry of Environment and Natural Resources, PO Box 30513, Nairobi.

Additional Information The main identified function of national parks in Kenya is to conserve, as far as possible, a representative sample of fauna and flora for educational purposes (particularly through the Wildlife Clubs of Kenya), and for aesthetic and recreational enjoyment by Kenyans and overseas visitors. National parks form the mainstay of tourism economy (Rogalsky, 1981).

One of the major constraints on management of existing protected areas in Kenya and other countries of East Africa, is the lack of planning documents (Thorsell, 1983). Deficiencies in

man-power, scientific information and finances are major difficulties in developing adequate plans and managing new and established areas. However, some management plans have been and are being prepared in Kenya and a preliminary system-planning project has been undertaken by the Wildlife Planning Unit, with additional areas proposed for protection or increased status (Pertet, 1984).

As in most parts of Africa, poaching is a considerable problem facing protected areas managers. In 1977 a Kenyan Rhino Action Group (KRAG) was set up (with support from IUCN/WWF Project 1724) to formulate conservation policies and raise funds. The Government established anti-poaching units in 1978 particularly in an attempt to save the black rhinoceros from extinction in Kenya. However, despite success of these units in some areas in reducing poaching of many species, serious concern is still expressed by several conservation groups about adequate protection of rhinoceros. IUCN/WWF Project 3022 was set up in 1982 to protect 60-70 black rhinoceros on a private ranch on the eastern edge of the rift valley. So far this has been successful.

A first attempt has been made to use remote sensing techniques to rapidly assess actual forest cover in Kenya, so as to provide an accurate inventory of unconverted forest, to establish a baseline for monitoring, and to provide information for land use managers. The results of this survey are published by the Kenya Range Ecological Monitoring Unit (Doute, Ochanda and Epp, 1981).

There are reports of heavy encroachment and over-exploitation of many forest areas and other biotic communities of Kenya. To try and save the natural resources a workshop on 'Plant Communities in Kenya', was organised by national and international agencies during 1984 to assess the best means of halting the current degradation of plant communities and of co-ordinating dissemination and storage of information on biotic resources. The proceedings of this meeting were published in 1984 under the title *Endangered Resources for Development*.

The recent drought has affected several of the parks and reserves, and in particular Meru, Samburu, Mt Kenya, Sibiloi, Amboseli and Tsavo. However, wildlife has survived well compared with earlier droughts although the mortality of young has been higher, especially of wildebeest, buffalo, kongoni and elephant.

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- IUCN/WWF Project 1262. Kenya, Hell's Gate National Park.
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Protected Areas

	(hectares)
<i>National Parks</i>	
Aberdare	76,619
Amboeli	39,206
Central Island	500
Hell's Gate	6,800
Kakamega Forest	9,698
Lake Nakuru	20,000
Lambwe Valley (Ruma)	12,000
Meru	87,044
Mount Elgon	16,923
Mount Kenya	58,800
Nairobi	11,721
Ol Doiyo Sabuk	1,842
Saiwa Swamp	192
Sibiloi	157,085
South Island	3,880
Tsavo	2,082,114
Subtotal	2,584,424

National Marine Parks

Kisite/Mpunguti	3,900
Malindi/Watamu	1,600
Subtotal	5,500

Nature Reserves

Arabuko Sokoke Nature Reserves	4,332
Cheptugen-Kapchemutwa	31
Kaimosi Forest	19
Kaptagat Forest	
Karura	102
Katimok Kabarnet	58
Langata	96
Mau South West	43,032
Mbololo	
Nandi North	3,434
Uaso Narok	1,575
Subtotal	52,679

National Marine Reserves

Kiunga	60,000
Malindi/Watamu	21,309
Subtotal	81,309

National Reserves

Arawale	53,324
Bisanadi	60,600
Boni	133,900
Buffalo Springs	33,915
Dodori	87,739
Kerio Valley	
Kora	178,780
Lake Bogoria	10,705

IUCN Directory of Afrotropical Protected Areas

Losai	180,680
Maasai Mara	151,000
Marsabit	208,842
Mwea	6,803
Nasolot	92,500
Ngai Ndethya	21,209
North Kitui	74,500
Rahole	127,000
Samburu	16,500
Shaba	23,910
Shimba Hills	19,251
South Kitui	183,300
South Turkana	109,100
Subtotal	1,773,558

Game Sanctuaries

Maralai	
Taita Hills	11,340
Subtotal	11,340

Reserves

Tana River Primate	16,807
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Sanctuaries

Lewa Downs Rhinoceros	2,023
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Nature Parks

Marsabit	
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Biosphere Reserves

Kiunga Marine National Reserve	60,000
Malindi-Watamu Biosphere Reserve	19,600
Mount Kenya Biosphere Reserve	71,759
Mount Kulal Biosphere Reserve	700,000
Subtotal	851,359

Proposed areas

Ras Tenewi Coastal Zone National Park	35,000
Diani Marine National Park Complex	250

ABERDARE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.21.12 (East African Highlands)

Legal Protection Total. Areas at lower altitudes including the so-called 'Treetops Salient' are closed except to licensed safari companies

Date Established 1950

Geographical Location Central highlands, west of Mount Kenya. A corridor of highly

disturbed montane forest (19km by 3-11km) connects the main forest area to the salient. 0°08'-0°42'S, 36°32'-36°55'E.

Altitude 1,829-3,994m

Area 76,619ha; surrounded by Forest Reserve (26,480ha)

Land Tenure Government

Physical Features This isolated range of volcanic mountains forms part of the eastern wall of the Rift Valley. The two main peaks Oldonyo Lesatima (3,994m) and Kinangop (3,906m) are separated by alpine moorland at over 3,000m. Deep ravines cut through the forested eastern and western flanks and there are many clear streams and waterfalls. Heavy rainfall occurs through most of the year. Soils are red and of volcanic origin, but rich in organic matter.

Vegetation This varies with altitude, a rich alpine and sub-alpine flora giving way at lower altitudes to bamboo forests and then montane rainforest. The lower montane forests (1,829-2,590m) are dominated by *Podocarpus*, *Olea* and cedar *Juniperus procera*, succeeded at higher altitudes (2,600-3,000m) by *Podocarpus* and bamboo *Arundinaria alpina*, and bamboo *Hagenia abyssinica*, and *Erica arborea*, *Festuca pilgeri* and *Carex* moorland. Other characteristic plants of higher altitude subalpine/alpine floras include tree senecios, giant lobelias such as *Lobelia telekii*, and *L. deckenii*, St Johns wort *Hypericum*, and tussock-grass *Eleusine*. At lower altitudes in the forest species include cape chestnuts *Calodendrum capense*, camphor *Ocotea usambarensis*, tree fern *Cyathea deckeni*, elder *Sambucus adnata*, and wild banana *Ensete ventricosa*.

Fauna Mammals of the forest zone include: blue monkey *Cercopithecus mitis*, Angolan black-and-white colobus *Colobus angolensis abyssinicus*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, black rhino *Diceros bicornis* (T), giant forest hog *Hylochoerus meinertzhageni*, bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, red duiker *Cephalophus natalensis harveyi* and suni *Neotragus moschatus*. The open moorlands have serval *Felis serval*, eland *Taurotragus oryx*, bush and black-fronted duikers *Sylvicapra grimmia*, black-fronted duiker *Cephalophus nigrifrons* and bongo *Tragelaphus euryceros* (a species with restricted distribution, and there are reports of a decrease in the number of sightings in the area). Bird life is abundant and varied, with over 200 recorded species including green ibis *Mesembrinibis cayennensis*, cuckoo falcon *Aviceda cuculoides*, mountain buzzard *Buteo oreophilus*, scaly francolin *Francolinus squamatus*, Hartlaub's turaco *Tauraco hartlaubi*, silvery-cheeked hornbill *Bycanistes brevis*, and Mackinder's eagle owl *Bubo capensis* in the forest areas. Jackson's francolin *Francolinus jacksoni*, white-starred bush robin *Pogonochila stellata*, and yellow crowned canary *Serinus canicollis* occur mainly in the bamboo forest. Montane francolin *Francolinus psilolaemus*, Montagus harrier *Circus pygargus*, great snipe *Gallinago media*, cape grass owl *Tyto capensis* and tinkling cisticola *Cisticola rufilata* occur in the moorlands. Mountain chat *Cercomela sordida* and wing-snapping cisticola *Cisticola ayresii* occur in the alpine zone. Birds around the waterhole at Treetops include numerous warblers (Sylviinae), shrikes (Lanidae), sunbirds (Nectarinidae) and waterfowl such as little grebe *Tachybaptus ruficollis*, black-headed heron *Ardea melanocephala*, and ducks *Anas* spp.

Conservation Management A network of tracks has been developed in the forest zone in the eastern sector of the park to assist fire and poaching control. A light aircraft is used for park management. The subalpine/alpine zones are under a policy of minimum management. There is a trench and fence separating the park from areas of cultivation.

Zoning The National Park acts as a core zone surrounded by a Forest Reserve of 26,480ha.

Disturbances or Deficiencies The park is bisected by a major road, and exploration of the high moorland on foot and trout-fishing are permitted. There is increasing pressure from surrounding farmland expansion and uncontrolled tree felling. Accidental forest fires may pose a potential threat if not controlled.

Visitor Facilities Tourism is encouraged in all areas with facilities including access roads (unmetalled), two fully catering night-time wildlife viewing lodges, the Treetops Lodge and the Ark, two banda type lodges for fishermen, 11 public campsites (closed in 1984 due to lions), and five special campsites in the salient. There were 44,500 visitors in 1979.

Scientific Research Studies of the alpine flora, and research on bongos. The Ark and Treetops keep a record of the animals visiting the lodge areas each night.

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget Capital expenditure 1975/1976: Ksh. 43,500 (US\$95,700); recurrent expenditure 1975/1976: Ksh. 60,934 (US\$134,000).

Local Park or Reserve Administration Warden, Aberdare National Park, PO Box 22, Nyeri.

Date 1984

AMBOSELI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established The park is a remnant of the Southern Game Reserve (27,700,000ha) established in 1906. 326,000ha were established as a National Reserve in 1948 and as a County Council Game Reserve in 1961, administered by the Kajiado County Council. National Park status was given on 1 November 1974 to a 39,206ha area.

Geographical Location On the border with Tanzania, north-west of Kilimanjaro. 2°33'-2°45'S, 37°06'-37°24'E.

Altitude Up to 1,155m

Area 39,206ha

Land Tenure Government. Previously administered by Kajiado County Council, which owns the Ol Tukai area.

Physical Features Amboseli comes from the Masai word meaning 'salty dust'; it is a dry lake basin of 60,000ha occupied in the Pleistocene by a saline lake. The area is now usually dry with shallow seasonal flooding. Three large swamps in the south-east, Enkongo Narok, Ol Tukai Orok, and Longinye are fed by underground springs from Mount Kilimanjaro. They are the only source of permanent water in the region and constitute major watering points for animals. Most of the Lake Amboseli basin is very flat with alkaline soils but a few prominent hills of volcanic origin rise about 100m above the surrounding area near the southern border, and a noticeable fault line forms the north-east shoreline of the seasonal lake. The climate is generally hot and dry with only 305mm rainfall annually.

Vegetation There are four types of semi-arid vegetation: 1) *Commiphora/ Acacia* bushland (10%); 2) saline/alkaline plains (50%) with *Suaeda monoica* and *Salvadora persica*; 3) *Acacia* woodland with yellow-barked acacia *A. xanthophloea* and *A. tortilis*; 4) and the remaining 10% swampland, which supports sedges *Cyperus* spp., including *Cyperus papyrus*. Grasses include needlegrass *Aristida*, fingergrass *Digitaria*, the salt-loving dropseed *Sporobolus* sp. and stargrass *Cynodon dactylon*.

Fauna The park contains 56 species of mammal including: baboon *Papio cynocephalus*, vervet monkey *Cercopithecus aethiops*, lion *Panthera leo*, cheetah *Acinonyx jubatus* (T), leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), zebra *Equus burchelli* (several 'negative' examples have been observed), hippopotamus *Hippopotamus amphibius*, black rhinoceros *Diceros bicornis* (T), Maasai giraffe *Giraffa camelopardalis tippelskirchi*, buffalo *Syncerus caffer*, fringe-eared oryx *Oryx gazella callotis*, wildebeest *Connochaetes taurinus*, gerenuk *Litocranius walleri*, impala *Aepyceros melampus*, Grant's gazelle *Gazella granti*, spotted hyena *Crocuta crocuta*, and bat-eared fox *Otocyon megalotis*. Over 425 recorded bird species include southern banded snake eagle *Circaetus fasciolatus* and Taveta golden weaver *Ploceus castaneiceps* with three species of sandgrouse visiting the permanent waters in the dry season. These waters also support waterfowl such as the migrant squacco heron *Ardeola idae* from Madagascar, which is infrequently seen in Kenya. Taita falcon *Falco fasciinucha* is widespread but locally scarce and lammergeier *Gypaetus barbatus* has also been seen.

Population Amboseli has a large pastoral Maasai population and the original reserve acknowledged the status quo between wildlife and pastoralists but the economy of the Maasai in this area has undergone some change.

Conservation Management An official plan was approved for implementation in 1981. Recommendations include management zones; no expansion of tourist accommodation; introduction of an education/interpretation programme; a new camp ground outside the park; control of off-road driving, stock encroachment and poaching; reconstruction and closure of roads; and training programmes. The pastoralist Maasai group ranch landowners agreed in 1977 to vacate the park area in return for guaranteed water supplies outside the park and compensation payments for wildlife grazing on their lands.

Zoning The management describes three zones: intensive use, extensive use, and low use.

Disturbances or Deficiencies From the 1960s, tourism thrived and harassment of some species such as cheetah occurred. Other species, including vervet monkey, baboon, elephant, and a variety of birds, had access to artificial food from tourist lodges, vehicles and garbage dumps within and around the park. The local Maasai, whose cattle were excluded from a 8,000ha wildlife viewing area, received no compensation or financial benefits from park entrance fees. In protest, they killed rhinoceroses and elephants with spears and were largely responsible for reducing the former population from 120 animals to about eight. In 1977, a new agreement was made (see above). However, compensation has not been paid since 1981, and some livestock grazing has been resumed in the park. Since 1983/84, when the rhinoceros population reportedly numbered 14, three rhinoceroses and over 20 elephants have been killed. Many habitats have changed over the past 25 years, swamp areas have expanded and shifted and many acacia *Acacia xanthophloea* trees have been replaced by salt-tolerant shrubs, as rising groundwater levels having been responsible for the increasing salinity of the soil. The creation of the park may have altered the balance maintained by pastoralism over thousands of years. Reduction of grazing competition between livestock and wildlife was marked by increases in numbers of zebra, wildebeest and elephant. The population dynamics of predators and other large herbivores may show complex responses to these changes in the large mammal and plant communities. In 1983, a large area of irrigated agricultural land was developed on Maasai group ranches immediately adjacent to the park's eastern boundary. This has increased the conflict between local people and wildlife and so fencing (expensive to build and maintain) or culling of problem animals will be necessary. Park policies must be integrated with Maasai land use practices, as much of the wildlife uses Maasai grazing areas and depends on local goodwill.

Visitor Facilities Some 79,607 visitors in 1979. Substantial increase in tourism. There is a well developed network of tracks and game viewing areas. Accommodation based in lodges and one campsite. Amboseli is one of the three areas funded by the IBRD Wildlife and Tourism project. The overall objective of WTP is 'to provide support to the government when implementing policies for wildlife-based tourism' (Development Plan p. 396).

Scientific Research Past studies include: ecology of the Amboseli basin by D. Western and tourist use patterns by W. Henry. Current studies include: a monitoring programme by Western of the New York Zoological Society and long-term baboon, vervet and elephant studies by the Altmanns (since 1971), Seyforth and Cheney (since 1976), and Moss (since 1972) respectively.

Special Scientific Facilities Accommodation for visiting scientists may be arranged at the tourist cottages or campsite.

Principal Reference Material

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- * Western, D. (1982). Amboseli. *Swara* 5(4): 8-14.
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- * Western, D. and Thresher, P. (1973). *Development plans for Amboseli*. Report to the International Bank for Reconstruction and Development. 99 pp.
- * WPU Ministry of Environment and Natural Resources.

Staff Warden, three assistant wardens, accountant, 22 rangers, 13 ranger/guides, and 57 labourers.

Budget 1975/1976 - recurrent expenditure Ksh.822,440 (US\$90,500), capital expenditure Ksh.750,000 (US\$82,500).

Local Park or Reserve Administration The Warden, Amboseli National Park, PO Box 18, Namanga.

Date 1984

HELL'S GATE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.21.12 (East African Highlands)

Legal Protection Total

Date Established 1984

Geographical Location Hell's Gate or Njorowa Gorge is situated south of Lake Naivasha in the Rift Valley. 36°05'E, 1°25'S

Altitude 2,777m

Area 6,800ha

Land Tenure Government

Physical Features Njorowa Gorge or Hell's Gate is the ancient outlet of Lake Naivasha and there are many stream jets in the lower portion. The park includes Longonot crater near the eastern boundary.

Vegetation There is a wide variety of succulents in the area.

Fauna The gorge area is particularly notable for birds of prey and swifts and it is possible to observe 25-30 raptor species in one day, including several uncommon large eagles. Species breeding in the cliffs of the gorge are Ruppell's griffon *Gyps rueppellii* (seriously reduced since 1950 by indiscriminate killing and poisoning), Verreaux's eagle *Aquila verreauxii*, augur buzzard *Buteo rufofuscus*, and Egyptian vulture *Necrosyrtes monachus*. Other species present include peregrine falcon *Falco peregrinus*, lanner *F. biarmicus*, and an easily observed pair of lammergeier *Gypaetus barbatus*. During the rains there is a spectacular concentration of swifts breeding in the cliffs mainly Nyanza *Apus niansae*, mottled *A. aequatorialis*, white-rumped *A. caffer*, little *A. affinis*, and Horus *A. horus*. Despite constant poaching there is a fair amount of plains game in the gorge area including eland *Taurotragus oryx*, giraffe *Giraffa camelopardalis*, zebra *Equus burchelli*, Thompson's gazelle *Gazella thomsoni*, Grant's gazelle *G. granti*, and impala *Aepyceros melampus*. The steep hilly country contains numerous klipspringer *Oreotragus oreotragus*, mountain reedbuck *Redunca redunca*, and hyrax *Procavia capensis*. Steinbok *Raphiceros campestris* is common in surrounding areas.

Zoning None

Disturbances or Deficiencies Poaching occurs and there may be encroachment due to thermo-hydro-electric development. The migration route of mammals is influenced by the condition of the waterholes, and is interrupted by fences.

Scientific Research No information

Special Scientific Facilities None

Principal Reference Material

- Cunningham, G.R., van Someren (1984). Endangered Mountain Islands. In: *Endangered Resources for Development*. Proceedings of a workshop on the status and options for management of plant communities in Kenya. National Museums of Kenya.
- WWF/IUCN Project 1262. Hells Gate National Park.

Staff No information

Budget No information

Local Park or Reserve Administration Wildlife Conservation and Management Department.

Date 1984

KAKAMEGA FOREST NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total; all clear felling activity prohibited

Date Established Forest Reserve established in 1933 (23,000ha). Nature Reserve (1,163ha) and Forest Station established in 1967 under Legal Notice No. 22. Reported to have been gazetted as a National Park in 1983, but it would appear that gazettelement has yet to be completed. Kakamega National Reserve Order was published in the Kenya Gazette Supplement of 31 May 1985 as Legal Notice 95.

Geographical Location Nandi District in western Kenya, directly north of Kisumu. 0°47'N, 34°45'E.

Altitude 1,520-1,680m

Area 9,698ha; closely associated geographically and biologically with: South Nandi Forest Reserve 19,502ha (south-east, contiguous), Kisere Forest Reserve (600ha, 6km north), Malaba Forest Reserve (800ha, 12km north), and Bunyala Forest Reserve (1,000ha, 14km north-west).

Land Tenure Government

Physical Features The country is hilly, with scattered seasonal swamps. There are two major rivers, the Isiukhu in the north and the Yala in the south. Each of them has several tributaries particularly in the eastern blocks of the forest. Annual rainfall is 1,600mm. Average temperatures remain similar between 24°C and 28°C.

Vegetation This is the easternmost area of the Congo-West African equatorial rainforest. The fairly dense rainforest is interspersed with grassy glades, where the soil is too shallow to support forest trees. There are few endemics, but many species found nowhere else in Kenya including 13 out of a total of 62 recorded species of Pteridophyte. Genera include *Renealmia*, *Pisonia*, *Polia*, and *Voacanga*. At least 125 species of tree have been identified with species such as the major (giant) forest trees *Aningeria altissima*, *Cordia millenii*, *Entandrophragma angolense*, and *Maesopsis eminii*, with an average height of 30-40m and a maximum of 70m. Other central-west African forest trees and shrubs only recorded from this reserve in Kenya are: *Bequaertiodendron oblanceolatum*, *Cassipourea ruwenzoriensis*, *Chrysophyllum albidum*, *Leea guineense*, *Monodora myristica*, *Uncaria africana*, *Uvariopsis congensis*, *Zanthoxylum leprieurii*, and *Z. mildbraedii*. To the east, north, west and south-west is wet *Combretum* woodland, a secondary succession following the clearing of rainforest.

Fauna Some 10-20% of the amphibians, reptiles, birds and mammals found here occur nowhere else in Kenya. The reserve supports a large and varied primate population which includes Angolan black and white colobus *Colobus angolensis* and blue monkey *Cercopithecus mitis*. This is the only known locality in Kenya for brush-tailed porcupine *Atherurus africanus*, giant water shrew *Potamogale velox* and hammer-headed fruit bat *Hypsignathus monstrosus*. The avifauna is unique in Kenya with locally threatened birds including: chestnut wattle-eye *Platysteira castanea*, red-cheeked wattle-eye *P. blissetti* and yellow-bellied wattleeye *P. concreta*, Chapin's flycatcher *Muscicapa lendu* (R), red-tailed grey parrot *Psittacus erithacus*, blue-headed bee-eater *Merops muelleri*, chestnut-breasted negro finch *Nigrita bicolor*, white-breasted negro finch *N. fusconata*, Sabine's spinetail *Chaetura sabini*, Turner's eremomela *Eremomela turneri* (R), and red-chested owl *Glaucidium tephronotum*. Kokwaro (1984) lists the unique bird species in this area. The rich Lepidopteran population includes *Cymothoe herminia johnstoni*, *C. sangaris hobarti*, swallowtails *Papilio* spp., and *Charaxes* spp..

Conservation Management A general purpose working plan was implemented in 1982, which included provisions for strictly monitored selective logging. No exotic species are planted in the forest. A report on the status and values of Kakamega is being prepared by the Botany Department of Nairobi University at the request of the Wildlife Fund Trustees. It will contain recommendations to the government concerning conservation of the forest.

Zoning The area contains Yala Nature Reserve 469ha, Kisere Nature Reserve 484ha and

Kakamega Forest Station 210ha (containing a small nature reserve). These Nature Reserves were core zones with exploitation prohibited.

Disturbances or Deficiencies Problems include pressure by the local rural community for more agricultural land, firewood collection, illegal extraction of trees for charcoal production, and bark-stripping of particular species including *Maytenus buechananii*, *Olea welwitschii*, *Warburgia salutaris*, and *Voacanga* sp. for traditional medicines. About half of the reserve area has been cleared. The Forest Department has been under pressure to replace indigenous species with more commercial exotics. Saplings have been over-exploited. There is also illegal cattle-grazing and poaching of game. At the present rate of deforestation the forest will be entirely eliminated by the turn of the century.

Scientific Research There has not yet been full botanic exploration of the Forest; there was a sampling survey carried out by the Forest Department in 1966.

Special Scientific Facilities The Forest Department resthouse at the administrative centre is available for visiting scientists.

Principal Reference Material

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- ° Cunningham van Someren, G.R. (1978). *Komba* Term II 41.
- ° Cunningham van Someren, G.R. (1982). Review of Habitat Status of some Important Biotic Communities in Kenya. Division of Natural Sciences, National Museums, Kenya. March 1982. Unpublished.
- ° Diamond, T. (1979). *Kakamega*. *Svara* 2(1): 25.
- ° Gillett, J.B. (1978). *Komba* Term II: 43.
- ° Kokwaro, J. (1984). The Kakamega Forest of Kenya: the Easternmost relic of the Equatorial Rainforests of Africa. In: *Endangered Resources for Development. Proceedings of a workshop on the status and options for management of plant communities in Kenya*. National Museums of Kenya.

Staff No information

Budget No information

Local Park or Reserve Administration Chief Forester, Kakamega Forest Station, PO Kakamega.

Date 1984

LAKE NAKURU NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total. The lake was recently included in the protected area.

Date Established Established in 1960 as a Bird Sanctuary. National Park status in 1967. Expanded in 1974. Proposal by WMCD in 1983 to include Lake Elementaita.

Geographical Location Central Kenya, 140km north-west of Nairobi. 0°18'-0°24'S, 36°03'-36°08'E.

Altitude 1,753-2,073m

Area 20,000ha (including lake 7,100ha)

Land Tenure Government

Physical Features Lake Nakuru is a shallow alkaline soda lake in the Central Rift Valley bordered to the west by one wall of the Rift Valley and to the east by a salt-dome hill. There is a crater in the north beyond Nakuru Town. To the south is an open plain, which is the bed of a former that lake once joined Lake Nakuru and Lake Elementaita to form a single lake. The rift wall is rugged, with volcanic cliffs rising in steps to 2,743m. Soils are volcanic in origin interspersed with alkaloid deposits. The lake has no outlet and is very alkaline with a pH of 10.5. It supports only limited species of algae and zooplankton, but these are present in great abundance. Annual rainfall is 965mm.

Vegetation The normally water-covered surface of the lake occupies about a third of the park and derives its colour from the blue-green algae *Sporulina platensis*, the major food source of the flamingo. The lake is fringed by swamps and the surrounding areas support a dry transitional savanna with lake margin grasslands of *Sporobolus spicatus* salt grass and sedge *Cyperus laevigatus* moving into grasslands of *Hyparrhenia hirta* and rhodes grass *Chloris gayana* in the lower areas. More elevated areas have dry forest with *Acacia xanthophloea*, olive *Olea hochstetteri* and *Croton dichogamus*; *Euphorbia candelabrum* forest; and bushland dominated by the composites, mulelechwia *Tarchonanthus camphoratus* and *Psiadia arabica*.

Fauna Mammals include: the threatened long-eared leaf-nosed bat *Hipposideros megalotis*, Angolan black and white colobus *Colobus angolensis*, spring hare *Pedetes capensis*, clawless otter *Aonyx capensis*, rock hyrax *Heterohyrax brucei*, hippopotamus *Hippopotamus amphibius*, rhinoceros *Diceros bicornis* (T), leopard *Panthera pardus* (T), waterbuck *Kobus ellipsiprymnus*, Bohar and mountain reedbucks *Redunca redunca* and *R. fulvorufula*, impala *Aepyceros melampus*, Thomson's gazelle *Gazella thomsoni*, striped hyena *Hyaena hyaena*, hunting dog *Lycaon pictus* (T), bat-eared fox *Otocyon megalotis*, wild cat *Felis silvestris*, and golden cat *Felis aurata*.

A group of Rothschild's giraffe *Giraffa camelopardalis rothschildi* were successfully introduced in 1977. The park contains over 450 recorded bird species and is one of the few national parks established specifically for the protection of birds, in particular the vast flocks of over 1.5 million greater flamingo *Phoenicopterus ruber* and lesser flamingo *Phoeniconaias minor*: hence its name 'the lake of a million flamingoes'. Waterbirds include eastern white pelican *Pelecanus onocrotalus*, common cormorant *Phalacrocorax carbo* and reed cormorant *P. africanus*, night heron *Nycticorax nycticorax*, African spoonbill *Platalea alba*, 30 species of Charadriidae and Scolopacidae, Cape wigeon *Anas capensis*, and Maccoa duck *Oxyura maccoa*. Resident avifauna are augmented in spring by passage migrants from Europe. Birds of prey include secretary bird *Sagittarius serpentarius* and Verreaux's eagle *Aquila verreauxii* hunting over the western scarp. The introduced alkali-tolerant fish *Tilapia grahami* (from Lake Magadi in 1960) is now abundant at high water level.

Zoning 5,700ha lake zone and 14,300ha buffer zone

Disturbances or Deficiencies The area is extremely vulnerable to pollution due to the closed nature of the lake basin. A lake quality monitoring programme will warn of danger, but there is no preventative system. The park is bordered on the north by Nakuru township and surrounded by farmlands. Fires, started outside the park, are a problem. In 1984 SWARA provided funds for 30km of firebreaks to be cleared.

Visitor Facilities The park is an important recreation area for Nakuru, Kenya's third largest town. Three public campsites are available and a lodge is planned. Hotel accommodation and other facilities are available in Nakuru. There were 72,399 visitors in 1979. Wildlife clubs of

Kenya have established a youth hostel with 40 beds (Nakuru Hostel), which was used by 1,800 groups in 1982.

Scientific Research There has been a limnological study, a lake monitoring programme planned, biochemical analysis of the lake and studies of flamingoes and pelicans. A programme of conservation education has been set up by the Wildlife Club of Kenya. IUCN/WWF Project 1985 was set up in 1982 to rebuild the hostel and improve facilities.

Special Scientific Facilities There is a research laboratory for limnological and biochemical analyses, a workshop, inflatable boat, housing, and, central sampling platform. An environmental Education Centre (Nakuru Hostel) has been established in the park with dormitory, lecture room, office, and display area to be used by school groups for practical field studies. IUCN/WWF Project 1985 was set up in 1982 to rebuild the hostel and improve facilities.

Principal Reference Material

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- ° IUCN/WWF Project 1985. Wildlife Clubs, Lake Nakuru Hostel.
- ° Kenya National Parks (1973). *Guide to Lake Nakuru National Park*.
- ° Koeman, J.H. (1972). A preliminary survey of the possible contamination of Lake Nakuru in Kenya with some metals and chlorinated hydrocarbon pesticides. *Journal of Applied Ecology* 9(2): 411-416.
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- ° Wirtz, P. (May 1979). Checklist of the larger mammals of Lake Nakuru N.P. *East African Natural History Society Bulletin*.

Staff No information

Budget 1975/1976: recurrent expenditure Ksh.32,915 (US\$72,400), capital expenditure Ksh.32,400 (US\$70,300). US\$7,426 since 1982 for IUCN/WWF Project 1985.

Local Park or Reserve Administration Warden, Lake Nakuru National Park, PO Box 539, Nakuru, Kenya.

Date 1984

LAMBWE VALLEY (RUMA) NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established Established as a National Reserve in 1966. Upgraded to National Park in 1983.

Geographical Location 10 km east of Lake Victoria in west Kenya. 0°35'-0°44'S, 34°12'-34°22'E.

Altitude 1,200-1,600m

Area 12,000ha

Land Tenure Government

Physical Features The flat valley floor is bounded on its south-eastern side by the Kanyamua escarpment. It has black cotton soils. Mean annual rainfall is 1200-1600mm.

Vegetation There is a mixture of tall grassland and woodland with extensive thicket vegetation dominated by *Acacia* spp..

Fauna Roan antelope *Hippotragus equinus*, leopard *Panthera pardus* (T), buffalo *Syncerus caffer*, and topi *Damaliscus lunatus*. There are many woodland bird species. Giraffe *Giraffa camelopardalis*, zebra *Equus burchelli*, and ostrich *Struthio camelus*, have been introduced.

Conservation Management To reduce grass and shrub cover, three species: Rothschild's giraffe, common zebra, and ostrich were introduced from the Samburu district. A vegetation inventory is to be drawn up to facilitate visitor interpretation services.

Zoning None

Disturbances or Deficiencies The area is surrounded by high density human settlement, however, people avoid the area because of tsetse fly infestation and uranium deposits. (There have been reports of past inhabitants becoming sterile.)

Visitor Facilities None; however, there are bandas in the area.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None

Staff Three wardens, 19 ranger, five support staff, three casuals (1980)

Budget 1979-1980: KSh.124,802 (US\$16,640).

Local Park or Reserve Administration Warden, WCMD, Box 420, Homa Bay.

Date 1984

MERU NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established National Park status in 1966

Geographical Location East-north-east of Mount Kenya. 0°18'N-0°11'S, 38°02'-38°25'E.

Altitude 366-914m

Area 87,044ha; contiguous to Kora Nature Reserve (178,780ha), Rahole Nature Reserve (127,000ha), North Kitui Nature Reserve (74,500ha), and Bisanadi Nature Reserve (60,000ha)

Land Tenure Government expropriated, under Trusteeship.

Physical Features The western area is a hilly upland of volcanic rocks drained by 15 permanent streams with rich black volcanic soil. The east is an open plain with red lateritic soil drained by three rivers with considerable sections drying out seasonally. The Tana river forming the southern boundary, features Adamson's Falls, where the river passes over basement rocks. The Ura River forms the western boundary, and Bisinadi River the eastern. Several prominent hills of Precambrian rock tower above the surrounding plains. Rainfall is 635-762mm in the west and 305-356mm in the east.

Vegetation There is mainly thorn bushland and thicket with *Combretum* prevailing in the north and *Commiphora* in the south. To the west the *Combretum* merges into *Terminalia* wooded grasslands. The red-flowered parasitic *Loranthus* grows on the branches of *Acacia reficiens* trees along the rivers. Dense riverine forests of doum and raffia palms *Hyphaene* and *Raphia* spp. grow along the watercourses. There are some riverine swamps with sedges *Cyperus* sp. and grasses *Echinochloa hapladelphoides* and *Pennisetum mezianum*. On the plains *Sehima nervosa*, *Chloris roxburghiana*, and other species of *Pennisetum* are the dominant grasses. In the north, a small outlier of rain forest, the Ngaia forest, still exists.

Fauna Larger mammals include: lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), elephant *Loxodonta africana* (T), zebra *Equus burchelli*, Grevy's zebra *E. grevyi* (T), black rhino *Diceros bicornis* (T), some introduced white rhinoceros of the southern race *Ceratotherium simum*, reticulated giraffe *Giraffa camelopardalis reticulata*, hippopotamus *Hippopotamus amphibius*, lesser kudu *Tragelaphus imberbis*, oryx *Oryx gazella beisa*, gerenuk *Litocranius walleri*, hartebeest *Alcelaphus buselaphus*, and Grant's gazelle *Gazella granti*. The Somali race of ostrich *Struthio camelus molybdophanes* is among the 277 recorded bird species, but many other birds of restricted range are to be found including small brown-backed woodpecker *Picoides obsoletus* and numerous golden-breasted starling *Cosmopsarus regius*. Red-necked falcon *Falco chicquera* and three species of courser including Heuglin's courser *Rhinoptilus cinctus* occur in the doum palms. African finfoot *Podica senegalensis*, Pel's fishing owl *Scotopelia peli*, sacred ibis *Threskiornis aethiopicus*, brown-hooded kingfisher *Halcyon albiventris*, violet woodhoopoe *Phoeniculus damarensis*, and scaly babbler *Turdoides squamulatus* are found along the rivers. Black-bellied sunbird *Nectarinia congensis*, shrikes (Laniidae), starlings (Sturnidae), and weavers (Ploceidae) inhabit the open scrub woodland.

Conservation Management An electrified fence has been erected on the western boundary.

Zoning The managed National Park has one section designated as a wilderness area with no developed access roads.

Disturbances or Deficiencies Deforestation, although mainly outside the Park, may cause erosion and adversely affect water supply and storage capacity within the Park. There are reports of encroachment of pastoralists with cattle, sheep, goats, and some camels.

Visitor Facilities Tourism is encouraged in all areas with a well planned network of roads for game viewing. Accommodation includes a 140-bed lodge with full catering, a 40-bed 'banda' lodge with partial catering, one public, and some private camp grounds. There are good wet and dry access roads and also airstrips.

Scientific Research Studies of vegetation have been made by the East African Wildlife Society and there is currently a study of small mammals.

Special Scientific Facilities None

Principal Reference Material

- ° Ament, J. (1972). Assignment Meru. *Africana* 4(12).
- ° Ament, J.G. (1975). The vascular plants of Meru National Park, Kenya. *Journal of the East Africa Natural History Society and National Museum* 154.
- ° Kenya National Parks (1975). Meru: A Guide to Meru National Park.
- ° Wateridge, L.E.D. (1960). Meru District Game Reserve. *Journal of the Kenya Wildlife Society*, June-Sept.

Staff No information

Budget Capital expenditure 1975/1976 Ksh.60,200 (US\$132,400); recurrent expenditure 1975/1976: Ksh.47,525 (US\$104,500).

Local Park or Reserve Administration Warden, Meru National Park, PO Box 162, Nanyuki.

Date 1984

MOUNT ELGON NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established 1968

Geographical Location On the western border with Uganda. 01°02'-10°10'N, 34°35'-34°48'E.

Altitude 2,336-4,321m

Area 16,923ha

Land Tenure Government

Physical Features The park is shaped like a figure of eight on the east flank of a massive volcanic cone which rises to 4,627m, overlooking a huge caldera which, together with half the mountain, lies in Uganda. Features include a flat-topped basalt column known as Koitobos (Table Rock) at the summit near the edge of the caldera, the 'lava-tube' caves, some over 60m in diameter, which are visited by elephants in search of salt, and the high basalt cliffs of Endebus Bluffs near the western boundary. Soils are red and lateritic. Annual rainfall is over 1,270mm.

Vegetation This has altitudinal zones, changing with increasing altitude from olive *Olea hochstetteri* and *Aningeria adolfi-friedericii* wet montane forest, through olive and *Podocarpus gracilior* forest, a *Podocarpus* and bamboo *Arundinaria alpina* zone, and a *Hagenia abyssinica* zone to moorland with heaths *Erica arborea* and *Philippia trimera*, tussock grasses such as *Agrostis gracilifolia* and *Festuca pilgeri*, herbs such as *Alchemilla*, *Helichrysum*, *Lobelia*, and the giant groundsels *Senecio barbatipes* and *S. elgonensis*. Other tree species include cedar *Juniperus procera*, pillarwood *Cassipourea malosana*, elder *Sambucus adnata*, and pure stands of *Podocarpus gracilior*. Of the 400 species recorded for the area the following are of particular note as they only occur in high altitude broad-leaf montane forest: *Ardisiandra wettsteinii*, *Carduus afromontanus*, *Echinops hoehnelii*, *Ranunculus keniensis*, (previously thought endemic to Mount Kenya), and *Romulea keniensis*.

Fauna Mammals include: Angolan black-and-white colobus *Colobus angolensis*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), giant forest hog *Hylochoerus meinertzhageni*, bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, duiker *Cephalophus* spp. (black-fronted *C. nigrifrons* being the least common), and the threatened golden cat *Felis aurata*. Birds of the forest zone include the crested guinea fowl *Guttera edouardi sethsmithi*, great blue turaco *Corythaeola cristata*, and black-and-white-casqued hornbill *Bycanistes subcylindricus*. The moorland supports most of the species characteristic of such altitudes in eastern Africa and includes the endemic subspecies of chat *Cercomela sordida rudolfi* and Hunter's cisticola *Cisticola hunteri masaba*. Raptors include crowned eagle *Stephanoaetus coronatus*, African hobby *Falco cuvierii*, mountain buzzard *Buteo oreophilus*, and lanner falcon *Falco biarmicus*.

Zoning None

Disturbances or Deficiencies There is severe encroachment into the western section of the reserve as well as into the forests and moorlands surrounding the Park which act as a buffer for the maintenance of these habitats within the reserve.

Visitor Facilities Facilities include several all-weather roads, three public camp sites, and a small hotel on the park boundary. There were 3,342 visitors in 1979.

Scientific Research An extensive vegetation survey was undertaken in 1976.

Special Scientific Facilities None

Principal Reference Material

- * Dale, I. (1940). The Forest Types of Mount Elgon. *Journal of the East African Natural History Society*.
- * Hamilton and Perrot, (1981). A Study of altitudinal zonation in montane forest of Mt Elgon. *Vegetatio* 45: 107-125.

Staff No information

Budget 1975/1976: recurrent expenditure Ksh.28,005 (US\$61,600), capital expenditure Ksh.37,600 (US\$82,700).

Local Park or Reserve Administration The Warden, Mount Elgon National Park, PO Box 753, Kitale.

Date 1984

MOUNT KENYA BIOSPHERE RESERVE

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.21.12 (East African Highlands)

Legal Protection The area above 3,100m has been declared a National Park and the area between 1,600 and 3,100m constitutes Mount Kenya Forest Reserve (142,071ha).

Date Established The National Park was established in 1949 and accepted as a Biosphere Reserve in April 1978.

Geographical Location Mount Kenya straddles the equator about 193km north-east of Nairobi and about 480km from the Kenya coast. The Park boundary is defined by the 3,100m contour line with two salients, Naro Moru and the Sirimon down to approximately 2,600m and centred at 0°10'S, 37°20'E.

Altitude 1,600-5,199m

Area Biosphere Reserve 71,759ha. National Park 58,800ha. Contiguous to Mount Kenya Forest Reserve (142,071ha).

Land Tenure Government

Physical Features Several mountain peaks with isolated glaciers. The entire mountain is deeply dissected by valleys radiating from the peaks, which are largely attributed to glacial erosion. The base of the mountain is approximately 96km wide. There are about 20 glacial tarns (small lakes) of varying sizes and numerous glacial moraine features between 3,950m and 4,800m. The highest peaks are Batian 5,199m and Nelion 5,188m. The salients, comprise 3-5km wide ridges.

Vegetation This varies with altitude and rainfall, and there is a rich alpine and sub-alpine flora. *Juniperus procera* and *Podocarpus* spp. are predominant in the drier parts of the lower zone (below 2,500m), with rainfall between 875 and 1400mm (Naro Moru and Sirimon tracks on the western slopes). In wetter areas (over 2200mm/year) in the south-west and north-east, *Cassipourea malosana* predominates. However, most of this lower altitude zone is not within the reserve and is now used for growing wheat. Higher altitudes (2,500-3,000m with rainfall over 2000mm/year) are dominated by a bamboo *Arundinaria alpina* on south-eastern slopes, and a mosaic of bamboo and *Podocarpus milanjianus* with bamboo at intermediate elevations (2,600-2,800m), and *Podocarpus* at higher and lower elevations (2,800-3,000m) and (2,500-2,600m). Towards the west and north of the mountain, bamboo becomes progressively smaller and less dominant. There are also areas in zones of maximum rainfall 2,000-3,500m with up to 2,400mm/year, where *Hagenia abyssinica* with *H. revolutum* predominate. Above 3,000m, cold (low temperatures) become a more important factor, tree stature declines, and *Podocarpus* is replaced by *Hypericum* spp.. A more open canopy here results in a more developed understorey. Grassy glades are common especially on ridges. The lower alpine or moorland zone (3,400-3,800m) is characterized by high rainfall, a thick humus layer, low topographic diversity, and low species richness. Tussock grasses *Festuca pilgeri*, and sedges *Carex* spp. predominate. Between the tussocks there are *Alchemilla cyclophylla*, *A. johnstonii*, and *Geranium vagans*. The upper alpine zone (3,800-4,500m) is more topographically diverse, and contains a more varied flora. Many of the species here are bizarre, especially the giant rosette plants *Lobelia telekii* and *L. keniensis*, *Senecio keniodendron* and *Carduus* spp.. *Senecio brassica* is found in both the lower and upper alpine zone. There are a variety of grasses on well-drained ground and along the streams and river banks such as megaphytic *Senecio batescombei* and *Helichrysum kilimanjari*. Continuous vegetation stops at about 4,500m although isolated vascular plants have been found at over 5,000m. There are 13 species endemic to Mount Kenya listed in Hedberg,(1951).

Fauna In the lower forest and bamboo zone mammals include giant forest hog *Hylochoerus meinertzhageni*, tree hyrax *Dendrohyrax arboreus*, white-tailed mongoose *Ichneumia albicauda*, elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T)(seldom seen), suni *Neotragus moschatus*, black-fronted duiker *Cephalophus nigrifrons* and leopard *Panthera pardus* (T)(which has also been seen in the alpine zone). Forest birds include green ibis *Mesembrinibis cayennensis* (local Mount Kenya race), Ayre's hawk eagle *Hieraaetus dubius*, threatened Abyssinian long-eared owl *Asio abyssinicus*, scaly francolin *Francolinus squamatus*, Ruppell's robin-chat *Cossypha semirufa*, and numerous sunbirds (Nectariniidae). Moorland mammals include: localised Mount Kenya mouse shrew *Myosorex polulus*, hyrax *Procavia johnstoni mackinderi*, and common duiker *Sylvicapra grimmia altivallis*. Birds include: scarlet-tufted malachite sunbird *Nectarinia johnstoni*, montane francolin *Francolinus psilolaemus*, Mackinder's eagle owl *Bubo capensis mackinderi*, and the locally threatened scarce swift *Schoutedenapus myioptilus*. The endemic mole-rat *Tachyoryctes splendens* is common

throughout the northern slopes and the Hinde Valley at elevations up to 4,000m. There have also been reported sightings of the golden cat *Felis aurata*.

Population No information

Conservation Management Continued protection is vital for Mount Kenya as it is a significant water catchment area. Initial attempts have been made to redesign the trail system, but with limited success. There are several draft management plans at various stages of implementation.

Zoning The central National Park is surrounded by a buffer forest reserve.

Disturbances or Deficiencies Human interference is low and mainly confined to the gazetted forest area at lower altitudes. Fire is a threat from humans and lightning is a threat in the dry, lower forest but recovery takes place through natural recolonization. Trail proliferation along the Naro Moru Track has resulted in muddy swathes up to 100m wide in the lower alpine zone, and the destruction of an estimated 10% of the entire valley-bottom habitat in the upper 3km of the Teleki Valley. There is concern that current construction of a high altitude road across the eastern slopes will cause large-scale degradation.

Visitor Facilities Mountain safaris are organized by the Naro Moru Lodge and a private safari company, and locally by the Mountain Club of Kenya. The Mountain Lodge is within the Forest. Access to the park is possible by the Sirimon track, the Naro Moru track (officially) and the Chogoria track, which has a control gate. There were 10,637 visitors in 1979.

Scientific Research The Mount Kenya ecosystem is an excellent area for studying tropical alpine ecology. Studies of meteorology and palynology have been undertaken, but no rainfall data is available. Most work has been done above 3,800m and more comparative work is needed.

Special Scientific Facilities An environmental monitoring station is to be established on Mount Kenya by UNEP and the Government of Kenya. There is one building with basic facilities, which was originally designated as a research facility.

Principal Reference Material

- ° Biosphere Reserve nomination submitted to Unesco.
- ° Coe, M. (1967). *The Ecology of the Alpine Zone of Mount Kenya*. W. Junk, The Hague.
- ° Hedberg, O. (1951). Vegetation belts of East African mountains. *Svensk Bot. Tidskr* 45: 140-202.
- ° Moreau, R. (1944). Mt. Kenya: A Contribution to the Biology and Bibliography. *J. East Afr. Nat. Hist. Soc.* 18(1 and 2): 61-92.
- ° Olindo, P.M. (1965-1966). Kenya National Parks Annual Reports.
- ° White, F. (1950). The forests of Mt Kenya. *J. Oxf. Univ. For. Soc.* (series 3) No. 5: 32-38.
- ° Williams, J.G. (1981). *A field guide to the National Parks of East Africa*. Collins.
- ° Woodley, B. (1959-1975). Quarterly Reports of Mount Kenya National Park. Unpublished.
- ° Young, T. (1984). Status and Potential of Kenya's High Mountain Ecosystems. In: *Endangered Resources for Development*. Proceedings of a workshop on the status and options for management of plant communities in Kenya. National Museums of Kenya.
- ° Young, T. (in prep). Notes on the Alpine Vertebrates of Mount Kenya.

Staff Three wardens and approximately 100 others (1984)

Budget No information

Local Park or Reserve Administration Warden, PO Box 69, Naro Moru.

Date 1984

NAIROBI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established 1946

Geographical Location About 8km south of Nairobi. 1°21'S, 36°47'-36°55'E.

Altitude 1,533-1,760m

Area 11,721ha

Land Tenure Government

Physical Features The park includes a sloping plain crossed by several deep river valleys. The western portion towards Ngong is dominated by an upland formed by an old lava flow. The Athi river and tributaries flowing south-eastwards through the Park form part of the southern boundary. Soils are mainly black loamy clay known as 'black cotton'. Rainfall varies from 889mm in the upland area to 635mm on the plains.

Vegetation Dry transitional savanna. The upland areas are forested with stands of *Olea africana* and *Croton dichogamus/Brachylaena hutchinsii* accounting for about 20% of the park, and *Croton/Psiadia arabica* bushland for a further 15%. The lower slopes making up the remaining 65% are a grassland composed of such species as: *Themeda*, *Cyperus*, *Digitaria*, and *Cynodon* with scattered yellow-barked acacia *Acacia xanthophloea*. There is gallery forest in the valleys, predominantly *Acacia* spp., and *Euphorbia candelabrum*. Other tree species include *Apodytes dimidiata*, *Canthium schimperanum*, *Elaeodendron buchananii*, *Newtonia* sp., *Ficus eriocarpa*, *Aspilia mossambicensis*, and *Rhus natalensis*.

Fauna The close proximity of forest cover, pasture and permanent water makes the park the centre of an animal migration area, particularly in drought years, which extends 160km beyond the park boundary to include the Athi Kapiti Plains in the south. The park is noted for concentrations of larger mammals with over 80 recorded species including leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), black rhinoceros *Diceros bicornis* (T) (approximately 30 individuals), baboon *Papio anubis*, lion *Panthera leo* (the prides being accustomed to vehicles form a particular tourist attraction), zebra *Equus burchelli*, Masai giraffe *Giraffa camelopardalis teppelskirchi*, eland *Taurotragus oryx*, bushbuck *Tragelaphus scriptus*, Coke's hartebeest (kongoni) *Alcelaphus buselaphus*, wildebeest *Connochaetes taurinus*, dikdik *Madoqua kirki* and gazelles *Gazella thomsoni* and *G. granti*. This well-studied Park has some 500 bird species ranging from the Masai ostrich *Struthio camelus massaicus* to the tiny 'kapok bird' or penduline tit *Remiz caroli* with its close-woven felt-like nest. The various ponds, small dams and the Athi river attract many waterbirds with the river providing one of the best chances in Kenya of seeing finfoot *Podica senegalensis*, African darter *Anhinga rufa*, bitterns *Ixobrychus minutus* and *Botaurus stellaris* and sanderling *Calidris alba*. Hippopotamus *Hippopotamus amphibius* and crocodiles *Crocodylus* sp. are also present.

Conservation Management Excessive tourist roads have recently been reduced in number. Parts of a management plan written by W. Lusigi (Unesco) have been implemented although the plan itself has not been officially approved.

Zoning None

Disturbances or Deficiencies The major threat to the park is the encroachment of settlement on the southern border; all other sides are fenced. Consequent interruption of the migration patterns of the mammals of the area could have a detrimental effect on the populations

involved, interfering with recruitment and emigration, and the reserve could become a free-range zoo with a decrease in diversity of mammal, and perhaps other, species. There are plans to dam the Mbagathi River at Hippo Pools to provide water for an industrial project at Athi River. This could result in thousands of hectares of the park being flooded. Traces of former encampments of pastoralists and army personnel can still be seen. The buffalo *Syncerus caffer* has been introduced, although some may also wander in from the Ngong hills. Fire is a problem particularly on the perimeter.

Visitor Facilities Tourism is very evident and may present a major management problem if it continues to increase, despite the fact that it is confined entirely to day visitors from Nairobi, some only visiting the small zoo or 'orphanage' near the main gate, which has visitor facilities. There is an extensive network of sign-posted tracks and game viewing points. There were 106,910 visitors in 1979.

Scientific Research Has been the site for many ecological MSc projects from Nairobi University.

Special Scientific Facilities Research in the area includes studies of grassland ecology, tourist impact, and of various species including Coke's hartebeest, ostrich, and Grant's gazelle.

Principal Reference Material

* Rudnai, J. (1974). The pattern of lion predation in Nairobi Park. *E. Afr. Wildlife J.* 12: 213-225. (Includes detailed vegetation description.)

Staff No information

Budget 1975/1976 recurrent expenditure Ksh.83,016 (US\$183,000), capital expenditure Ksh.62,903 (US\$138,400).

Local Park or Reserve Administration Warden, Nairobi National Park, PO Box 42076, Nairobi.

Date 1984

OL DOINYO SABUK NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.21.12 (East African Highlands)

Legal Protection Total

Date Established 22 December 1967

Geographical Location East-south-east of Thika, 50km north-east of Nairobi. 1°07'-1°10'S, 37°13'-37°17'E.

Altitude 1,524-2,146m

Area 1,842ha

Land Tenure Government

Physical Features The park's main feature is the inselberg rising from the surrounding plains. It is a remnant of a former range and composed of Precambrian granitic rock, which

has been much eroded. The mountain is almost entirely forested, except for a small bare area around the summit. The local Swahili name Kilima Mbogo means Buffalo Mountain.

Vegetation The forest is a remnant of a once-common montane forest type dominated by *Olea*, *Podocarpus* and *Croton*.

Fauna This includes: Angolan black-and-white colobus *Colobus angolensis*, Syke's monkey *Cercopithecus mitis*, green monkey *Cercopithecus aethiops*, leopard *Panthera pardus* (T), black rhino *Diceros bicornis* (T), bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, duikers *Cephalophus*

spp., and impala *Aepyceros melampus*. Bird species include: great blue turaco *Corythaeola cristata*, forest species such as Ayre's hawk-eagle *Hieraaetus dubius*, African goshawk *Accipiter tachiro*, Verreaux's eagle *Aquila verreauxii*, lemon dove *Alopelia larvata*, Hartlaub's turaco *Tauraco hartlaubi*, Narina's trogon *Apaloderma narina*, grey cuckoo-shrike *Coracina caesia*, Abyssinian crimsonwing *Cryptospiza salvadorii* and several sunbirds *Nectarinia* spp.. After the start of the seasonal rains, Lepidoptera are noticeably abundant including species of *Charaxes*, Nymphalidae, and swallowtails (Papilionidae). The threatened *Charaxes nandina* occurs in the Park.

Conservation Management There have been plans to redirect tourists from Nairobi National Park to this area.

Zoning None

Disturbances or Deficiencies None reported

Visitor Facilities There are no hotels or camp grounds, but in two areas camping is permitted.

Scientific Research None at present

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget 1975/1976: recurrent expenditure Ksh.11,819 (US\$26,000), capital expenditure Ksh.23,000 (US\$50,6000)

Local Park or Reserve Administration The Warden, Ol Doinyo Sabuk, c/o Nairobi National Park, PO Box 42076, Nairobi.

Date 1984

SAIWA SWAMP NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established 1974. There is a proposal to extend the park and land has already been acquired by the government.

Geographical Location Situated below the Cherangani Hills, 20km north-east of Kitale in west Kenya. 1°04'-1°07'N, 35°06'-35°07'E.

Altitude 1,860-1,880m

Area 192ha

Land Tenure Government

Physical Features The swamp lies in a narrow basin of the meandering channel of the Saiwa River and is 6km long and 90-360m wide. Saiwa is a permanent, flowing river.

Vegetation Swamp vegetation of tall bullrushes and sedges. The swamp is bordered by a mixture of grassland, riverine forests and *Acacia*.

Fauna Primarily established for the protection of 80-100 sitatunga *Tragelaphus spekei*. Other mammals include: de Brazza's monkey *Cercopithecus neglectus* of which 28 of the 100-200 Kenyan population live in the park, the nocturnal potto *Perodicticus potto*, spotted-necked otter *Lutra maculicollis*, giant forest squirrel *Protoxerus stangeri*, and leopard *Panthera pardus* (T) have been reported, but are probably spasmodic visitors. Diverse avifauna including eastern grey plantain-eater *Crinifer zonurus*, great blue turaco *Corythaëola cristata*, bare-faced go-away bird *Corythaixoides personata*, double-toothed barbet *Lybius bidentatus* and black-billed barbet *L. guifsobalito*, Ovampo sparrow-hawk *Accipiter ovampensis*, fish eagle *Haliaeetus vocifer*, African marsh owl *Asio capensis*, giant kingfisher *Ceryle maxima*, malachite kingfisher *Alcedo cristata*, striped kingfisher *Halcyon chelicuti*, sunbirds (Nectarinidae), and weavers.

Zoning None

Disturbances or Deficiencies None reported

Visitor Facilities Open for day visitors

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Warden, one assistant Warden, five rangers, eight support staff and six casual workers (projected only).

Budget No information

Local Park or Reserve Administration Warden, WCMD, PO Kisauna, via Kitale.

Date 1984

SIBILOI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established 1972 gazetted as a National Park; there has been a proposal by WMCD to extend this area to include Illeret, the area north of the Ethiopian border.

Geographical Location Situated on the eastern shores of Lake Turkana (formerly Lake Rudolf), 720km from Nairobi

Altitude No information

Area 157,085ha

Land Tenure No information

Physical Features This is the most remote of Kenya's national parks, and has been preserved as a wilderness in its natural state. The open plains, interspersed with luggas, are flanked by volcanic formations including Mount Sibiloi, the site of the remains of a petrified forest possibly 7 million years old. The park includes a volcanic island, Central Island, in the middle of Lake Turkana. The lake shore is mostly rocky or sandy, with little aquatic vegetation. The climate is hot and windy with fierce gales.

Vegetation Grassy plains with yellow spear grass and doum palms predominate. Scrubby salvadora bush is found on Central Island.

Fauna Mammals include: Burchell's and Grevy's zebras *Equus burchelli* and *Equus grevyi* (T), Grant's gazelle *Gazella granti*, Beisa oryx *Oryx gazella beisa*, hartebeest *Alcelaphus buselaphus*, topi *Damaliscus lunatus*, lion *Panthera leo*, and cheetah *Acinonyx jubatus* (T). There is a crocodile population of about 12,000 (the world's largest colony) breeding on Central Island. Lake Turkana is an important flyway for north-bound migrants. Central Island has a breeding population of African skimmer *Rhyncops flavirostris* which nests in banks. It is also an important staging post for migrating birds including warblers, wagtails and little stints *Calidris minuta* (Cunningham Van-Someren, 1981). Lake Turkana has over 350 recorded species of aquatic and terrestrial birds including: Egyptian geese *Alopochen aegyptiacus*, Lichtenstein's sandgrouse *Pterocles lichtensteinii*, chestnut-bellied sandgrouse *P. exustus*, chestnut-headed finch-lark *Eremopterix signata*, Heuglin's bustard *Neotis heuglinii*, glossy ibis *Plegadis falcinellus*, sacred ibis *Threskiornis aethiopicus*, cormorants (Phalacrocoracidae), pelicans (Pelecanidae), yellow-billed stork *Mycteria ibis*, and black-winged stilt *Himantopus himantopus*.

Cultural Heritage At Koobi Fora to the north of Alia Bay, extensive palaeontological finds have been made, including the evidence of the existence of a relatively intelligent hominid two million years ago (reflecting the change in climate from that supporting lush forest to present day desert).

Conservation Management Local people are allowed to use the area during drought.

Zoning None

Disturbances or Deficiencies The salvadora bush on Central Island has been cut by wandering fishermen for firewood. Efforts to make the island a sanctuary have been unsuccessful. Debris has been allowed to collect at Rocodoni camp site.

Visitor Facilities There is no petrol obtainable beyond Nyahururu, so visitors have to bring their own. For visitors to Koobi Fora there are self-help bandas at the Koobi Fora camp or

next to the museum, and it is possible to hire a landrover and guide through the National Museum in Nairobi. There are camping facilities elsewhere in the Park including Rocodoni campsite facing Mount Sibilot, but visitors must bring their own supplies.

Scientific Research Extensive archaeological work was carried out by Richard Leakey at Koobi Fora.

Special Scientific Facilities Palaeontological museum at Koobi Fora

Principal Reference Material

- ° Cunningham Van-Someren, C.R. (1981). Lake Turkana Biological Survey: Birds. Report to the National Museum of Kenya, Nairobi.
- ° Fitzgerald, M.A. (1981). Sibiloi: The Remotest Park in Kenya. *Africana* 8(4): 22.

Staff One warden, 28 rangers, and 20 additional staff

Budget No information

Local Park or Reserve Administration Warden, Park Headquarters, Alia Bay, Sibiloi National Park.

Date 1984

TSAVO NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established 1948. The portion of the Park north of the main Nairobi-Mombasa road is designated Tsavo Park East and that to the south and west Tsavo Park West. Tsavo West was extended on the northwestern boundary by 4,700ha in 1983, to include the Chyulu Hills.

Geographical Location Southeast Kenya, inland from Mombasa; 02°00'-04°08'S, 38°08'-39°15'E

Altitude 229-2,438m

Area 2,082,114ha; contiguous to Ngai Ndethya National Reserve (21,209ha)

Land Tenure Government

Physical Features The topography is varied. In the north of Tsavo East part of the 300m high Yatta plateau, a peneplain capped by protective lava, extends into the park. The south-eastern end of the Chyulu hills comprising recent volcanics rising to over 2,438m obtrudes into Tsavo West. Other older volcanic hills exposed by erosion include Ngulia, Ithumba, Murka and the noted vantage point, Mudanda Rock. The Athi river from the northwest and the Tsavo from the west join to form the Galana River which flows through the centre of the park, and the extreme north of the park is drained by the Tiva river into the Tana. Much of the water of the Tsavo river is derived from the Mzima Springs on the western boundary, although part of the flow is carried by pipeline to Mombasa. Springs emerge where the impervious base rock underlying the sponge-like basalt surface rock is exposed at the edge

of the lava flow. The Voi River to the south is not permanent. Soils are generally red and lateritic with patches of black cotton and recent volcanic types.

Vegetation The park contains a diversity of habitats: bush grassland is dominated by *Chrysopogon*, *Chloris* and *Eragrostis* species with bushes of *Cordia sinensis*, *Premna resinosa* and *Carphalea glaucescens* and occasional *Euphorbia robecchii*; riversides and Mzima Springs have saltbush *Suaeda monoica*, *Acacia elatior*, *A. xanthophloea*, doum palm *Hyphaene coriacea*, tamarinds and figs; and there is a mixture of *Acacia* and *Commiphora* woodland and bush. Over-browsing has resulted in large areas being dominated by grasses such as *Cenchrus ciliaris* and *Chloris roxburghiana*. Tree species include baobab *Adansonia digitata*, *Lannea stuhlmannii*, vegetable ivory palm *Hyphaene crinita* and the climbing *Cissus quadrangularis*.

Fauna Larger mammals include lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), elephant *Loxodonta africana* (T), black rhino *Diceros bicornis* (T), hippopotamus *Hippopotamus amphibius*, giraffe *Giraffa camelopardalis*, lesser kudu *Tragelaphus imberbis*, eland *Taurotragus oryx*, Cape buffalo *Syncerus caffer*, zebra *Equus burchelli*, yellow baboon *Papio cynocephalus*, waterbuck *Kobus ellipsiprymnus*, gemsbok *Oryx gazella beisa*, Coke's hartebeest (kongoni) *Alcelaphus buselaphus*, Thomson's and Grant's gazelles *Gazella thomsoni* and *Gazella granti* and gerenuk *Litocranius walleri*. The bird life is varied, including fish eagle *Haliaeetus vocifer*, Heuglin's bustard *Neotis heuglinii*, Scops owl *Otus scops* and osprey *Pandion haliaetus*, sacred ibis *Threskiornis aethiopicus*, glossy ibis *Plegadis falcinellus*, white-faced tree duck *Dendrocygna viduata*, skimmer *Rhynchops flavirostris*, open-bill stork *Anastomus lamelligerus*, black heron *Egretta ardesiaca*, grey-headed kingfisher *Halcyon leucocephala*, African pygmy kingfisher *Ispidina picta*, beautiful sunbird *Nectarinia pulchella*, d'Arnauds barbet *Trachyphonus darnaudii*, eight species of hornbill including trumpeter hornbill *Bycanistes bucinator*, six species of nightjar and 12 species of starling including Fischer's starling *Spreo fischeri* which has a fairly restricted distribution. The area also a variety of the avifauna of the arid zone of northeastern Africa and is an important staging post for migrant palaeartic birds. Crocodile *Crocodylus niloticus* (V) live in the pools. Fish in the Mzima Springs include *Tilapia spilurus*, *Labeo gregori*, gobies, and catfish *Clarias* sp. and *Clarotes* sp.

Conservation Management A management plan is being prepared for the area by the Wildlife Planning Unit.

Zoning About two-fifths of the park north of the Galana river is a completely protected zone with no development.

Disturbances or Deficiencies The Nairobi-Mombasa highway and railway bisect the park. Problems include continuing poaching despite protection measures. Recurrent drought and increasing incidence of fires have resulted in large scale vegetation changes in several areas of the park. The Chyulu Hills, a major water catchment area for the Mzima Springs, is suffering encroachment.

Visitor Facilities Tourism is encouraged except in the totally protected area. Facilities include three fully catering lodges, three partially serviced lodges, several campgrounds and four additional fully catering lodges near the Park boundaries. The waterless area north of Galana River has not yet been developed for visitors. There were 154,546 visitors in 1979.

Scientific Research Research includes studies of elephant, birds of prey, vegetation and the effects of human pressure. Studies assisted by outside organizations concern termites, dung beetles, animal distribution and ethology.

Special Scientific Facilities The Research Centre has a laboratory, library, offices, workrooms, storage, and housing for six scientists.

Principal Reference Material

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- ° Kewuko-Lee, H. (1974). Study on human pressures on Kenya's National Parks. Report for Kenya National Parks.
- ° Leuthold, W. (1974). Observations on home range and social organization of Lesser Kudu. In: Giest, V. and Walther, F. (Eds) *The behaviour of ungulates and its relation to management*. IUCN New Series No. 24.
- ° Leuthold, W. and Leuthold, B.M. (1975). Temporal patterns of reproduction in ungulates at Tsavo East National Park, Kenya. *E. Afr. Wildl. J.* 13: 159-169.
- ° Leuthold, W. and Leuthold, B.M. (1976). Density and biomass of ungulates in Tsavo East National Park, Kenya. *E. Afr. Wildl. J.* 14: 49-58.
- ° Myers, N. (1973). Tsavo and its elephants, an appraisal. *Biol. Conservation*, 5(2).
- ° Powiss, G. (1982). Tsavo East National Park. *East African Natural History Society Bulletin*. (Includes a bird species checklist.)

Staff 17 wardens (various grades), 2 scientists, 11 general administration, 170 rangers and 310 labourers (projected only)

Budget 1975-76: recurrent expenditure: Ksh.247,513 (US\$545,000), capital expenditure: Ksh.85,000 (US\$187,000)

Local Park or Reserve Administration Tsavo East: Warden, Tsavo East National Park, PO Box 14, Voi. Tsavo West: Warden, Tsavo West National Park, Private Bag, Mtito Andae.

Date 1984

KISITE/MPUNGUTI MARINE NATIONAL PARK (SHIMONI)

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established Kisite Marine National Park was established 10 May 1978 under Legal Notice 92, while Mpunguti Marine National Reserve was established 10 May 1978 by Legal Notice 91, both published in the Kenya Gazette 9 June 1978.

Geographical Location South of Wasini Island off Shimoni, on the south coast near the Tanzanian border. 4°40'-4°44'S, 39°21'-39°26'E

Altitude Sea level to about 5m

Area 3,900ha (island area approximately 18ha)

Land Tenure Government

Physical Features A trapezoid section of the Indian Ocean encompasses four small waterless coral islands, Kisite, Mpunguti ya juu, Mpunguti ya chini, and Jiwe la Jahazi, with a considerable area of the fringing reefs and surrounding sand.

Vegetation Sea grasses *Cymodocea serrulata* and *Syringodium isoetifolium* cover a large area of the sub-littoral zone of the reef. Marine algae include *Padina commersonii*, *Dictyota bartayresiana*, *Bostrychia binderi*, *Ulva lactuca*, *Dictyosphaera* sp., *Udotea indica*, and *Halimeda opuntia*.

Fauna Includes common species such as the corals *Balaxea* sp. and *Porites* sp., money cowrie *Cypraea moneta*, starfish *Protoreaster lincki*, sea urchin *Echinometra mathaei*, ghost crabs *Ocypode kuhlii*, rock crabs *Grapsis maculatus*, sergeant-major fish *Abudefduf saxatilis*, butterfly fish *Chaetodon lunula*, and parrot fish *Callyodon guttatus*. The off-shore islands support an assemblage of pelagic feeding birds including breeding colonies of roseate terns *Sterna dougallii* and sooty terns *S. fuscata*.

Zoning None

Disturbances or Deficiencies Damage to the area by past blasting has caused concern, but present protection has permitted regeneration of coral reefs. Island bird colonies were frequently raided before the area was protected, but the colonies are slowly recovering. There is a fishing village in the park and some illegal fishing.

Visitor Facilities Tourist accommodation and boats for hire are available in Shimoni. Cottage hotels have also been established and there are tourist facilities in the fishing village. There were 3,899 visitors in 1980.

Scientific Research None at present

Special Scientific Facilities None

Principal Reference Material

- * Ray, C. (1969). Marine Parks and Inshore Conservation in Kenya. African Wildlife Leadership Foundation, Nairobi.
- * Saw, P. (1974). Sea Sanctuary. *Africana* 5(5).

Staff No information

Budget 1975/1976: recurrent expenditure Ksh.20,573 (US\$45,300), capital expenditure Ksh.17,500 (US\$38,500)

Local Park or Reserve Administration Warden, Kisite/Mpunguti Marine National Park, PO Box 55, Ukunda.

Date 1984

MALINDI-WATAMU BIOSPHERE RESERVE

Management Category II, VI and IX (National Park, Resource Reserve and Biosphere Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Two Marine National Reserves and two Marine National Parks gazetted under the Wildlife Conservation and Management Act 1976. Protected under Legal Notices 98 and 99.

Date Established 1968; accepted as a Biosphere Reserve in May 1979.

Geographical Location A strip of coast and sea 30km long and 5km broad and including Mida Creek; south of Malindi and 88km north of Mombasa. 3°14'-3°25'S, 39°57'-40°11'E.

Altitude Sea level

Area Marine national reserves 21,309ha and marine national parks 1,600ha; Biosphere Reserve 19,600ha

Land Tenure Government

Physical Features Three major habitats can be identified: intertidal rock; intertidal sand and mud; and the sublittoral area. Notable features include 'rock platforms' and cliffs. In the Watamu area there are caves and coral reefs inhabited by fish. There is no continental shelf and the coastline is bordered by fringing reefs on the seaward side with water depth dropping sharply within short distances. Between the limestone cliffs are stretches of beautiful sandy beach. Mida Creek contains tidal mudflats with fringing mangrove swamp. Whale Island is located at the creek entrance. The southern monsoons between April and October create a current up to 4 knots with northern monsoons between November and March. Temperature variation of 34°C maximum and minimum 2°C with mean annual temperature of 26°C. Monthly rainfall varies between 2mm and 390mm.

Vegetation The varied marine flora includes algae *Padina commersonii*, *Dictyota bartayresiana* and *Udotea indica*. Microscopic marine plants occur throughout the sublittoral zone but only occasionally on mobile sand or actively growing coral. They are absent from the upper part of the intertidal zone (except the brown alga *Bostrychia binderi*) and in the extensive mangrove areas of Mida Creek in Watamu. In the intertidal sand and mud the finer sediments below water, which are subject to less wave action, have become fixed by growth of marine angiosperms including *Cymodocea rotundata*, *C. ciliata*, *Halodule wrightii*, *Thalassia hemprichii* and *Syringodium* spp.. The mangroves *Rhizophora mucronata*, *Bruguiera gymnorrhiza*, and *Ceriops* spp. merge with terrestrial vegetation. Considerable quantities of drifted plant debris, mainly dead leaves shed by *C. ciliata*, accumulate on the sloping sandy beaches. Palms and casuarina trees indicate the high water mark.

Fauna Whale Island is a nesting ground for roseate tern *Sterna dougallii* and bridled tern *Sterna anaethetus* between June and October. Shore birds include: sanderling *Calidris alba*, curlew sandpiper *Calidris ferruginea*, whimbrel *Numenius phaeopus*, grey plover *Pluvialis squatarola*, greater sand plover *Charadrius leschenaultii*, and Mongolian plover *C. mongolus*. Non-breeding visitors include: lesser crested tern *Thalasseus bengalensis*, Saunders's little tern *Sterna saundersii* and sooty gull *Larus hemprichii*. The intertidal rocks are inhabited by rock crabs *Grapsis maculatus* and *Geograpsis lividus*, small rock gobies, anemones, a few Holothuria, and the large flat six-plated barnacle. There are numerous small caves with dripping water which support a dense population of the ghost crab *Ocypode kuhlii*. Near the foot of the cliffs a red and white xanthid crab is common, and below this the porcelain crab *Petrolisthes* predominates. Sandy beaches are characterized by talitrid amphipods (four species including *Ocypode ceratophthalma*), an ippid crab, gastropod molluscs, and some polychaetes and also the hermit crab *Caenobita rugosus* and occasional *Ocypode kuhlii* occur. Species comprising the heads of the coral gardens are primarily *Porites* supplemented by the branching *Acropora*, *ocillopora*, colonies of *Cyphastrea*, *Galaxea*, brain corals and *Millepora*. Other species include *Ophicomma crinaceus* in coral cracks, *Echinometra mathaei* and *Diadema* on the surface and *Diadema*, *Echinathrix* and the large blue fish *Linkia laevigata* beneath overhangs. Molluscs include *Tridacna squamosa* attached to the coral, *Barbatia* spp. inside the coral, *Lithophaga* spp. which burrows extensively through it, tiger cowrie *Cypraea tigris*, large oyster *Pinctada margaritifera* (I) and numerous species of nudibranchs. Marine worms (Polychaeta) include the sabellid fan worm and serpulids, which are common in the coral.

Population No information

Conservation Management A management plan for the whole area was prepared by the Wildlife Conservation and Management Department in 1982, but the plan has not been officially accepted. It has been suggested that the adjacent section of Arabuko Sokoke Forest,

which contains two nature reserves, should be included in reserve.

Zoning The Biosphere Reserve comprises the Malindi-Watamu Marine National Parks and Malindi-Watamu Marine National Reserves. The national parks constitute the core areas, and the national reserves form the buffer zone. The management plan identifies three zones: park service zone (land), recreation zone (concentration of water-based recreation) and natural environment zone (coral reef in Malindi Marine National Park and the area of mangrove community of Watamu Marine National Reserve).

Disturbances or Deficiencies The most significant human effect on the area at present is the silting of the Sabaki River which carries a heavy load of silt during rainy seasons as a result of uncontrolled cultivation in the Ukambani hills. Corals and shells have been exploited heavily by visitors and local tradesmen for souvenirs. This was prohibited by the gazettment of the protected areas and there has been considerable recovery, but some poaching persists. There is apparent tourist pressure during the peak tourist season. The effects on the ecosystem of permitted activities such as swimming, sailing and snorkelling have not yet been investigated, but there are possible disturbances due to trampling and boat anchorage. Some fishing occurred prior to the establishment of the reserve, but this is now prohibited apart from some traditional fishing. It has been noted that the fish populations are smaller in the reserves where fishing is still allowed and when proper monitoring has been carried out it may be necessary to introduce quota fishing systems and controls on fishing methods used. There is no pollution from the city of Malindi as the sewage system is closed but there have been oil spills from tankers in the deep seas. The extent of oil pollution has not yet been investigated.

Visitor Facilities There are 50,000 visitors annually, of which half are Kenyans. The major attractions are boat trips, water sports, and coral viewing. Access is mainly through private land belonging to hotels therefore, visitor control and revenue collection is difficult.

Scientific Research Some research has been carried out on corals, turtles, ecological zonation and siltation effects on reef ecology. High potential for research.

Special Scientific Facilities A government-appointed officer is investigating the possibility of establishing a marine research station. The Marine Park Education Centre was opened in 1968.

Principal Reference Material

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- ° Hamilton, H. (1973). Taxonomy and distribution of corals of the East African coast. M.Sc. Thesis, University of Dar-es-Salaam.
- ° Jachowsky, R.L. (1975). Structure and ecology of coral reefs in Malindi Marine National Park, Kenya. Mimeo report to Kenya National Parks.
- ° Keech, R., Moore, J., Stafford-Smith, M. and Green, F. (1979). Leopard Reef Expedition Report. (Includes comprehensive coral species list.)
- ° Pertet, F. (1984). Kenya's experience in establishing coastal marine protected areas. In: McNeely, J.A. and Miller, K.R. (Eds) *National Parks, Conservation and Development*. Smithsonian Institution, Washington D.C.
- ° Stevenson, S. (1971). A study of the distribution of members of the family Cypracidae on Intertidal Reefs of the Kenya Coast. University of Wales, Bangor.
- ° University of Newcastle upon Tyne Exploration Society, (1972). Some aspects of ecology of the Malindi-Watamu.
- ° University of Wales. Bango-Watamu Expedition. (1969).

Staff Two wardens, 26 rangers and 17 support staff (1980)

Budget 1979-1980: Ksh.301,715 (US\$40,200)

Local Park or Reserve Administration Warden, Marine National Parks, PO Box 109, Malindi.

Date 1984

ARABUKO SOKOKE FOREST RESERVE AND NATURE RESERVES

Management Category IV and VIII (Managed Nature Reserve and Multiple Use Management Area)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Exploitation is prohibited in the two Nature Reserves. There is a quota system for timber extraction in the forest reserves whereby any person or organization engaged in logging must be licensed. All licences are granted from Forestry Headquarters in Nairobi.

Date Established Established as a Forest Reserve (41,764ha) in 1943. Within the Forest Reserve are two nature reserves, one of 2,697ha, established under Legal Notice No. 100 in 1977, and the other of 1,635ha, established under Legal Notice No. 180 in 1979.

Geographical Location Kilifi district. 3°30'S, 39°30'E.

Altitude No information

Area 36,000ha; 332ha are Nature Reserves

Land Tenure Government

Physical Features Soils comprise dark red infertile magarini sand-soil which meets a variety of loose and compact sands and coral rag off the coastal belt. Margarini sand-soilka to the west lie above the 60m contour line and slope steeply at the eastern edge slopes onto the grey-buff sands. This boundary is characterised not only by sharply demarcated vegetation change but by standing water in the form of drainage pools which can be over 2ha in surface area. Rainfall varies with vegetation community and ranges from 600-900mm/per year.

Vegetation This area is considered to be one of the most important sites for nature conservation in East Africa. The Arabuko Sokoke Forest is of vital importance as East Africa's only surviving area of lowland coastal forest of any appreciable size. It is now confined within the boundary of the forest reserve with the exception of a few remnant stands of modified forest in the west and north-west. *Brachystegia* woodland and lowland rainforest *Azelia* forest, are the most common communities. Other associations include *Cynometra-Manilkara-Brachylaena* forest, in the south-west and north-east with mature trees approaching 15m height and a dense understorey; *Cynometra* thicket, in the north-west with vegetation mainly comprising a thick shrub and sapling tangle from 3m to 6m tall with emergent trees (10m) of *Brachylaena hutchinsii* (threatened in Kenya); and white soil *Cynometra-Azelia* forest, which borders the *Cynometra* thicket. Important plants include *Phyllanthus kirkianus*, *P. stolzianus*, *Nectaropetalum kaessneri*, *Strychnos mitis*, *Memecylon melindensis* and *M. verruculosum*, *Eugenia* sp. nov., *Angylocalyx braunii*, *Pavetta uniflora*, and *Nesogordonia parviflora*. Threatened (in Kenya) plant species include: *Phyllanthus stolzianus*, *Nectaropetalum kaessneri*, *Strychnos mitis*, *Memecylon melindensis*, *Memecylon verruculosum*, *Angylocalyx braunii*, *Pavetta uniflora*, and *Nesogordonia parviflora*.

Fauna Mammals include: Ader's duiker *Cephalophus adersi* (R), blue duiker *C. monticola*, golden-rumped elephant shrew *Rhynchocyon cirnei chrysopygus*, bristle-tailed elephant shrew *Petodromus tetradactylus sultan*, and coastal races of bushbaby *Galago crassicaudatus*, and *Galago senegalensis zanzibaracus*. Threatened birds include Sokoke scops owl *Otus ireneae* (E), and Clarke's weaver *Ploceus golandi* (E) (both endemic to this forest), east coast akalat *Sheppardia gunningi* (R), Amani sunbird *Anthreptes pallidigaster* (R), and Sokoke pipit *Anthus sokokensis* (V). Migratory visitors include pitta *Pitta angolensis*, and spotted ground thrush *Turdus fischeri* (R) (breeding ground of this species is unknown). A bird species list is included in Kelsey and Langton (1984). The frog *Leptopelis flavomaculatus* is only known from this forest and Shimba Hills.

Conservation Management Regular patrols by forestry personnel are carried out around the area immediately surrounding the Mida-Gede forest station. Private contracted workers from the area carry out almost all of the timber extraction under forestry licence and remove dead timber from the forest reserve as a source of firewood, mainly from the north-east of the forest (north of Arabuko). Due to its international conservation value, it has been recommended by Kelsey and Langton (1984), that the management policy for the Arabuko Sokoke forest be widened to encompass conservation objectives.

Zoning The two nature reserves within the forest reserve are effective as core zones.

Disturbances or Deficiencies Forest clearance outside the boundary is a threat as the Forest Reserve is probably of insufficient size to support viable breeding populations of many threatened birds. Tree removal has been reported (*Brachystegia spiciformis* and *Brachylaena hutchinsii*, in particular) within the strictly protected nature reserves. Cycads are also being removed. Enforcement of forestry regulations has been limited because of the restricted resources available to the stations at Gedi and Jilore. Access is possible without official monitoring. The reserve is surrounded by settlement. Fire is of concern particularly after the dry season.

Scientific Research A University of East Anglia/International Council for Bird Preservation team carried out a study of the area in 1983. Other bird studies have been undertaken.

Special Scientific Facilities None

Principal Reference Material

- Britton, P.L. and Zimmerman, D.A., (1979). The Avifauna of Sokoke Forest, Kenya. *Journal of E. Afr. Nat. Hist. Soc. & Nat. Museum* 169: 1-15.
- Cunningham van Someren, G.R. (1978). *Komba* Term II: 41 (Wildlife Club, Kenya).
- Cunningham van Someren, G.R. (1982). Review of Habitat Status of some Important Biotic Communities in Kenya. Division of Natural Sciences, National Museums, Kenya. Unpublished.
- Kelsey, G.M. and Langton, T.E.S. (1984). The Conservation of the Arabuko-Sokoke Forest, Kenya. ICBP/University of East Anglia, Cambridge, England.

Staff Forest Officers

Budget Lack of adequate funds

Local Park or Reserve Administration Forest Stations at Gedi and Jilore

Date 1984

KIUNGA MARINE NATIONAL RESERVE

Management Category VI and IX (Resource Reserve and Biosphere Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial, under the Wildlife Conservation and Management Act 1976. The boundaries are delineated on Boundary Plan No. 216/39, which is deposited in the Survey Records Office, Nairobi.

Date Established 1979 by Legal Notice No. 291 in the official Kenya Gazette. Accepted as a Biosphere Reserve in 1980.

Geographical Location North-eastern coastal border of mainland Kenya and the Pate Islands, Indian Ocean. 1°75'-2°00'S, 41°20'-41°25'E.

Altitude 0-30m

Area 25,000ha; Biosphere Reserve 60,000ha including the marine area contiguous to Dodori National Reserve (87,739ha), which is itself almost contiguous to Boni National Reserve (124,000ha)

Land Tenure The offshore islands and mangrove swamps are state owned and administered by Lamu County Council. The coastal waters are under the supervision of the Fisheries Department and the Wildlife Conservation and Management Department (Ministry of Environment and Natural Resources).

Physical Features The coast has sandy beaches, some with mangrove swamps, with about 50 calcareous offshore islands and coral reefs paralleling the coastline. The upper part of the reserve on the mainland consists of sand dunes and there is dry coastal shrubby forest.

Vegetation Great variation of marine flora. In the sublittoral zone microscopic marine plants are absent only from areas of mobile sand and actively growing coral though sometimes gaining foothold in these unfavourable habitats. Microscopic marine plants are absent from the upper part of the intertidal zone except for areas of *Bostrychia bindelia*. In the intertidal sand and mud, the finer sediments below water, which are subject to less wave action, have become fixed by growth of marine angiosperms and there are extensive areas of dugong grass (green algae) and *Zostera* spp.. Dwarf shrub thickets of salt-tolerant plants (halophytes) typical of the Indo-Pacific beach littoral zone are common on the mainland, and species include *Ipomoea pes-caprae*, *Cyperus maritimus*, *Suaeda*, and *Tephrosia*. Mangrove swamps dominated by *Rhizophora mucronata* occur in the sheltered tidal waters between Mwanzi and Mkokoni.

Fauna The offshore islands are rich in seabirds and there are large nesting colonies of various gulls and terns (particularly numerous in the breeding season from June to August) including: sooty gull *Larus hemprichii*, roseate tern *Sterna dougallii*, white-cheeked tern *Sterna repressa*, and bridled tern *Sterna anaethetus*. Dugong *Dugong dugon* (V) and green turtle *Chelonia mydas* (E) are also common. Several large land mammals frequently visit the mainland buffer area including Hunter's antelope *Damaliscus hunteri* (T) and elephant *Loxodonta africana* (V). Lesser kudu *Tragelaphus imberbis* are resident on some of the islands. Extensive coral and reef fish populations occur.

Conservation Management No information

Zoning Dodori National Reserve, which occupies the mainland area inland of the Kiunga Reserve, is the main buffer zone separating the increasing human activities on the mainland from the coastal beach areas.

Disturbances or Deficiencies There has been little human interference in the area and this constitutes one of the main reasons for protection. There has been limited collection of reef coral and shells for selling purposes. The rate of cutting of the mangrove forest for commercial purposes was on the increase before Reserve status was declared, but is now under control. Poaching of green turtle and its eggs is now under the control of the Game Warden from Lamu. There is some poaching of dugong. Certain water sports are allowed within the park including water skiing and the passage and anchorage of boats, and use of the beaches is under the control of the authorities. Kiungu is, however, the least developed of the Kenyan Marine Parks/Reserves.

Scientific Research There is a need for basic research.

Special Scientific Facilities The Kenyan government has completed the construction of a marine research station at Kiunga consisting of laboratories, junior staff houses and three houses for scientists. The station is equipped, but there are no marine research scientists locally available. There is a need for basic research and the training of local marine scientists,

which will, in the initial phases, require cooperation and support from international research and financing institutions - Unesco assistance through the MAB programme has been suggested.

Staff Currently supervised by the Game Warden from Lamu; staff of 45 proposed

Budget Under preparation

Local Park or Reserve Administration Warden, WCMD, PO Kiunga, via Lamu.

Date 1984

ARAWALE NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial but reported to be increasing as this area is now considered important for *Damaliscus hunteri*, a rare hartebeest.

Date Established 1974

Geographical Location 5 km from the Tana River and 130 km north of Malindi in Garissa county. 1°15'-1°34'S, 40°04'-40°20'E.

Altitude 85-100m

Area 53,324ha

Land Tenure Trust land, under the jurisdiction of Garissa County Council.

Physical Features Flat plain with sandy-bedded rivers

Vegetation Primarily thorn bushland (zone V of Pratt and Gwynne)

Fauna Hunter's hartebeest *Damaliscus hunteri* (T) (the only area in Kenya where this species is found) and some northern species such as Grevy's zebra *Equus grevyi* (T), and lesser kudu *Tragelaphus imberbis*. There are also elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, and crocodile *Crocodylus* sp. (V).

Conservation Management The boundary has been demarcated and the Water Department has located where to drill bore holes as part of a general purpose reserve plan. Antipoaching outposts outside the park have been set up, and this was the first area where a camel anti-poaching unit was set up (1983). It appears to be successful.

Zoning None

Disturbances or Deficiencies Poaching; grazing of domestic stock, and construction of semi-permanent cattle kraals by nomadic tribes. This area is reported to be insecure.

Visitor Facilities The area is completely undeveloped, although campsites are planned.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Bunderson, W.T. (1979). Numbers of wildlife in Garissa and Lamu Districts, report to Research Section, WLMD.

Staff One warden, nine rangers, two support staff (1980)

Budget 1978-1979 grant of KSh.660,000 (US\$88,000)

Local Park or Reserve Administration Warden, WCMD, Box 58, Garissa.

Date 1984

BISANADI NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1979

Geographical Location Adjacent to north-east boundary of Meru National Park. 0°05'S-0°17'N, 38°12'-38°35'E.

Altitude 320-660m

Area 60,600ha, part of a complex which includes Meru National Park (87,044ha), Kora National Reserve (178,780ha), Rahole National Reserve (127,000ha), and North Kitui National Reserve (74,500ha)

Land Tenure Trust land, under the jurisdiction of Isiolo County Council

Physical Features Open dry plain dissected by seasonally dry luggas

Vegetation Mainly thorn bushland and thicket (Zone V of Pratt and Gwynne 1977) with *Combretum* prevailing in the north and *Commiphora* in the south. To the west the *Combretum* merges into *Terminalia* wooded grasslands. The red-flowered parasitic *Loranthus* grows on the branches of *Acacia reficiens* along the rivers. Dense riverine forests of doum palm *Hyphaene* spp. and raffia palm *Raphia* spp. occur along the watercourses. Some riverine swamps have sedges *Cyperus* sp., and grasses *Echinochloa haplachelada* and *Pennisetum mezianum*. On the plains *Sehima nervosa*, *Chloris roxburghiana* and other species of *Pennisetum* are the dominant grasses.

Fauna In the wet season, it is the dispersal area for wildlife from Meru National Park, primarily elephant *Loxodonta africana* (T) and buffalo *Syncerus caffer*.

Zoning None

Disturbances or Deficiencies Illegal hunting and livestock grazing

Visitor Facilities None

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Warden, WCMD, Box 29, Isiolo.

Date 1984

BONI NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1976

Geographical Location Centred on the extensive Boni forest on the north-east coast in Garissa District, on the Kenya/Somali border. 1°21'-1°40'S, 41°02'-41°35'E.

Altitude 0-100m

Area 133,900ha; almost contiguous to Dodori National Reserve 87,739ha to the south, which is itself contiguous to Kiunga Marine Reserve (60,000ha)

Land Tenure Trust land vested in Garissa County Council

Physical Features The flat coastal plain has a braided drainage system separated by marine sand and clay ridges. The area behind the Mundane Hills is seasonally flooded to a depth of 2m. There are two major flood pan areas (Ziwas).

Vegetation Part of the reserve is coastal lowland groundwater forest (the only known area in Kenya) with species of *Sterculia*, *Chlorophora*, and *Memecylon*. In drier areas the primarily lowland dry bushland and bush grassland consists of dense *Manilkara* with *Diospyros*, *Encephalartos*, and *Euphorbia*. Flood pan grasses are *Echinochloa* and *Setaria*.

Fauna In the dry season it is a concentration area for the east Lamu and southern Garissa elephant *Loxodonta africana* (T). Other mammals include: Harvey's duiker *Cephalophus natalensis harveyi*, and Ader's duiker *Cephalophus adersi* (T). It is possible that white-winged apalis *Apalis chariessa* may still survive in the area.

Conservation Management There is an anti-poaching camel unit at Mkowe.

Zoning None

Disturbances or Deficiencies Poaching

Visitor Facilities None

Scientific Research Vegetation inventory (Kremu)

Special Scientific Facilities Kiunga Wildlife Research Station

Principal Reference Material None listed

Staff Two wardens and one ranger; two support staff allocated (1980)

Budget 1979 grant aid KSh.560,000; no expenditure made in the Reserve

Local Park or Reserve Administration Warden, WCMD, Box 58, Garissa.

Date 1984

BUFFALO SPRINGS NATIONAL RESERVE

Management Category II (National Park)

Biogeographical Province 3.21.12 (East African Highlands)

Legal Protection Total

Date Established Yet to be gazetted

Geographical Location South bank of Ewaso Nyiro River 85 km north of Mount Kenya. 0°31'-0°39'N, 37°31'-37°41'E.

Altitude 900-1,000m

Area 33,915ha; on the opposite bank of the Ewaso Nyiro river to Samburu National Reserve (22,510ha) and separated from Shaba Nature Reserve (23,910ha) by approximately 9km of road and bush.

Land Tenure Trust land, under the jurisdiction of Isiolo County Council

Physical Features The gently rolling lowland plain includes basaltic lava fields and several rounded hills. There are seasonally dry luggas and the Ewaso Nyiro River borders the park for 22km. Annual rainfall averages 350mm.

Vegetation Various types of community are present, including riverine forest dominated by *Acacia elatior* and doum palm *Hyphaene coriacea*; *Acacia tortilis* woodland; *Acacia senegal*, *A. reficiens*, *Salvadora*, and *Commiphora* bushland; alkaline grassland of *Sporobolus spicatus*, and Saloss shrubland.

Fauna This includes 22 large animal species including elephant *Loxodonta africana* (T), Grevy's zebra *Equus grevyi* (T) (important dry season habitat and breeding area for this species), reticulated giraffe *Giraffa camelopardalis reticulata*, Beisa oryx *Oryx gazella*, cheetah *Acinonyx jubatus* (T), and crocodile *Crocodylus niloticus* (T). The avifauna includes approximately 320 species.

Conservation Management A road management plan has been developed for the area. Suggestions have been made that any construction should be undertaken during the wet season when less animals use the area (Rainy, 1980). The three reserves are considered too small to constitute a viable ecological unit for many of the larger species. A survey was initiated in 1980 to provide guidelines for enlargement of the areas. Pastoralists are compensated for assumed loss of grazing in surrounding areas. A management plan is being prepared for this area by the Wildlife Planning Unit of WMCD. It has been suggested that Samburu, Shaba and Buffalo Springs should be managed as one area.

Zoning None

Disturbances or Deficiencies Illegal grazing and unregulated tourism impact. Elephant density in riverine forest is very high. There have been reports that disturbance of wildlife has not been considered in the plans for construction of roads and bridges in the area.

Visitor Facilities The reserve is heavily utilized for tourism with two lodges (148 beds) and five public campsites. In 1979, there were 38,000 visitors.

Scientific Research Vegetation and wildlife dynamics of riverine zone; behaviour and ecology of Grevy's zebra

Special Scientific Facilities None

Principal Reference Material

- ° Barkham, J.P. and Rainy M.E. (1976). The Vegetation of the Samburu Isiolo Game Reserve. *E. Afr. Wildlife J.* 14: 297-329.
- ° Rainy, M.E. (1980). An Ecological Analysis for Road Development purposes of Samburu-Buffalo Springs-Shaba Game Reserve. Consultant report to Wildlife Planning Unit, Kenya.

Staff No information

Budget The World Bank has funded road construction and development plans in 1980-1981; otherwise no information

Local Park or Reserve Administration Warden, WCMD, Box 29, Isiolo.

Date 1984

DODORI NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1976

Geographical Location Coastal zone of north-eastern Lamu District extending in the north to the Somali border. 1°40'-1°55'S, 40°52'-41°25'E.

Altitude 0-100m

Area 87,739ha; contiguous to Kiunga Marine Reserve (60,000ha) to the east and close to Boni National Reserve (124,000ha) to the north.

Land Tenure State, under the jurisdiction of Lamu County Council

Physical Features The Dodori River flows through an alluvial valley of short grass flood meadows with the estuary of Dodori Creek at the entrance to the Indian Ocean. The Mundani Hills are Pleistocene dune sand ridges which run parallel to the coast.

Vegetation The mangrove swamp along Dodori Creek comprises *Rhizophora mucronata*. Primarily lowland dry forest of dense *Manilkara* and *Cynometra* occurs. Some marshes are seasonally flooded glades and groundwater forests.

Fauna This is a major breeding ground for topi *Damaliscus lunatus*. Elephant *Loxodonta africana* (T) and lesser kudu *Tragelaphus imberbis* are the most common larger species. The tidal mangrove swamps contain a rich avifauna including pelicans *Pelecanus* sp. and coastal waterbirds, crustacea, and molluscs. There are substantial breeding populations of dugong *Dugong dugon* (T), and marine green turtle *Chelonia mydas* (E).

Conservation Management Little formal development has taken place but plans are being prepared. Aerial surveys and boundary demarcation have been completed.

Zoning None

Disturbances or Deficiencies Wet season poaching

Visitor Facilities Accommodation is at the one public campsite or occasionally at lodges located in the nearby Kiunga Reserve.

Scientific Research None

Special Scientific Facilities Kiunga Wildlife Research Station

Principal Reference Material None listed

Staff One assistant warden, nine rangers, two subordinate, and 30 casual workers (1980)

Budget 1979 KSh.134,000 expenditure

Local Park or Reserve Administration Warden, Dodori National Reserve, Box 82, Kiunga.

Date 1984

KORA NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1974

Geographical Location On the Tana River, 125km east of Mount Kenya. 0°02'-0°32'S, 38°32'-39°03'E.

Altitude 250-440m

Area 178,780ha; part of a complex of potential areas, which also includes the Meru National Park (87,044ha); Rahole National Reserve (127,000ha); North Kitui National Reserve (74,500ha); and Bisanadi National Reserve (60,000ha) Complex

Land Tenure Government, under the jurisdiction of Tana River County Council

Physical Features The bushland is medium altitude with low hills on the northern boundary, which is defined by a 80km stretch of the Tana River. The south-eastern boundary is the Mwitamisi River. Major landforms are riverine, alluvial with inselbergs of granitoid magmatites. The inselbergs are of great importance for local floral and faunal endemism. The climate is dry with annual rainfall of 350-500mm falling mainly from March to May and November to December.

Vegetation The reserve contains three major habitats: a strip of riverine forest bordering the river Tana with doum palm *Hyphaene coriacea*, *Acacia elatior*, and Tana River poplar *Populus ilicifolia*; rocky outcrops supporting many endemic species; and complex *Acacia-Commiphora* bushland (Nyika).

Fauna Large mammals include: elephant *Loxodonta africana* (T), black rhino *Diceros bicornis* (T), and hippopotamus *Hippopotamus amphibius* (200). Carnivores include: lion *Panthera leo* (3 adults in 1984), leopard *Panthera pardus* (T)(6 in 1984), cheetah *Acinonyx jubatus* (T) (normally associated with open grassland and rocky areas rather than bush scrub), serval *Felis serval*, caracal *Felis caracal*, wildcat *Felis silvestris*, genet *Genetta* sp., spotted hyena *Crocuta crocuta* and striped hyena *Hyaena hyaena*. Several antelope species include gerenuk *Litocranius walleri*. The river edges are important habitats for a wide range of amphibians, lizards, snakes, tortoises including the threatened pancake tortoise *Malacochersus tornieri*, and crocodile *Crocodylus niloticus* (V). There is a rich avifauna on Tana River including red-billed hornbill *Tockus erythrorhynchus*, and yellow-billed hornbill *T. flavirostris*.

Conservation Management The Government has stopped the bringing in of lions but restocking with leopards is taking place, as these are less dangerous and more suitable to the country.

Zoning None

Disturbances or Deficiencies Livestock grazing by Somalian pastoralists is leading to serious soil erosion in the east of the Reserve. Elephant and rhino in particular are poached. There is a threat of flooding from the Tana River dam scheme. The impact of existing dams is already evident from the appearance of a daily and weekly rhythm of rise and fall in water level according to the demand for electricity. This change from the previous seasonal pattern will inevitably have a profound impact on the local ecology. There are reports of uninvited visitors interrupting the lion and leopard rehabilitation studies.

Visitor Facilities No tourism

Scientific Research Lion and leopard rehabilitation by George Adamson and Tony Fitzjohn. Kora was the site of a two year comprehensive ecological survey by the Royal Geographical Society in association with the National Museums of Kenya (1983) which included the use of Landsat imagery for geomorphological surveys. The findings are being used as a basis for the management plan for the reserve.

Special Scientific Facilities Adamson's Kora Trust Camp

Principal Reference Material

- ° Coe, M.J. (1985). *Islands in the Bush: A natural history of the Kora National Reserve, Kenya*. George Philip and son. 256 pp.
- ° Jones, D.K. (1983). Kora National Reserve. *Swara* 6(2).

Staff Six rangers and eight support staff (1980)

Budget Grant-in-aid KSh. 500,000 (US\$66,600) 1978-1979

Local Park or Reserve Administration Warden, WCMD, Box 91, Garissa.

Date 1984

LAKE BOGORIA NATIONAL RESERVE

Management Category II (National Park)

Blogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established 1970; in the process of being upgraded to National Park

Geographical Location 50km north of Nakuru in the Rift Valley. 0°10'-0°24'N, 36°05'-36°9'E.

Altitude 1,000-1,600m

Area 10,705ha

Land Tenure The waterbody is Government owned, with the remaining land under the jurisdiction of Baringo County Council.

Physical Features The shallow soda lake is at the base of the east wall of the escarpment of the Rift Valley with 40km of shoreline. Shallow stony soils with lava boulders occur away from the lake and there is a thermal area with steam jets and geysers.

Vegetation The primarily thorn bushland (*Balanites* and *Commiphora* spp.) has small patches of riverine forest dominated by *Acacia tortilis*. Shoreline alkaline grassland dominated by *Sporobolus spicatus*. Patches of *Combretum*, *Heeria*, *Loudetia*, and *Grewia* species grow on the rocky slopes of the escarpment.

Fauna Greater kudu *Tragelaphus strepsiceros* occurs and the lake shore is seasonally occupied by greater flamingo *Phoenicopterus ruber* and lesser flamingo *Phoeniconaias minor*.

Conservation Management A management plan is being prepared by the Wildlife Planning Unit.

Zoning None

Disturbances or Deficiencies Livestock grazing and settlement within the reserve

Visitor Facilities It is used primarily on a day-use basis from nearby lodges at Lake Baringo, but there are two public campsites in the reserve. In 1979, there were 5,349 visitors.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None

Staff One warden, 10 rangers, eight support, 10 casual workers (1980)

Budget Expenditure 1979 - KSh.556,175 (US\$74,200)

Local Park or Reserve Administration Warden, WCMD, Box 53, Kabarnet.

Date 1984

LOSAI NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1976

Geographical Location Situated in the Losai Mountains, south-west of Marsabit National Reserve in North Kenya, 175km north of Mount Kenya. 1°01'-1°52'N, 37°15'-37°58'E.

Altitude 625-1,750m

Area 180,680ha

Land Tenure Trust land, under the jurisdiction of Marsabit County Council

Physical Features The Losai Mountains are foothills of the Mathew and Ndotu Mountains. The reserve is a lava plateau, dissected by dry gullies, with scattered volcanic plugs and cones.

Vegetation Medium thorn bushland

Fauna The area is a known former habitat of elephant *Loxodonta africana* (T) and black rhinoceros *Diceros bicornis* (T). It is unlikely that the rhinoceros is still present.

Conservation Management Development includes a road network, staff housing, and gates. Demarcation of the boundary has been initiated by the Wildlife Conservation and Management Department (WMCD).

Zoning None

Disturbances or Deficiencies Problems include illegal hunting, livestock grazing, and threats to security.

Visitor Facilities No tourism

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None

Staff One warden, 12 rangers and two support staff (1980)

Budget 1979-1980 aid grant of KSh.630,000 (US\$84,000)

Local Park or Reserve Administration Warden, WCMD, PO Box Marsabit, via Isiolo.

Date 1984

MAASAI MARA NATIONAL RESERVE

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established Established as a Wildlife Sanctuary in 1948 with a smaller area than the present reserve and indefinite boundaries. National Reserve status (167,200ha) in 1974 under Legal Notice 271. There were discussions in 1976 between the Kenyan Government and Narok County Council to reduce the area by 16,200ha. These excisions were gazetted in 1984 and include sections in the north-west, south-west and the mid-north.

Geographical Location Southwest Kenya bordering on Serengeti in Tanzania. 1°15'-1°45'S, 34°45'-35°24'E.

Altitude 1,500-2,170m

Area 151,000ha; contiguous to Serengeti National Park in Tanzania (1,476,300ha)

Land Tenure Narok County Council

Physical Features The reserve comprises mainly undulating grassland with isolated rocky outcrops (kopjes) and contains the Loita Hills in the north-east, steep hills in the Ngama area, and the Siria Escarpment in the west. The Mara, which is a major international river, bisects the area with Talekand Sand River a significant tributary. Mean annual precipitation at Keekorok (1971-1977 period) was 1,025mm. There is a rainfall gradient increasing from east to west across the reserve. Mean temperatures (1971-77) were minimum 12°C-14°C and maximum 26.5°C-31°C.

Vegetation The reserve constitutes the north section of the Serengeti ecosystem. Open grassland has *Themeda triandra*, *Pennisetum*, *Aristida*, and *Sporobolus*. Olpunyata Swamp and other low-lying areas support a diverse community of the taller grass species. Termite mounds are characterised by distinctive plant communities dominated by *Rhus natalensis* and *Cordia ovalis*. There are also dense thickets of *Croton dichogamus* and *Euclea* spp., riverine forests dominated by *Warburgia ugandensis*, *Olea africana*, *Diospyros abyssinica* and *Ficus* spp., and patches of *Acacia* woodland.

Fauna In the dry season (July-October) it is a concentration area for a great number of migratory herbivores including approximately 250,000 zebra *Equus burchelli*, and 1.3 million wildebeest *Connochaetes taurinus*. This movement from the Serengeti in the south has occurred on a significant scale only since 1972 as wildebeest numbers increased as a result of control of rinderpest. The 65 mammal species include: Thomson's gazelle *Gazella thomsoni*, numerous elephant *Loxodonta africana* (T), topi *Damaliscus lunatus*, buffalo *Syncerus caffer*, lion *Panthera leo* (largest population in Kenya), black rhinoceros *Diceros bicornis*, hippopotamus *Hippopotamus amphibius*, spotted hyena *Crocuta crocuta*, giraffe *Giraffa camelopardalis*, leopard *Panthera pardus* (T), and banded mongoose *Mungos mungo*. The profuse avifauna includes 53 birds of prey. Birds recorded include African hobby *Falco cuvierii*, peregrine falcon *F. peregrinus*, cuckoo-falcon *Aviceda cuculoides*, open-billed stork *Anastomus lamelligerus*, osprey *Pandion haliaetus*, blue quail *Excalfactoria adansonii*, crested guinea-fowl *Guttera edouardi*, Ross's turaco *Musophaga rossae*, Pel's fishing owl *Scotopelia peli*, red-headed quelea *Quelea erythrops*, and parasitic weaver *Anomalospiza imberbis*.

Conservation Management A development plan for a viewing track was prepared by the Wildlife Planning Unit (Ministry of Environment and Natural Resources) in 1980 and a management plan was prepared in 1983 for Narok County Council but neither have been approved. However several recommendations in the plan have been proposed for adoption in the five year development plan for the park. In addition, a World Bank roadbuilding unit has been carrying out road maintenance in the reserve. IUCN/WWF are also assisting in improving protection and management.

Zoning Three viewing zones for planning purposes: Triangle south-west, Keekorok south-east and Musiara north-west

Disturbances or Deficiencies The main problems are illegal grazing, poaching around the periphery of the reserve (particularly rhinoceros of which there are almost none left), and tourism impact through off-road driving. The combination of uncontrolled fires and elephant destruction of riverine forest and bushland has resulted in reduction in diversity and conversion to open grassland. Peripheral pressures are increasing with an upsurge in cultivation in surrounding areas. The park boundary has not been demarcated, which aggravates this problem. Potential threat of degradation of the reserve by tourists is increased with the planned increase in capacity by 390 beds. Animal harassment by tourists is a further source of concern.

Visitor Facilities It is extensively developed for tourism with facilities including three lodges in the reserve, six tented camps surrounding the reserve (total 680 beds), and 24 campsites on the periphery (totalling 546 beds). There were about 40,000 visitors in 1979/1980. Primary visitor activity is game viewing from vehicles. Other attractions are camping, scenic viewing, walking, and balloon safaris.

Scientific Research Only one scientist in 1984, who studied the decline of woodlands and thickets. Earlier studies include baboon behaviour, hyena ecology, bat-eared fox ecology, and vegetation changes. There is no monitoring programme, however, elephant and buffalo counts were planned for April 1984.

Special Scientific Facilities Mara Research Station is no longer operational. There have been suggestions to convert the remaining buildings into an educational hostel.

Principal Reference Material

- * Burney, D.A. (1980). The effect of human activities on cheetah in the Mara Region of Kenya. M.Sc. Thesis, University of Nairobi.
- * Costich, B.D. and Popp, S.L. (1978). *Mara: A field guide to Masai Mara Reserve*. Man and Nature Press, Cambridge. 55 pp.
- * Darling, F.F. (1960). An Ecological Reconnaissance of the Mara Plains in Kenya Colony. Wildlife Monograph No. 5.
- * IUCN/WWF Project 3142. Kenya, Maasai Mara Reserve.

- Lamprey, R.H. and Collins, W.G. (in press). Woodland Changes in the Mara Region of Kenya. In: *Endangered Resources for Development*. Proceedings of a workshop on the status and options for management of plant communities in Kenya. National Museums of Kenya.
- Shorter, C. Kenya *Horizons*. (Reprint).
- Taiti, S. 1973. A Vegetation survey of the Mara Game Reserve, M.Sc. Thesis, University Nairobi,
- Thorsell, J. (1980). Masai Mara National Reserve Viewing Tract Development Plan. Prepared by the Wildlife Planning Unit, Ministry of Environment and Natural Resources.
- Wildlife Planning Unit, (1983). Masai Mara National Reserve Management Plan. WPU, Wildlife Conservation and Management Department, Ministry of Environment and Natural Resources.

Staff One senior warden, three wardens, 57 rangers and five support staff employed by Narok County Council (1984)

Budget Expenditure 1979 - KSh.367,071 (US\$49,000).

Local Park or Reserve Administration Warden, WCMD, Box 60, Narok.

Date 1984

MARSABIT NATIONAL RESERVE

Management Category II (National Park)

Biogeographical Province 3.14.07 (East African Highlands)

Legal Protection Total

Date Established 1962

Geographical Location Northern Kenya, 560km north of Nairobi. 2°06'-2°39'N, 37°46'-38°11'E.

Altitude 420-1,700m

Area 208,842ha

Land Tenure Marsabit County Council

Physical Features The reserve comprises a forested mountain oasis rising out of surrounding desert country. The mountain consists of a group of volcanic craters, of which Got Bongoli is the largest, and several are occupied by fresh water lakes (the largest being Lake Paradise). The surrounding area is acacia scrub desert and the lava fields of the Dida Galgalla Desert.

Vegetation The upper zone is forest dominated by Brown Olive Middle Zone forest of *Olea capensis*, *Diospyros abyssinica* and *Teclea* sp., with *Acacia* grassland and *Combretum* at lower altitudes. The lower zone is arid thorn brushland.

Fauna Mammals include: elephant *Loxodonta africana* (T), greater kudu *Tragelaphus strepsiceros*, diademed monkey *Cercopithecus mitis*, olive baboon *Papio anubis*, striped hyena *Hyaena hyaena*, aardwolf *Proteles cristatus*, caracal *Felis caracal*, cheetah *Acinonyx jubatus* (T), lion *Panthera leo*, leopard *Panthera pardus* (T), klipspringer *Oreotragus oreotragus*, suni *Neotragus moschatus*, Grant's gazelle *Gazella granti petersi*, beisa oryx *Oryx gazella beisa*

and reticulated giraffe *Giraffa camelopardalis reticulata*. There are 13 recorded bat species and over 350 bird species, including 52 birds of prey. Birds include Somali ostrich *Struthio camelus*, peregrine falcon *Falco peregrinus* (T), black-faced Heuglins bustard *Neotis heuglinii*, swallow-tailed kite *Elanoides forficatus*, cream-coloured courser *Cursorius cursor*, Somali bee-eater *Merops revoilii*, and masked lark *Spizocorys personata* (locally abundant) in the lowland bush; lammergeier *Gypaetus barbatus*, mountain buzzard *Buteo oreophilus*, yellow-billed hornbill *Tockus flavivirostris*, star-spotted nightjar *Caprimulgus stellatus*, and Narina's trogon *Apaloderma narina* in the mountain area; little grebe *Tachybaptus ruficollis*, purple heron *Ardea purpurea*, saddle-bill stork *Ephippiorhynchus senegalensis*, ibises, and numerous duck species visiting Lake Paradise.

Zoning The core area is to be constituted a national park (14,413ha) but gazettment is not yet complete. Areas outside the core area are not managed for protection purposes.

Disturbances or Deficiencies There is forest cutting in the area surrounding the reserve. Numbers of greater kudu are recovering following a devastating outbreak of rinderpest in 1960.

Visitor Facilities Tourism is encouraged. Accommodation includes a lodge with 30 beds and three public campsites. There were 1,785 visitors in 1979.

Scientific Research Unesco are currently funding a project to combat desertification in the area. In this project, camels are being introduced into the area in an attempt to use them as livestock, replacing the cattle that are causing serious habitat degradation.

Special Scientific Facilities None

Principal Reference Material None listed

Staff One warden, 18 rangers and 10 support staff (1981)

Budget Expenditure 1979/1980: Ksh.491,607 (US\$7,756)

Local Park or Reserve Administration Warden, WCMD, PO Marsabit via Isiolo.

Date 1984

MWEA NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1976; there is a proposal to degazette the most populated areas.

Geographical Location 100km north-east of Nairobi. 0°43'-0°51'S, 37°35'-37°00'E.

Altitude 1,000-1,100m

Area 6,803ha

Land Tenure Trust land, but managed by the Central government.

Physical Features Gently rolling bushland. Southern border is on Kamburu reservoir on the Tana River, a drowned portion of the Thiba River.

Vegetation Primarily thorn bushland with some *Acacia* and *Commiphora* woodland. Scattered baobab *Adansonia digitata*.

Fauna Remnant elephant *Loxodonta africana* (V) and buffalo *Syncerus caffer* populations. Lesser kudu *Tragelaphus imberbis*, crocodile *Crocodylus niloticus* (V), and hippopotamus *Hippopotamus amphibius*. Numbers of individuals in most animal populations low.

Zoning None

Disturbances or Deficiencies Illegal hunting and seasonal livestock grazing. Timber felling. Severe encroachment by irrigation, and settlement schemes. A reservoir separates populations of elephants; hippo cannot use the reservoirs as they can't scale the sides to graze at night. Egyptian geese numbers are controlled due to their grazing of rice. There is concern that the incidence of Bilharzia will increase due to reduction in the numbers of this natural predator of the vector snail.

Visitor Facilities None

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None

Staff No information

Budget 1978-1979: aid grant of Ksh.390,000 (US\$52,000)

Local Park or Reserve Administration Warden, WCMD, Box 264, Embu.

Date 1984

NASOLOT NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Partial

Date Established 1979

Geographical Location Situated 100 km north of Kitale in west Kenya, near the Uganda border. 1°47'-1°56'N, 35°20'-35°28'E.

Altitude 750-1,500m

Area 92,500ha

Land Tenure Trust land, under the jurisdiction of West Pokot County Council.

Physical Features Flat plain with seasonal water courses, rising to the foothills of the Sekerr Range. Comprises a portion of the gorge of the Turkwell River.

Vegetation Primarily thorn bushland (zone V of Pratt and Gwynne).

Fauna Elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T), and lesser kudu *Tragelaphus imberbis*.

Zoning None

Disturbances or Deficiencies No information

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Pratt, D.J. and Gwynne, D.M. (1977). *Rangeland Management Ecology in East Africa*. Hodder and Stoughton, London

Staff Not yet operational

Budget None

Local Park or Reserve Administration Warden, WCMD, PO Kapenguria, via Kitale.

Date 1984

NGAI NDETHYA NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1976

Geographical Location South-east Kenya between Tsavo East and Tsavo West National Parks. 2°35'-2°41'S, 38°9'-38°20'E.

Altitude 650-750m

Area 21,209ha; forms a corridor between Tsavo East and West (total 2,082,114ha)

Land Tenure Trust land, under the jurisdiction of Masaku County Council

Physical Features It is a migration corridor between Tsavo East and West; open flat thornbush plains are bordered by the Athi River to the east, and the seasonal Kambu and Mtito Andei Watercourses (luggas) to the north and south.

Vegetation Thornbush and thicket (zone V of Pratt and Gwynne 1977), primarily *Commiphora* with scattered baobab *Adansonia digitata*

Fauna None

Zoning None

Disturbances or Deficiencies Human settlement persists within reserve; there are 10,000 people in the area with the consequence that there is very little left of nature conservation value.

Visitor Facilities None although there is a lodge

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff None

Budget None

Local Park or Reserve Administration Warden, WCMD, Box 66, Voi.

Date 1984

NORTH KITUI NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1979

Geographical Location South bank of Tana River adjacent to Meru National Park. 0°03'-0°32'S, 38°18'-38°40'E.

Altitude 428-675m

Area 74,500ha; is part a complex which includes Meru National Park (87,044ha), Kora Nature Reserve (178,780ha), Rahole Nature Reserve (127,000ha), and Bisanadi Nature Reserve (60,000ha)

Land Tenure Trust land, under the jurisdiction of Kitui County Council

Physical Features Dense bushland with low hills and seasonal water courses (luggas), which drain north into the Tana River. The northern boundary includes 20km of the Tana River.

Vegetation Unsurveyed bushland (Zone V of Pratt and Gwynne 1977); some riverine forest along the Tana River.

Fauna Crocodile *Crocodylus niloticus* (V) and hippotamus *Hippopotamus amphibius* occur along Tana River where the avifauna is particularly rich.

Conservation Management The boundary has been surveyed as well as sites chosen for the entrance gates, campsites, and boreholes as part of a general purpose plan. There is an anti-poaching unit in the area.

Zoning None

Disturbances or Deficiencies Illegal hunting and livestock grazing

Visitor Facilities None

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff There are WMCD staff

Budget No information

Local Park or Reserve Administration Warden, WCMD, Box 9, Mwingi via Kitui.

Date 1984

RAHOLE NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1976

Geographical Location 150 km east north-east of Mount Kenya. 0°03'S-0°15'N, 38°41'-39°11'E.

Altitude 250-480m

Area 127,000ha, part of a complex comprising the Meru National Park (87,044ha), Kora Nature Reserve (178,780ha), North Kitui National Reserve (74,500ha), and Bisanadi National Reserve (60,000ha)

Land Tenure Trust land, under the jurisdiction of Garissa County Council

Physical Features The open dry plain is traversed by the seasonal Rahole sand river.

Vegetation Unsurveyed dry thorn bushland; Zone V of Pratt and Gwynne (1977)

Fauna A few elephant *Loxodonta africana* (T) (almost gone), and various northern species such as Grevy's zebra *Equus grevyi* (T), and beisa *Oryx gazella*.

Zoning None

Disturbances or Deficiencies Illegal hunting and livestock grazing occur and the area is invaded by semi-permanent settlers. WMCD have never really established their presence as access is difficult with the river forming a barrier. Staff are stationed at Garissa. A great deal of poaching has been reported, particularly from the north.

Visitor Facilities None

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff One warden, nine rangers, three support staff (1980)

Budget 1978-1979, aid grant of Ksh.550,000 (US\$73,300)

Local Park or Reserve Administration Warden, WCMD, Box 58, Garissa.

Date 1984

SAMBURU NATIONAL RESERVE

Management Category II (National Park)

Biogeographical Province 3.21.12 (East African Highlands)

Legal Protection Total

Date Established Gazette notice pending

Geographical Location North bank of Ewaso Ngiro River, 90 km north of Mount Kenya. 0°34'-0°40'N, 37°26'-37°39'E.

Altitude 800-1,230m

Area 16,500ha; on the opposite bank of the Ewaso Ngiro river to Buffalo Springs (33,915ha) National Reserve, and 9km from Shaba National Reserve (23,910ha)

Land Tenure Trust land under jurisdiction of Samburu and Isiolo County Councils

Physical Features This is a lowland area below the foothills of Mount Kenya. The Ewaso Ngiro river forms the southern boundary for 32km. Away from the river the reserve is characterised by steep gullied slopes and rounded basement hills mixed with lava plains. Annual rainfall is 350mm.

Vegetation Several types occur; narrow riverine woodland of doum palm *Hyphaene coriacea* and *Acacia elatior*; open *Acacia tortilis* woodland; bushland dominated by *Salvadora*, *Commiphora* spp. and *Acacia senegal*; shrubland community of *Salsola dendroides* and *Cordia gharaif*, and some *Cynodon dactylon* grassland.

Fauna At least 22 large animal species occur including elephant *Loxodonta africana* (T), cheetah *Acinonyx jubatus* (T), reticulated giraffe *Giraffa camelopardalis reticulata*, Beisa oryx *Oryx gazella* and vervet monkey, *Cercopithecus aethiops*. The reserve is important to Grevy's zebra *Equus grevyi* (T) as it may be located along one of the major migratory routes from north-west to south-east. Rich avifauna. Crocodile *Crocodylus niloticus* (V) is also present.

Conservation Management The three reserves are considered too small to constitute a viable ecological unit for many of the larger species. A survey was initiated in 1980 to provide guidelines for enlargement of the areas. Pastoralists are compensated for assumed loss of grazing in surrounding areas. A management plan is being prepared for this area by the Wildlife Planning Unit of WMCD. It has been suggested that Samburu, Shaba and Buffalo Springs should be managed as one area.

Zoning None

Disturbances or Deficiencies Livestock grazing encroachment occurs, particularly along the river, and elephant damage to riverine forest where they have become concentrated due to disturbance outside the area. Tourists harass animals, particularly Grevy's zebra and cheetah. The road plan for this area describes tracks through riverine forest; there is concern that this will irrevocably disturb the area and that there will be further degradation caused by off-road driving. There is also a conflict of interests in the area and divided management between Isiolo and Samburu Councils and also WMCD.

Visitor Facilities Heavy tourist use occurs with 38,000 visitors in 1979. Facilities include one lodge with 129 beds in the reserve, a lodge with 79 beds adjacent to the reserve, and three public campsites.

Scientific Research Biogenetics of vervet monkeys, vegetation surveys; wildlife dynamics, work on gerenuk and behaviour and ecology of Grevy's zebra

Special Scientific Facilities None

Principal Reference Material

- ° Barkham, J.P. and Rainy, M.E. (1976). The Vegetation of the Samburu Isiolo Game Reserve. *E. Afr. Wildl. J.* 14: 297-329.
- ° Rainy, M.E. (1980). An ecological analysis for road development purposes of Samburu, Buffalo Springs and Shaba Game Reserves. Consultant report to Wildlife Planning Unit, Kenya.
- ° WWF Project 1762 Report.

Staff No information

Budget 1978-1979, aid grant of Ksh.520,000 (US\$69,000). The World Bank has funded road construction and development plans in 1980-1981. Otherwise no information.

Local Park or Reserve Administration Warden, WMCD, PO Box 29, Isiolo.

Date 1984

SHABA NATIONAL RESERVE

Management Category II (National Park)

Biogeographical Province 3.21.12 (East African Highlands)

Legal Protection Total

Date Established 1974

Geographical Location South side of Ewaso Ngiro River, 70 km north of Mount Kenya. 0°34'-0°43'N, 37°43'-37°57'E.

Altitude 700-1,500m

Area 23,910ha; 9km from Buffalo Springs National Reserve (33,915ha), and Samburu National Reserve (22,510ha) on the opposite bank of Ewaso Ngiro river

Land Tenure Trust land, under the jurisdiction of Isiolo County Council

Physical Features This is mainly a lowland lava plain with an isolated hills area below the foothills of Mount Kenya. The northern boundary includes 34km of Ewaso Ngiro River frontage and there are numerous springs and a large swamp area. Ridges are dominated by the Shaba Massive to the south of the reserve. This area is very different to Buffalo Springs and Samburu National Reserves in its physical aspects.

Vegetation There are several types, including riverine plant communities dominated by patches of *Acacia elatior* and doum palm *Hyphaene coriacea*; woodland communities of *Acacia tortilis*. Also bushland communities of *Commiphora* spp. with *Ipomoea*, *Grewia*, *Acacia senegal* and *Salvadora*; *Sporobolus spicatus* alkaline grasslands, and a swamp community.

Fauna There are 17 recorded large mammal species including gerenuk *Litocranius walleri*, Grant's gazelle *Gazella granti*, oryx *Oryx gazella beisa*, Grevy's zebra *Equus grevyi* (T), reticulated giraffe *Giraffa camelopardalis reticulata*, cheetah *Acinonyx jubatus* (T), leopard *Panthera pardus* (T), and lion *Panthera leo*.

Conservation Management A road management plan has been developed for the area. Suggestions have been made that any construction should be undertaken during the wet season when less animals use the area (Rainy, 1980). The three reserves are considered too small to constitute a viable ecological unit for many of the larger species. A survey was initiated in 1980 to provide guidelines for enlargement of the areas. Pastoralists are compensated for assumed loss of grazing in surrounding areas. A management plan is being prepared for this area by the Wildlife Planning Unit of WMCD. It has been suggested that Samburu, Shaba and Buffalo Springs should be managed as one area.

Zoning None

Disturbances or Deficiencies Illegal hunting mainly for meat and livestock grazing. The use of the area directly to the north of the reserve, since an army/air force training ground is reported to disturb the area.

Visitor Facilities Tourism is limited at present, but the planned road system could increase use. There are three public campsites. In 1979 there were 3,000 visitors.

Scientific Research Leopard rehabilitation scheme

Special Scientific Facilities The Elsa Trust (Adamson) Camp is now dilapidated and useless

Principal Reference Material

° Rainy, M.E. (1980). An Ecological Analysis for Road Development purposes of Samburu-Buffalo Springs-Shaba Game Reserve. Consultant report to Wildlife Planning Unit, Kenya.

Staff No information

Budget 1978-79, aid grant of KSh. 520,000 (US\$ 69,000). The World Bank has funded road construction and development plans in 1980-81. Otherwise no information.

Local Park or Reserve Administration Warden, WCMD, Box 29, Isiolo.

Date 1984

SHIMBA HILLS NATIONAL RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total, except for parts of the reserve that are still managed as a forest resource

Date Established Designated as a Forest Reserve (21,740ha) in 1903 and gazetted in 1956. National Reserve status in 1968. There have been proposals since 1938 to make the area a National Park.

Geographical Location 30km south-west of Mombasa above the coastal plain in Kwale district. 4°10'-4°20'S, 39°16'-39°30'E.

Altitude 120-450m

Area 21,740ha Oha Forest Reserve, which includes 19,251ha; National Reserve

Land Tenure Central government managed by WCMD

Physical Features It includes a dissected plateau consisting of conical hills and steep incised ridges. The Shimba Hills is a low-lying range of hills running parallel to the coastline about 20km inland and constituting a major water catchment for the surrounding area and a large part of the south coast region. There is little surface water on the plateau due to the porous nature of the soils. Water appears at spring lines at the base of the scarp slopes. The main rock types are sandstone, and soils are deep and strongly weathered. The climate is cooler than that at the coast with strong sea breezes and frequent mist and cloud in the early morning. Annual rainfall is 855mm-1682mm.

Vegetation Forested scarp slopes and undulating grasslands are interspersed with woodland clumps and ribbons of riverine forest in the steeply cut valleys. Mature forests occur to the south where the plateau drops to a low-lying area. There are five main vegetation types: 1) forest dominated by *Chlorophora* and *Paramacrolobium* (one of the last examples of relict forests from an era of much heavier rainfall in Kenya); 2) coastal bushland with *Manilkara*; 3) scrubland dominated by *Lantana* and *Vernonia*; 4) wooded grassland with *Syzygium* and *Hyphaene*; 5) and open grassland with numerous species including orchids.

Fauna There are 13 recorded species of large herbivore including sable antelope *Hippotragus niger roosevelti* (about 150 individuals and the last population in Kenya), roan antelope *Hippotragus equinus* (introduced in 1971 but decreased to about 12), buffalo *Syncerus caffer* (160-180), waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca* sp., spotted hyena *Crocuta crocuta*, warthog *Phacochoerus aethiopicus*, and giraffe *Giraffa camelopardalis* (four introduced in 1984). Sable feed in the open grassland that has woodland clumps rather than in the open woodland they are usually associated with. There are at least 200 elephant *Loxodonta africana* (T) in the reserve with a large proportion of young and it seems likely that the population will increase. Mammals also include: leopard *Panthera pardus* (T), yellow baboon *Papio cynocephalus* and bush pig *Potamochoerus porcus*. The area is also noted for its wealth of bird life. Species include: green-headed oriole *Oriolus chlorocephalus*, broadbill *Smithornis capensis*, green barbet *Cryptolybia olivacea*, green tinkerbird *Pogoniulus simplex*. The southern banded harrier eagle *Circaetus fasciolatus* (threatened in Kenya) inhabits the woodlands and forests of this area. The hills are important with respect to amphibians, particularly frogs which include *Chiromantis xerampelina*, *Kassina maculata*, *Hyperolius tuberilinguis* and *Leptopelis flavomaculatus*, which is only found here and in Arabuko Sokoke Forest.

Conservation Management There is management conflict between the game department, who advocates non-interference, and the forestry department, which allows timber exploitation and softwood re-afforestation. A high-tensile wire fence was erected in 1980 in an attempt to stop elephant and buffalo straying into the villages. A management plan was prepared in 1983 primarily as a guide for the evolution of a plan for the area. Money has been set aside by a trustee of the African Wildlife Foundation for the construction of an education centre if the area becomes a national park. Zebra *Equus burchelli* and impala *Aepyceros melampus* were formerly found in the reserve and their reintroduction has been suggested.

Zoning None

Disturbances or Deficiencies Elephant tree damage, though not serious, may increase as the population increases, but it could benefit the sable herds by opening up bushy and wooded areas. Timber exploitation in the reserve has been discontinued for all species except *Pinus caribaea* due to slow growth and excessive animal damage. Plantations deprive sable and other grazers of grassland. Uncontrolled bushfires can cause extensive damage, but controlled burning is important to maintain grassland for sable antelope. The reserve is completely surrounded by privately-owned farms, but no extensions are likely. The private land includes the game corridor proposed by Glover (1968) and Kates *et al.* (1968). Conflicts with the surrounding settlements are small scale poaching for meat (including sable), wood raiding for fuel, and illegal removal of *Chlorophora* trees from uncut plantation areas. Local villagers frequently walk through the reserve making it difficult to determine the identity of poachers and wood raiders. There are four quarries in the reserve for road building material.

Visitor Facilities Visitor utilisation is mainly on a day use basis from Mombasa and coastal hotels. Facilities include two public campsites, a picnic site and a nature trail. The road system is extensive on the plateau, though the rest of the reserve has more difficult access. 13,067 visitors in 1980 brought a revenue of Ksh.266,110 (greater revenue than from forestry). Revenue will increase when campsite improvements are completed.

Scientific Research Research has been carried out on tsetse fly, arboreal beetles, locusts, and the ecology of sable antelope.

Special Scientific Facilities None

Principal Reference Material

- ° Anon (1983). Shimba Hills National Reserve Management Plan. WPU. Wildlife Conservation and Management Department.
- ° Glover, P.E. (1968). Report on an Ecological Survey of the Proposed Shimba Hills National Reserve Soil Survey Unit, Department of Agriculture.
- ° Kates, Peat, Marwick and Co. (1968). A Land Use Strategy for the Shimba Hills. Canadian International Development Agency report.

- Owino, F. (1979). Conservation status of the Shimba Hills. *Komba*.
- Risley, E. (1966). An urgent plea for a National Park to be created in the Shimba Hills. *Africana* 2(9): 6-8.
- Ross, K., (1981). Vegetation and Land Use changes in the Shimba Hills National Reserve, and its effect on the ecology of the large herbivores. WPU Wildlife Conservation and Management Unit. 56 pp.
- Ross, K. (1982). Ecology of Large Herbivores in Shimba Hills and its significance to their management. Annual report to WWF.
- Ross, K. (1984). Ecology of the sable antelope in relation to habitat changes in the Shimba Hills. Ph.D. Thesis, Edinburgh University.
- Ross, K. (1985). Count of sable antelope in the Shimba Hills National Reserve. January/February 1985.

Staff Two wardens, 41 rangers, 52 subordinates, and 21 casual workers (1980)

Budget 1979-1980: Ksh.633,072 (US\$84,400)

Local Park or Reserve Administration Warden, WCMD, Box 30, Kwale.

Date 1984

SOUTH KITUI NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Partial

Date Established 1979

Geographical Location Adjacent to the north boundary of Tsavo East National Park. 01°38'-2°3'S, 38°31'-39°01'E.

Altitude 400-675m

Area 183,300ha; contiguous to Tsavo National Park (2,082,114ha)

Land Tenure Government under the jurisdiction of Kitui County Council

Physical Features The reserve includes the seasonal sand Thua River and its floodplain, which is surrounded by dense bushland with low hills.

Vegetation The vegetation is unsurveyed, but is similar to the northern area of Tsavo East National Park, with thorn bush and scrub thickets (Zone V of Pratt and Gwynn (1977)).

Fauna The fauna is unsurveyed, but similar to the northern area of Tsavo East National Park. The area formerly supported a substantial elephant *Loxodonta africana* (T) population.

Zoning None

Disturbances or Deficiencies Illegal hunting and livestock grazing

Visitor Facilities No tourism

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Not yet appointed.

Budget No information

Local Park or Reserve Administration Warden, WCMD, Box 9, Mwingi via Kitui.

Date 1984

SOUTH TURKANA NATIONAL RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Partial

Date Established 16th October 1979 by Legal Notice 290.

Geographical Location North-west Kenya, 100 km north of Kitale. 1°40'-2°00'N, 35°31'-35°55'E.

Altitude 900-2,270m

Area 109,100ha

Land Tenure Government, under the jurisdiction of Turkana County Council

Physical Features Two prominent hills are surrounded by plains dissected by seasonal water courses. The boundary includes about 25 km of the north-west bank of the Kerio River.

Vegetation There is some riverine forest with *Acacia* spp. on the Kerio River; the remainder is dense thorn bush, with remnant forest on the hill tops.

Fauna Elephant *Loxodonta africana* (T), and greater kudu *Tragelaphus strepsiceros* have been recorded.

Zoning No information

Disturbances or Deficiencies Encroaching settlement and livestock grazing

Visitor Facilities None

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget Expenditure 1979-80 KSh.124,775 (US\$16,600)

Local Park or Reserve Administration Warden, WCMD, Box 9, Lodwar.

Date 1984

TAITA HILLS GAME SANCTUARY

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection No information

Date Established 1973

Geographical Location Situated astride the main Voi-Taveta road in south-east Kenya; linked by a game corridor to Tsavo West National Park. 3°30'S, 38°12'E.

Altitude Up to 914m

Area 11,340ha

Land Tenure Hilton International

Physical Features It consists partly of plains and partly of *Commiphora* woodland. The Bura river runs through the area attracting animals from Tsavo National Park. Despite its name, this area is not within the Taita Hills.

Vegetation Savanna plains and *Commiphora* woodland.

Fauna Grazing animals attracted to the water in the dry season include: zebra *Equus burchelli*, buffalo *Syncerus caffer*, elephant *Loxodonta africana*, (T) impala *Aepyceros melampus*, Grants gazelle *Gazella granti*, eland *Taurotragus oryx*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca arundinum*, and giraffe *Giraffa camelopardalis*. Other animals include vervet monkey *Cercopithecus aethiops*, lion *Panthera leo*, and black-backed jackal *Canis mesomelas*. The prolific avifauna includes ostrich *Struthio camelus*, Bateleur eagle *Terathopius ecaudatus*, Pangani longclaws *Macronyx aurantiigula*, purple heron *Ardea purpurea*, hornbills (Bucerotidae), rollers (Coraciidae), and weavers (Ploceidae).

Conservation Management The area south of the Voi-Taveta road has been well developed with game viewing tracks. Controlled seasonal burning of old grasses is carried out on a rotational basis in the southern sector to maintain and improve grazing.

Zoning No information

Disturbances or Deficiencies No information

Visitor Facilities The whole complex of the Game Sanctuary and two tourist lodges (Taita Hills and Salt Lick) are run as a tourist concern by Hilton International.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Cheffings, J. (1983). The Taita Hills Game Sanctuary. *Swara* 6(1). East African Wildlife Society.

Staff No information

Budget No information

Local Park or Reserve Administration Hilton International

Date January 1983

TANA RIVER PRIMATE RESERVE

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established 1976

Geographical Location Inland from the Indian Ocean, 120km north of Malindi on the Tana River between Hola and Garsen. 1°45'-1°54'S, 40°5'-40°11'E.

Altitude 40-70m

Area 16,807ha

Land Tenure Tana River County Council

Physical Features The reserve contains about 50km of the Tana River with its flood-plain and the adjacent dry plains. The alluvial river channel is bounded by sandy levees, which give way to lower-lying areas of black cotton soil containing a variety of old river channels, ox-bow lakes and ponds. The river is highly meandering with good point-bar development.

Vegetation The Tana riverine forest is of high diversity with nearly 300 tree species recorded. Important species for the red colobus are *Sorindeia obtusifoliolata*, *Acacia robusta* and *Ficus sycomorus*. Other common trees are of the genera *Chlorophora*, *Sterculia*, *Albizia*, *Ficus* and *Diospyros*. Flood-plain bushland of *Terminalia*, and *Acacia* with *Garcinia*. Dry plains are dominated by *Dobera* and *Salvadora*. Grasses include *Chloris*, *Sporobolus*, and *Panicum*. The flora includes: *Rhus quartiniana*, *Maerua triphylla*, *Commiphora riparia*, *Combretum tanaensis*, and *Terminalia brevipes*.

Fauna The seven primates include: the endemic subspecies of red colobus *Colobus badius rufomitrat* (T) (200-300 in 1985), Tana mangabey *Cercococcebus galeritus galeritus* (T) (800-1100 in 1985), Sykes' monkey *Cercopithecus mitis*, and yellow baboon *Papio cynocephalus*. The populations of both threatened species has shown a decline over the past 10 years. Forty-three other recorded mammals include: a few elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, Peters' gazelle *Gazella granti petersi*, red duiker *Cephalophus natalensis*, red river hog *Potamochoerus porcus*, giraffe *Giraffa camelopardalis*, lion *Panthera leo*, and waterbuck *Kobus ellipsiprymnus*. Huet's bush

squirrel *Paraxerus ochraceus*, red bush squirrel *P. palliatus tanae*, and crocodile *Crocodylus niloticus* (V) also occur. The 248 recorded bird species include the endemic Tana River cisticola *Cisticola restricta* (K), and large numbers of breeding heron and other waterbirds. Some 22 species of fish have been identified.

Conservation Management Warden patrols have been effective to some extent against grazing encroachment from nearby settlements and the destruction of forest for firewood, poles and canoes by the local people. Some small crocodile and eggs are removed and taken to Mombasa for a farming project, but crocodiles have increased in number and size over the last decade.

Zoning None

Disturbances or Deficiencies There is settlement within reserve although this is legal. Other disturbances include uncontrolled fires, seasonal livestock grazing and illegal hunting. River erosion during the flood season threatens the tourist lodge. The natural ecology of the area is threatened by proposed upstream hydroelectric and irrigation development. A survey in early 1985 showed that some primate populations had declined drastically since a similar survey in 1975. Red colobus had been reduced to a sixth, and crested mangabeys to three-quarters of their previous numbers. This is largely due to the death of many large trees, for unknown reasons, which urgently needs investigating (Marsh 1985). There is some conflict over land in 1984, when some Pokomo tried to assert traditional ownership rights. Infrastructure is incomplete and funds are insufficient to improve this or sponsor urgently needed research.

Visitor Facilities Facilities include Baomo lodge (closed at present due to internal management problems), boat trips, dry season dirt tracks, and an airstrip to increase tourist access. One tented camp has 24 beds. Visitor numbers are low. Headquarter buildings have been started at Makere, outside the reserve.

Scientific Research Studies on behaviour and ecology of primates and elephants, and on riverine forest ecology in conjunction with the impact of dams.

Special Scientific Facilities There are two research huts in Mochelelo forest with keys obtainable from the warden, however, they are reported to be falling down.

Principal Reference Material

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Staff A warden and three rangers

Budget Sufficient for salaries and transport only

Local Park or Reserve Administration Warden, WCMD, Box 4, Hola. New park headquarters

being moved from the village of Wenje, which is outside the reserve, to a location adjacent to the reserve.

Date 1984

RAS TENEWI COASTAL ZONE NATIONAL PARK

Management Category Proposed II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection No information

Date Established Proposed; proposal submitted to the Commission of Lands in 1980

Geographical Location North of the Kipini Tana River Delta on a headland south of the Lamu archipelago. 2°30'S, 40°45'E.

Altitude No information

Area 35,000ha: 10,500ha land and 24,500ha sea

Land Tenure Government

Physical Features The area combines marine and terrestrial components and include extensive coral reefs and several rocky islands. The marine section extends 9km offshore. Tidal pool development is extensive along the Ras Biongwe area. The humid tropical climate is affected by monsoon winds.

Vegetation There are four vegetation zones in the proposed park area: 1) stable sand dunes bordering the beaches which are a unique habitat type covered with various dune grasses, doum palm *Hyphaene parvula*, *Sideroxylon dispyroides*, *Cordia somalensis*, *Croton menyhartii*, and *Cadaba farinosa*; 2) seasonally flooded grass-covered ziwas inland from the dunes; 3) a zone of coastal bushland thicket with a mixture of shrubs including: *Annona chrysophylla*, *Heeria mucronata*, *Lansea stuhlmannii*, *Markhamia zanzibarica*, and *Ziziphus mauritiana*; 4) and a lowland forest further inland of larger trees such as baobab *Adansonia digitata*, doum palm *Hyphaene coriacea*, *Rhodognaphalon schumannianum*, *Macaranga kilimandscharica*, *Memecylon verruculosum*, *Chlorophora excelsa*, *Sterculia africana*, and *Ficus* sp..

Fauna Mammals include: concentrations of elephant *Loxodonta africana* (T) and topi *Damaliscus lunatus*. Dugong *Dugong dugon* (v) occur in the nearby Tana River estuary. The area is an important flyway and feeding range for Palaearctic and Eurasian migrants particularly raptors and Sylviinae. Migratory seabirds breeding on the rocky islands in July and August include sooty gull *Larus hemprichii*, noddy *Anous stolidus*, roseate tern *Sterna dougallii*, and white cheeked tern *Sterna repressa*. Tenewi Rocks are the only nesting site in Kenya for sooty tern *Sterna fuscata*. There are more turtles breeding in this area than on the remainder of the Kenyan coast. These include olive ridley turtle *Lepidochelys olivacea* (E), green turtle *Chelonia mydas* (E), and hawksbill turtle *Eretmochelys imbricata* (E).

Cultural Heritage The proposed park area contains three gazetted National Monuments and several ungazetted ruins. The ruins and tomb at Mwana are of particular historic importance and include remains of a very large settlement with houses, mosques and tombs. The 'tomb of the seven virgins' dates from the 15th century.

Conservation Management Management and development proposals include marking of seaward and land boundaries, two entrance/exit gates, headquarters road connection through the park, viewing tracks, and beach and boat patrols. Future studies are to understand appropriate exploitation of marine resources and an EEC-sponsored development feasibility study of Lamu District. A turtle hatchery has been proposed and it was proposed by IUCN as a marine sanctuary for breeding turtles in 1979. Implementation of the Kenyatta Settlement Scheme would have a variety of benefits including a game-proof fence, encouragement of a local produce market, improved road access and benefits from increased tourism. The park would generate local employment.

Zoning There are restricted zones during the birds' breeding season. The northern area is to be left undisturbed by development.

Disturbances or Deficiencies Poaching of turtles and their eggs occurs along inadequately patrolled shorelines. The coastal zone in Kenya is undergoing a period of economic development associated with increasing growth of population and tourism.

Visitor Facilities Facilities include river launch trips from Kipini along the channels and marshes. An inland viewing track to a waterhole in the inland forest where elephants can be viewed is proposed. The area is part of the Tana River/Lamu tourist circuit.

Scientific Research The nature and extent of fishing needs further evaluation.

Special Scientific Facilities None

Principal Reference Material

- ° Pertet, F. (1982). Kenya's experience in establishing coastal and marine protected areas. In: McNeely, J.A. and Miller, K. (Eds) *National Parks, Conservation and Development*. Smithsonian Institution Press, Washington.
- ° Pertet, F. and Thorsell, J. (1981). Proposal for the establishment of a coastal zone national park in the Ras Tenemi area, Kenya. Internal Report. Wildlife Planning Unit, Ministry of Environment and Natural Resources.

Staff No information

Budget A cost/benefit analysis needs to be undertaken

Local Park or Reserve Administration No information

Date 1984

DIANI MARINE NATIONAL PARK COMPLEX

Management Category Proposed

Biogeographical Province 3.14.07 (Somalian)

Legal Protection The Chale Islands are currently protected from disturbance.

Date Established Proposed

Geographical Location South of Mombasa extending from Kaya Kinondo in the north to Chale Island in the south. 4°15'S, 39°37'E.

Altitude From sea level

Area Approximately 250ha

Land Tenure Trust land under the jurisdiction of Kwale County Council

Physical Features Comprises Similani, Kaya Kinondo, and Chale Islands and includes the bat caves at Similani

Vegetation It lies within the UNESCO vegetation unit (White 1983) of Zanzibar-Inhambane lowland rainforest with mangrove swamps along the seaboard. There are stands of the timber tree *Calophyllum inophyllum* which has been used in the past by coastal peoples for boat building. Specimens of a rare shrub believed to be a sub-species of *Grevea eggelingia* are also found here.

Fauna Mammals include at least eight species of resident and migratory bats, including the large fruit bat *Rousettus aegyptiacus* and the insectivorous *Hipposideros commersoni*. Red duiker *Cephalophus natalensis* and suni *Neotragus moschatus* occur in the coastal forest. The Chale Islands are important nesting sites for several bird species including: spotted ground thrush *Turdus fischeri* (R), red-tailed ant thrush *Neocossyphus rufus*, long-tailed cuckoo *Cercococcyx* sp., and pygmy kingfisher *Ispidina picta*.

Zoning None

Disturbances or Deficiencies A major threat to the bat population is the loss of critical habitat, which is being destroyed by entrepreneurs who buy local land to build beach houses. Contamination from insecticide toxins is a potential threat. There are feral goats and cattle on the island. Other disturbances are hunting, burning, snaring of animals, cutting of timber on the mainland, and shell collecting on the reefs and islands.

Visitor Facilities Beach houses have been built at Leisure Lodge and in the Ngomeni area which are outside the proposed reserve.

Scientific Research Dr K. Bock carried out several studies of the fauna of the area prior to 1978.

Special Scientific Facilities None

Principal Reference Material

- ° Pertet, F. (1982). Kenya's experience in establishing coastal and marine protected areas. In: McNeely, J.A. and Miller, K. (Eds). *National Parks, Conservation and Development*. Smithsonian Institution Press, Washington.
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- ° White, F. (1983). The Vegetation of Africa. A descriptive memoir to accompany the Unesco/AETFAT/UNSO vegetation map of Africa. Unesco, Paris.

Staff No information

Budget No information

Local Park or Reserve Administration WMCD, Nairobi

Date 1984

MOUNT KULAL BIOSPHERE RESERVE

Management Category IX (Biosphere Reserve)

Biogeographical Province 3.14.07/3.26.14 (Somalian/Lake Rudolf)

Legal Protection None

Date Established April 1978 as a Biosphere Reserve

Geographical Location Situated to the southeast of Lake Turkana (Rudolf) in the district of Marsabit. The western boundary is the centre of the lake and the eastern boundary is defined by the Chalbi Salt Desert. Access from Nairobi is by the main Nairobi-Moyale road or from Maralal to Loiengalani through Baragoi and South Horr. The reserve is 18 hours by road from Nairobi and two hours by air. 2°25'-3°25'N, 36°30'-37°30'E.

Altitude 378-2,416m

Area 700,000ha; includes South Island National Park (3,880ha)

Land Tenure Marsabit County Council

Physical Features The reserve is rectangular in shape and includes the saline-alkaline waters of Lake Turkana, the volcanic South Island and hot springs on the lakeshore. There are seasonal watercourses, but no perennial streams. The landscape is volcanic, formed during the Tertiary and Quaternary periods, comprising an extensive lava desert and numerous craters and lava flows. The reserve includes Teleki's volcano (active in 1899), and Mount Kulal (2,295m), a volcanic mountain with a deep crater capped by a mist/rainforest with deep box canyons on the eastern slopes. There is also a semi-desert of sand dunes and the Chalbi Salt Desert, an ancient lakebed which is occasionally flooded. Annual rainfall is 250-850mm and temperature range 20-40°C.

Vegetation The vegetation ranges from mountain forest to desert and includes a montane zone (above 2,000m) with rainforest, mistforest and grassland; a sub-montane zone (1,800-2,000m) with dry evergreen forest of *Olea africana* and *Juniperus procera* and shrub layer of *Euclea* spp. and *Carissa* spp., and grassland; a sub-humid/semi-arid zone (1,600-1,800m) of *Combretum* spp. woodland with *Euphorbia* spp. and *Acacia drepanolobium* woodland and an understorey of *Duosperma eremophilum*; a semi-arid zone (900-1,600m) of *Acacia mellifera* and *Commiphora* spp. bushland with an understorey of succulent *Euphorbia* spp. and *Plectranthus* spp.; and a semi-arid/arid zone (400-900m) with bushland of *Acacia reficiens* on sandy soils and woodland of *Acacia tortilis* with an understorey of *Duosperma* spp. and/or *Indigofera spinosa* on drainage lines. Evergreen shrubland of saltbush grows on saline alluvial soils bordering Chalbi. The lava desert supports sparse sub-shrubs and succulents. There are also desert communities induced by man and livestock, and salt desert.

Fauna The montane zone has one small antelope and a sub-species of bird endemic to Mount Kulal, the montane white-eye *Zosterops polioaster kulalensis*. The lower zones have a population of greater kudu *Tragelaphus strepsiceros*. The semi-arid and arid zones have fauna representative of the semi-arid areas of northern Kenya and Ethiopia including: Beisa oryx *Oryx gazella beisa*, gerenuk *Litocranius walleri*, reticulated giraffe *Giraffa camelopardalis reticulata*, Grevy's zebra *Equus grevyi* (T), dik-dik *Madoqua guentheri*, Grant's gazelle *Gazella granti*, rhinoceros *Diceros bicornis* (T), elephant *Loxodonta africana* (T), cheetah *Acinonyx jubatus* (T), lion *Panthera leo*, leopard *Panthera pardus* (T), and ostrich *Struthio camelus*. The population of Nile crocodile *Crocodylus niloticus* (T) in Lake Turkana is still relatively intact and fish communities adapted to brackish conditions include the Nile perch.

Cultural Heritage Long but probably discontinuous history of human occupation. There is archaeological evidence of pastoral and fishing populations near the old Chalbi Lake.

Pastoralism continues but emphasis has apparently shifted during the past 300 years from cattle to sheep, goats and camels.

Population There are about 1,000 Samburus on Mount Kulal, 1,000 Turkana around Loiyangalani, and 300 El Molo on Lake Turkana.

Conservation Management The NEP-MAB Integrated Project in Arid Lands (IPAL) has produced comprehensive management guidelines for the use of the area's resources (including water, grazing, woodlands, water catchments, wildlife, soils, fish, livestock and human) and made recommendations on an infrastructure of roads, settlement centres, markets, education, and health services. The central consideration of the plans is the human element. The District Development Committee (DDC) has agreed to form a sub-committee to oversee implementation of the management plans.

Zoning The core area occupies about 1,100ha near the centre of the reserve.

Disturbances or Deficiencies Alteration of grazing practices due to restriction of movement of nomadic peoples has resulted in overgrazing with replacement of perennial grasslands by annual and ephemeral vegetation and locally by desert. Due to the long history of human settlement, it is not possible to ascertain the original or 'natural' vegetation. The major and increasing human impact is tree felling for fuel and construction of houses and enclosures for livestock. The montane and sub-montane forests on Mount Kulal have been reduced and forest regeneration is hindered in several areas by removal of the understorey. Grass fires started by pastoralists erode the forest edge. Other problems are periodic droughts and the concentration of people and livestock into settlements.

Visitor Facilities No information

Scientific Research IPAL are concerned with the causes of desert encroachment. The main objective is to produce recommendations on land-use strategies and alternative economies which will permit rehabilitation of degraded lands and provide a living for the expanding human populations of the region. The first priority is to conserve existing resources and prevent further ecological and sociological degradation. It is anticipated that the present research programme will create the framework for an institution to monitor the Mount Kulal area as an example of the arid zone of East Africa. Such an institution is expected to be significant as a centre for survey, monitoring, and arid zone research, and as a training and orientation centre.

Special Scientific Facilities Facilities include a small research station on the southern slopes of Mount Kulal with laboratory and housing for six scientists and ancillary staff, smaller field stations in the working area and fenced experimental plots for the study of succession, protection from animal and human exploitation, grazing trials, productivity, plantation, and the demonstration of the results of management. The access road is rough and only suitable for cross-country four-wheel drive vehicles. The IPAL research station on Mount Kulal has an airstrip and there are more at several other field stations in the area.

Principal Reference Material

- IPAL has produced over 20 recent articles and reports on the Marsabit area, most of which are published as IPAL Technical Reports. Some of these are noted below.
- Bake, G. (1983). An analysis of Climatological data from the Marsabit District of Northern Kenya. IPAL Technical Report B-3, Unesco, Nairobi.
- FAO (1971). Range development in Marsabit District, Kenya. AGP: SK/KEN 11. Working paper No. 9. FAO, Nairobi.
- Field, A.C., Field, C.R. and Wachira, J.G. (Eds) (1977). Man and the Environment in Marsabit District II. Meeting held at Sokorte Dika Lodge, Marsabit, 24-26 October 1977.
- Grum, A. (1976). *Rendile Habitation*, Nairobi.
- Hepper, F.N., Jaeger, P.M.L., Gillet, J.B. and Gilbert, M.G. (1981). Annotated check-list of the plants of Mount Kulal, Kenya. IPAL Technical Report D-3, Unesco, Nairobi.
- Herlocker, D.J. (1979). Implementing a forestry programme for local community development. South-western Marsabit District, Kenya. IPAL Technical Paper.

- ° Lamprey, H.F. (1977). Desertification in northern Kenya: some preliminary observations. UNEP-MAB IPAL Paper for the National Seminar on Desertification, 6-8 July 1977.
- ° Lusigi, W.J. (Ed.)(1983). Proceedings of the IPAL Scientific Seminar, Nairobi 1-2 December 1981. IPAL Technical Report A-5, Unesco, Nairobi.
- ° Lusigi, W. (Ed.) (in press). Resource Management guidelines for West Marsabit District or Northern Kenya. UNEP-MAB IPAL Technical Paper.
- ° Marsabit District Development Plan. (1976). Republic of Kenya (mimeo).
- ° Sobania, N.W. (1979). Background History of the Mt. Kulal Region of Kenya. IPAL Technical Report A-3, Unesco, Nairobi.
- ° Spencer, P. (1973). *Nomads in alliance*. Oxford University Press, New York.
- ° UNEP-MAB IPAL. Quarterly reports of the UNEP-MAB Integrated Project in Arid Lands (IPAL), Mount Kulal Field Station.
- ° UNEP-MAB IPAL (1977). Draft final report Phase II. Regional Office for Science and Technology for Africa, Unesco. (mimeo report).

Staff One forester, three forest rangers and 20 police officers for administration and maintenance; two drivers, one foreman and one warden for research and monitoring; and one senior ecologist in charge of research, five field scientists and 10 field and laboratory technical assistants.

Budget No information

Local Park or Reserve Administration Director, National Environment Secretariat, Office of the President, PO Box 30510, Nairobi. Or: Unesco/IPAL, PO Box 30592, Nairobi.

Date 1983





Lesotho

LESOTHO

Area 30,344 sq.km

Population 1,470,000 (1984)

Parks and Reserves Legislation The Game Preservation Proclamation No. 33 of 1951 provides for the creation of Wildlife Sanctuaries, though these are only vaguely defined. Areas can also be set aside under the Historic Monuments, Relics, Fauna and Flora Act 1967 if they have distinctive or beautiful scenery or geological formations or if they contain rare, distinctive or beautiful flora or fauna. A National Parks Act was gazetted in 1975. The Land Husbandry Act 1969 also places a number of controls on cultivation and grazing, including prohibition or restriction in designated land (including vleis, sponges, marshes, swamps and reed beds).

Parks and Reserves Administration This is the responsibility of the Conservation Division within the Ministry of Agriculture. This division is also responsible for forestry.

Address

° Lesotho National Parks, Conservation Division, Ministry of Agriculture and Marketing, PO Box 92, Maseru.

Additional Information Much of Lesotho lies above 2,000m and agricultural development is often impracticable. The lowlands are easily accessible but have poor soil and periodic drought. There is also a shortage of male labour. Tourists are attracted to Lesotho, but unfortunately to forms of entertainment until recently unavailable in South Africa, rather than to the natural attributes of the country (Crush and Crush, 1983).

The Government of Lesotho commissioned a report on nature conservation in Lesotho (McVean, 1977) which made recommendations about improving national parks organisation and giving more areas protected status. The report suggested that a large area, Lesotho National Park, be set aside, to include Sehlabathebe Nature Reserve. Three other proposed national parks were reviewed, two new reserves suggested, and five smaller sites considered. In particular, it was emphasised that national parks in the usual Africa style would not be appropriate in Lesotho as the country has neither the wide uninhabited spaces, the big game, nor much of the necessary communications (also Lesotho parks would never be able to outcompete South African parks in this regard).

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- ° Readers Digest (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Protected Areas

	(hectares)
<i>National Parks</i>	
Sehlabathebe	6,805

SEHLABATHEBE NATIONAL PARK

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Some fishing is allowed under licence in certain rivers.

Date Established Established on 27 February 1970 in Lesotho Government Gazette Notice No. 34, as Sehlabathebe Wildlife Sanctuary and "National Park" (under the Game Preservation Proclamation).

Geographical Location In the Qacha's Neck District of south-eastern Lesotho, bordering on Transkei, Natal and Rast Grigualand in the Drakensberg Range. 29°55'S, 29°08'E.

Altitude Approximately 2,200-2,600m, with average elevation 2,400m.

Area 6,805ha

Land Tenure Government

Physical Features The park is characterised by mountains and grassveld with striking outcrops of sandstone, which occur at the contact between the Cave Sandstone and the Drakensberg Basalts at 2,380m. This junction occurs at a considerably higher altitude here than elsewhere in Lesotho and the greater exposure of the rock probably results in increased weathering into caves, pillars, arches, and potholes. The park is dissected by the Tsoelikana river and there are numerous small streams and pools. Much of the park is snow and ice-covered in winter.

Vegetation The area consists of a species-rich highveld of subalpine grasslands. There are also patches of wet meadow and marshland at all altitudes and small areas of dwarf shrub heaths on steep and rocky ground. Aquatic vegetation is well represented in the Tsoelikana River and its oxbow lakes, in rock pools produced by differential weathering of the Cave Sandstone where *Aponogeton ranunculiflorus* (discovered in 1970) is present, and in shallow ephemeral pans. There are scattered tall shrubs of *Polemammia montana*, *Rubus ludwigii*, *Rhus* spp., *Leucosidea sericea*, *Euryops* spp. and *Helichrysum* spp. on cliff ledges, rocky ground and other sites protected from fire and browsing animals. However, these form actual open scrub only on one or two high ledges on Thaba Ntso outside the park boundary. Only two small plants of *Protea* spp. survive in the park area, although near the park there is *Protea* savanna grassland.

Fauna There are few game. Mammals include a resident population of a few black wildebeest *Connochaetes gnou* and rhebok *Pelea capreolus*, mountain reedbuck *Redunca fulvorufula* and occasional eland *Taurotragus oryx* and oribi *Ourebia ourebi* which stray into the area from Natal and leave when the winter snow arrives, baboon *Papio* sp., black-backed jackal *Canis mesomelas*, wildcat *Felis silvestris* and otter *Lutra* sp. Birds include southern bald ibis *Geronticus calvus* (R), white stork *Ciconia ciconia*, black-headed heron *Ardea melanocephala*, bald ibis *Geronticus calvus*, cape vulture *Gyps coprotheres* and lammergeier *Gypaetus barbatus* (largely confined to the Drakensberg Mountains in Southern Africa). The Tsoelikana river harbours the threatened minnow-like fish *Oreodaimon quathlambae*, once thought to be extinct.

Cultural Heritage Some of the sandstone caves and arches contain Bushman paintings.

Zoning No information

Disturbances or Deficiencies Construction of dams and roads in the 1970s interfered with rock pools, blocked the Tsoelikana River, induced erosion, and increased siltation in the river. Incised cattle tracks, kraals and built-up cave shelters are scattered widely throughout the

park. Attempts at cultivation in some areas have resulted in locally severe erosion. Tall shrub communities have virtually been eliminated by past over-grazing and removal, and the dwarf shrub heaths have been seriously damaged by past burning.

Visitor Facilities Visitor access is encouraged. Access is by horse or four-wheel drive vehicles. Accommodation is available at the park lodge. Horses can be hired. Landing strip at Ha Paulus is for light aircraft.

Scientific Research A soil survey was carried out by the Conservation Division in 1976. Other studies have been a check-list of plant species, taxonomic studies of plants and invertebrates, and research on the endemic minnow and the effect of clipping and burning small grassland plots.

Special Scientific Facilities Field Research Station with laboratory near the park entrance

Principal Reference Material

- ° Crush D. and J. (1983). A State of Independence. *The Geographical Magazine* 55(1): 24-29.
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- ° Readers Digest (1983). *Game Parks and Nature Reserves of Southern Africa* (1983). Readers Digest Publication, Cape Town.

Staff No information




Budget No information

Local Park or Reserve Administration Park Administrator, Sehlabathebe, COMRUDEV, PO Box 686, Maseru..

Date 1983





- Key
-  National Park
 -  Proposed National Parks
 -  Proposed Nature Reserves

Liberia

LIBERIA

Area 111,370 sq.km

Population 1,900,000 (1984)

Parks and Reserves Legislation In 1953 presidential declarations classified a number of forests as National Forests, but without actually making provision for their protection. The Act for Conservation of the Forests of the Republic of Liberia, April 1958, declared the policy and programme of conservation for wildlife reserves and establishment of national parks; however, the Act was not implemented by the authorities of the time. The Forestry Development Authority was approved by an Act of 1 November 1976 (published 20 December 1976). The first national park, Sapo, was finally established in 1983.

Parks and Reserves Administration During the reorganisation of the forestry resource agencies in 1976, the newly created Forestry Development Authority established a Division of Wildlife and National Parks, which was to be concerned principally with developing plans to conserve wildlife and habitat resources. Three areas (including Sapo) were formally proposed for national park status and four sites for protection as nature reserves (Verschuren, 1983) - these are listed below. Three other areas were under consideration as national parks (Wologiza, Tumpo and Bokumu).

Address

° Division of Wildlife and National Parks, Forestry Development Authority, PO Box 3010, Monrovia.

Additional Information The long range conservation goals in Liberia are protection of prime catchment and watershed lands, preservation of the diverse biotic communities of tropical lowland rainforest, conservation of critically endangered populations and or species, and establishment of a nationwide system of habitat protection (Forestry Development Authority/IUCN, 1986). Five basic approaches are considered necessary for achievement of these goals, ecological surveying of the country, public awareness and education campaigns, staff development programmes, increased public involvement, and development of appropriate wildlife regulations. Work is under way on all but the last approach (Forestry Development Authority/IUCN, 1986).

The establishment of the Sapo National Park is seen as a key step in the framework of Liberia's conservation strategy, as is clear from the stated objectives for the area, which include: research into maintenance and development of the wildlife resource; investigation of the sustainable resource development and management in areas outside the park; encouragement of an educational role, and as a base for training, research, management planning etc; and focussing the interest and efforts of government agencies and other organizations on a cooperative management programme for the forests and associated natural resources (Forestry Development Authority/IUCN, 1986).

In addition to the Sapo National Park and other proposed areas, eight National Forests existed 1978-79 covering some 1,566,300 hectares, though these areas still require further protection from forest and wildlife destruction. These areas are Krahn Bassa (514,000ha), Grebo (251,000ha), Gola (207,000ha), Kpelle (174,800ha), North Lorma (100,000ha), Gbe (61,000ha), Gio (33,000ha), East Nimba (29,000ha).

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Protected Areas

	(hectares)
<i>National Parks</i>	
Loffa-Mano	230,000
Sapo	130,700
Subtotal	360,700
<i>Proposed areas</i>	
Cestos-Sankwen National Park	145,000
Cape Mount Forest Nature Reserve	
Cavally Forest Nature Reserve	
Mount Nimba Nature Reserve	
Wonegizi Mountain Range Nature Reserve	
Subtotal	145,000

SAPO NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Hunting or tree felling is prohibited under the 1958 Act for Conservation of Forests

Date Established 19 May 1983, by Decree 73

Geographical Location Eastern Liberia between Sinoe and Grand Gedah counties. Centred approximately at 5°20'N, 9°15'W.

Altitude Approximately 400m, with Mount Putu rising to 640m

Area 130,700ha (Over 1% of the country)

Land Tenure Government

Physical Features The park is bounded on the west by the Sinoe River and in the north by the Putu Mountain Range. Much of the topography is flat with fairly extensive marshlands,

crossed by numerous streams and rivers, of which the largest is the Sinoe River (navigable by canoe during the dry season). Some of the area is more undulating, including Mount Putu.

Vegetation The Sapo Forest is one of the last remaining blocks of tropical lowland forest in Liberia and one of the richest areas in the country for flora and fauna. Verschuren (1982) describes it as "luxuriant, with trees 70m tall, the 'forest cathedral' in all its splendour and the most impressive the author has seen in 20 years surveying equatorial regions". About 20% of the park area is swamp.

Fauna The forest area is one of the richest in West Africa for wildlife. The park contains most of the prominent mammalian species characteristic of Liberia including forest elephant *Loxodonta africana cyclotis* (T), pygmy hippopotamus *Choeropsis liberiensis* (T), zebra duiker *Cephalophus zebra* and Jentink's duiker *Cephalophus jentinki* (T). Mammals also include: leopard *Panthera pardus* (T), bongo *Tragelaphus euryceros*, West African forest buffalo *Syncerus caffer nanus*, giant forest hog *Hylochoerus meinertzhageni rimator* and many species of West African primates including chimpanzee *Pan troglodytes verus* (T) and red colobus *Colobus badius*. The avifauna is rich and varied, though little studied, and the 200 species include a variety of large forest hornbills and birds of prey, as well as the white-breasted guinea-fowl *Agelastes meleagrides* (E).

Conservation Management Park boundaries have been surveyed and Forestry Development Authority (FDA) field crews demarcated the southern boundary in 1979/80. In late 1982, a pilot wildlife conservation education programme was initiated in the towns and villages around Sapo. Its aims were to publicise the new status of the park area and the restriction of activities within its boundaries; to create awareness and understanding of the environment; to field-test educational materials and to develop a programme to fit the needs of Liberia; and to determine the feasibility and requirements of a long-term conservation education programme within the Department of Wildlife and National Parks. So far, more than 5,000 inhabitants have been reached. During 1983, the project received seven tents and two motorcycles from WWF/IUCN for use in drawing up an inventory of natural resources within the park, in preparation for a management plan. Future goals are to further develop the management plan, to open access routes to the park interior and select sites for patrol posts and to demarcate boundaries. The conservation education programme will be extended to other parts of Liberia. Equipment, including a Toyota vehicle and motorcycles have already been provided by the FDA. The US Peace Corps has assigned two volunteers to the wildlife conservation education programme.

Zoning None

Disturbances or Deficiencies The park was originally saved from logging because of the low grade commercial timber quality found there during the German Forestry Mission's forestry inventory of Liberia from 1960 to 1967. However, the park still faces tremendous pressure on all sides of its boundaries from timber concessions, farming and hunting. Population pressures and shifting agriculture are evident, especially along the Sinoe River boundary. The staff levels are far below the required administrative and manpower needs. Another problem is the communication and mobility of the park staff. Very thinly spread out around the park, the staff remains unequipped with basic materials. Their identity is difficult without proper uniforms. Although totally uninhabited, the whole forest appears to be completely divided into concession blocks. Several logging concessions existed in 1978, though they had not been exploited. Verschuren (1983) reported enormous concessions in the south-east forest area. There is some illegal hunting and confined logging along the road, to the north-west corner, which was constructed in 1981. Apart from this road, and the river, only footpaths enter the park and this has, to some extent, protected the remaining area from exploitation. The Putu Mountain Range to the north of the park is probably one of the richest game areas of the country, but several villages and mining projects prevent the inclusion of this range within the park.

Visitor Facilities None, though there are hotel facilities in nearby towns, and access to the edge of the park is possible on foot at three locations.

Scientific Research No information

Special Scientific Facilities Research accomodation near the park at Japoken

Principal Reference Material

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Staff One warden, two rangers and eight guards and two US Peace Corps volunteers under the Director of the Wildlife and National Parks Division, FDA.

Budget 1984 - IUCN/WWF Project 3216 grant of US\$70,000 towards the establishment of the park, supplemented by government expenditure of US\$ 67,000 (including salaries and operational funds).

Local Park or Reserve Administration Park Warden, c/o Peace Corps, PO Box 707, Monrovia.

Date 1985

CESTOS-SANKWEN NATIONAL PARK

Management Category Proposed

Biogeographical Province 3.01.01 (Guinean Highlands)

Legal Protection Hunting or tree felling is prohibited under the 1958 Act for Conservation of Forests

Date Established Proposed

Geographical Location Between the coastal towns of Grand Bassa (Buchanan) and Sinoe (Greenville) in Sinoe County. Access by road from the north through the Jo River concession, Bolowehn, or from Juarzon or Sinoe in the south. The Cestos River has no bridge or ford and can be crossed only by boat. 5°10'-6°00'N, 9°28'W.

Altitude Up to 300m

Area 145,000ha

Land Tenure Government

Physical Features Proposed limits follow a long north-south section of the previous limits of the extension of Krahn-Bassa National Forest, westwards to the Cestos River. It is a lowland area with occasional hills. The park would include the spectacular Cestos River and Senkwen River estuary with its extensive mangrove swamps.

Vegetation The proposed park lies in the transition zone between inland forest, littoral forest, mangroves, and undisturbed coastal vegetation.

Fauna The area reportedly contains a wide variety of Liberian fauna.

Zoning A 'Wilderness Area' is proposed for the coastal area which would have less strict legislation.

Disturbances or Deficiencies Shifting cultivation, upstream from the confluence of the Shani and Senkwen Rivers, is developing rapidly with associated riverside settlements along the Cestos River, though these are still outside the proposed park boundaries. There are few human settlements in the proposed area, except along the coast and near the middle Senkwen. Some concessions for forestry or mining exist (less than Sapo National Park).

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Verschuren, J. (1983). Conservation of tropical rain forest in Liberia. Recommendations for wildlife conservation and national parks. IUCN/WWF Project 1567 Report to the Government of Liberia. Gland, Switzerland.

Staff No information

Budget No information

Local Park or Reserve Administration Liberian Wildlife and National Parks Division, Forest Development Authority (FDA), Box 3010, Monrovia.

Date 1983





Madagascar

MADAGASCAR

Area 587,042 sq.km

Population 10,012,000 (1985)

Parks and Reserves Legislation Five different categories of protected area are recognised, National Parks, Integral Nature Reserves, Special Reserves, Classified Forests and Areas of Reafforestation and Restoration. There are also privately owned protected areas. Parks and reserves are established under individual decrees but governed by general hunting, fishing and protection regulations (Ordinance 60-126 of 3 October 1960). Integral nature reserves are sanctuaries mainly governed by Decree No. 66-242 of 1 June 1966, in which all human activity is prohibited. The first reserves were established in 1927, though one area (Masoala) has subsequently been degazetted (1964). National parks legislation is contained in Decrees 58-07 (28 October 1958) and 62-371 (19 July 1962). The 21 special reserves are regulated by a series of decrees and have less strict regulations. Their aim is the conservation of specific plant and animal species or habitats. Access is not restricted and although use of the land and its products is generally prohibited, there are areas where local communities can use secondary forest products. Within national parks, local people are allowed to collect secondary forest products with appropriate authorization. There are about 158 classified forests, covering an area of about 2,671,000ha, established by individual ministerial declarations. These areas are closed to forest exploitation, but this protection is not permanent. Some use may be made of secondary forest products by local communities. The Minister responsible for Water and Forests can also declare 'areas of reafforestation and restoration' for the protection of watersheds and the prevention of soil erosion by careful management of the various landuse activities within the area. There are about 77 such areas declared, covering some 823,978ha. There are also more than 30 forest stations practising reafforestation. The original definitions for parks and reserves were based on the 1933 London Convention (which was accepted in Malagasy law on 25 January 1937), and the African Convention of Conservation of Nature and Natural Resources (1968) is applied for the protection and conservation of all protected areas. Finally, there are four areas set up solely for protection of the two turtle species, where turtles under a certain size may not be taken.

Parks and Reserves Administration This is the responsibility of the Direction des eaux et forêts which comes under the Ministère de la production animale (élevage et pêche) et des eaux et forêts. The Direction des eaux et forêts is also responsible for forests and freshwater fisheries, while other departments within the same Ministry deal with marine fisheries and agriculture. Each integral reserve comprises a station for a deputy forester and each station is divided into two or three sectors under the responsibility of auxiliaries. The special reserves have less strict regulations than the strict nature reserves and do not have supervisory personnel. Permits for entry to the parks and reserves are obtained from the Direction des eaux et forêts in Antananarivo.

Address

° Service de la protection de la nature, Direction des eaux et forêts, Ministère de la production animale (élevage et pêche) et des eaux et forêts, BP 243, Anosy, Antananarivo.

Additional Information All protected areas are reportedly threatened by fire, poaching and shifting agriculture, and traditional conservation measures are becoming weaker. The Forest Service generally lacks equipment and urgently requires vehicles, field equipment and uniforms for its staff, as well as large increases in its field staff (currently each 'agent' covers some 25,000ha). Protection of 'classified forests' and 'areas of reafforestation' is particularly uncertain because of the lack of resources. WWF and IUCN are giving support for improving the management of parks and reserves.

In October 1970 a conference, organized by the Madagascan government and sponsored by several international organizations, was held in Tananarive (Antananarivo) on conservation of nature and resources, at which plans were made to conserve the particularly interesting flora

and fauna of the island. Of over 8000 plant species, 60-85% are endemic. Seventy-three of the 76 native terrestrial mammal species are endemic, as are nine of the 28 bats. Of the 197 native breeding bird species recorded, 54% are endemic and 28 are threatened. Reptiles and amphibians are particularly diverse, with over 400 species, 90% of which are endemic.

A follow-up conference entitled 'Conférence de Madagascar sur la conservation des ressources naturelles au service du développement' was held in Antananarivo, November 1985. Its principal aim was to develop projects for international funding within the framework of a national conservation strategy. Considerable emphasis was placed on protected areas, in particular the necessity for full biological inventories of existing protected areas and investigation of ways of increasing their value to local people.

In June 1979, a decree was issued authorising the establishment of a WWF representation in Madagascar to promote conservation. Up to 1986, the Representation was mainly concerned with education and public opinion, and to a lesser extent with implementation of field activities. Activities included organisation of lectures, debates, educational visits to study ecosystems, radio and television broadcasts and the preparation and distribution of brochures and posters. Its activities have helped establish the Association for the Protection of the Environment at Antananarivo (Diego Suarez), the Association for the Protection of Nature at Toamasina (Tamatave) and the Association for the Understanding and Conservation of Nature in Madagascar. For practical measures, a list has been drawn up of suitable themes to be studied in Madagascar. 1984/85 central themes were 'The Tree' and 'Medicinal Plants'. Since mid-1986 an additional officer has been appointed with responsibility for the implementation of field activities, particularly with respect to improving management of protected areas.

Another IUCN/WWF sponsored project aims to establish a preliminary conservation programme for lemurs, and a survey of lemur populations in the eastern rainforest. All conservation projects are undertaken by various Governmental services, such as the Direction des eaux et forêts or the University, in close collaboration with WWF. Research by foreigners is encouraged and under the aegis of the Direction de la Formation Post-Universitaire (DFPU) in the Ministère de l'Enseignement Supérieur (MES).

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- Griveaud, P. and Albignac, R. (1972). The Problems of Nature Conservation in Madagascar. In: Battistini, R. and Richard-Vindard G. (Eds) *Biogeography and ecology of Madagascar*. Junk, The Hague.
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- IUCN/WWF Project 1613. Primate Action Fund.
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Protected Areas

	(hectares)
<i>National Parks</i>	
Isalo	81,540
Montagne d'Ambre	18,200
Subtotal	99,740
<i>Integral Nature Reserves</i>	
Andohahela	76,020
Andringitra	31,160
Ankarafantsika	60,520
Betampona	2,228
Lokobe	740
Marojejy	60,150
Tsaratana	48,622
Tsimanampetsotsa	43,200
Tsingy de Bemaraha	152,000
Tsingy de Namoroka	21,742
Zahamena	73,160
Subtotal	569,542
<i>Special Reserves</i>	
Ambatovaky	60,050
Ambohijanahary	24,750
Ambohitantely	5,600
Analamerana	34,700
Andranomena	6,420
Anjanaharibe-Sud	32,100
Ankara	18,220
Bemarivo	11,570
Beza-Mahafaly	600
Bora	4,780
Cap Sainte Marie	1,750
Foret d'Ambre	4,810
Kalambatritra	28,250
Kasijy	18,800
Mangerivola	800
Maningozo	7,900
Manombo	5,020
Manongarivo	35,250
Marotandrano	42,200
Nosy Mangabe	520
Perinet-Analamazaotra	810
Pic d'Ivohibe	3,450
Tampoketsa d'Analamaitso	17,150
Subtotal	365,500
<i>Private Reserves</i>	
Berenty Reserve	265

PARC NATIONAL DE L'ISALO

Management Category II (National Park)

Biogeographical Province 3.09.04 (Malagasy Woodland/savanna)

Legal Protection Total

Date Established 19 July 1962 by Decree No. 62-371

Geographical Location Situated west of Ihosey, in the province of Fianarantsoa. 22°10'-22°41'S, 49°10'-49°21'E.

Altitude 800-1,082m

Area 81,540ha

Land Tenure Government

Physical Features The park consists of a highly dissected massif with steep escarpments, deep gorges and incised canyons. The region has a dry climate, with seven or eight months without rain.

Vegetation Endemic species include *Pachypodium rosulatum* and *Ravenia rivularis*. Also present is *Uapaca bojeri* (Euphorbiaceae).

Fauna Information is generally scanty. Lemurs include the ring-tailed lemur *Lemur catta*, brown lemur *Lemur fulvus* and Verreaux's sifaka *Propithecus verreauxi*. The fossa *Cryptoprocta ferox* and the widespread tenrec *Tenrec ecaudatus* are reportedly present. The recently described rock-thrush *Monticola bensoni* is found in the northern part of the massif and the endemic Madagascan boa *Acrantophis madagascariensis* also occurs.

Zoning None

Disturbances or Deficiencies There is some cattle grazing and fire.

Visitor Facilities The park contains constructions, 'Grottes des Portugais', dating from the 16th century, which are of considerable interest to visitors.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Revue de l'Office du Tourisme de Madagascar No. 33 (La Grotte des Portugais by P. Ginther and V.C. Herbert).

Staff One agent and one auxiliary

Budget Salaries are paid by the Government

Local Park or Reserve Administration Headquarters are at Ranohira

Date 1986

PARC NATIONAL DE LA MONTAGNE D'AMBRE

Management Category II (National Park)

Biogeographical Province 3.09.04 (Malagasy woodland/savanna)

Legal Protection Total

Date Established 28 October 1958 by Decree No. 58-07

Geographical Location At the northern point of Madagascar near the town of Antseranana. 12°28'-44'S, 49°04'-13'E.

Altitude 1,000-1,475m

Area 18,200ha

Land Tenure Government land

Physical Features The park lies within a volcanic massif which is composed essentially of basaltic rock of origin ca 14 myBP., and consists of a line of summits some 30km long, oriented north-south, the tallest being the Pic d'Ambre (1,475m). The park contains a crater lake and cascades, and is a place of great beauty. The region of Antseranana has a tropical climate with a marked dry season from May to December during which a strong south-east trade wind blows (the 'Varatraza') and a wet season from January to April with less than 1000mm rainfall. The Montagne d'Ambre, however, has a microclimate characteristic of the eastern rainforest with very high rainfall (3585mm per year has been measured) throughout the year, with a maximum in January- February. The area thus serves as an important rain catchment area for Antseranana.

Vegetation Vegetation is principally upland tropical moist forest, with trees reaching 30m height and including species such as *Canarium madagascariense*, *Gluta tourtour*, *Terminalia mantali* and *Dalbergia* sp.; palms (e.g. *Neodypsis* *Chrysalidocarpus* spp.) and tree-ferns (*Cyathea* spp.) are abundant in the understorey and there is a very diverse epiphytic flora, including ferns (e.g. *Platyserium*, *Drynaria* and *Asplenium*) orchids (e.g. *Bulbophyllum*, *Angraecum* and *Aeranthus*) and lichens. Around the Station Forestière des Roussettes there are plantations of introduced species including pines, *Eucalyptus* and *Araucaria*.

Fauna There are at least 54 species of birds endemic to the Madagascar region; seven amphibians including one, *Mantipus laevipes*, only known from this area; and 11 reptiles, including five presumed endemic to the mountain: *Uroplatus alluaudi*, *Brookesia tuberculata*, *Androngo alluaudi*, *Paracontias brocchi*, and *Pseudoxyrhopus ambreensis*. The area is important for molluscs, with over 20 recorded species (nine endemic to the region), and butterflies, including two threatened taxa, *Graphium endochus* (R) and *Amauris nossima dijuncta* (R). Five, possibly six, lemur species occur, namely fork-marked lemur *Phaner furcifer*, diadem sifaka *Propithecus diadema*, crowned lemur *Lemur coronatus*, russet mouse-lemur *Microcebus rufus*, brown lemur *Lemur fulvus*, and possibly *Lepilemur septentrionalis*.

Conservation Management In 1985, 23km of the park boundary were re-cleared - previously the park's limits had been badly marked on the ground; the path giving access to the park was renovated, as was the 'gîte d'étape' which provides accommodation at the Station Forestière des Roussettes situated on the northern boundary of the park (Langrand and Lenormand, 1985).

Zoning None

Disturbances or Deficiencies Both deforestation and grazing have been reported in the area and fires have damaged forests on the southern and western flanks of the mountain. In 1984 it was reported that a new commercial timber company, the 'Société des Bois du Nord', planned to extract 20,000 cubic metres of wood per year outside the park but still on the slopes of the

Montagne d'Ambre; they intended to export 90% of the wood. The plan had been opposed by the local authority, the Comité Exécutif du Conseil Populaire de la Ville de Diégo (Antseranana), who argued that it would threaten their water resources. The more recent fate of this scheme is unknown.

Visitor Facilities Access is relatively easy from Antseranana along an asphalt road. The 'jardin botanique' path passes numerous different trees that have been identified and labelled for visitors. There is accomodation in the form of a 'gîte d'étape' at the Station Forestière des Roussettes (Langrand and Lenormand, 1985).

Scientific Research There have been numerous collecting trips to the area since 1893.

Special Scientific Facilities None

Principal Reference Material

° Langrand, O. and Lenormand, B. (1985). Presentation sommaire du Parc National de la Montagne d'Ambre. Unpublished, 9 pp.

Staff An auxiliary, and from 1982 six additional local staff financed by WWF.

Budget Salaries paid by the government. WWF Tropical Forest Campaign (1982) grant of US\$150,000 over three years, to help restore and mark the park boundaries, survey the park's flora and fauna, and draw up a management plan.

Local Park or Reserve Administration Headquarters is at Roussettes.

Date 1986

RESERVE NATURELLE INTEGRALE D'ANDOHAEHEL (NO. 11)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.03.01 (Malagasy rain forest)

Legal Protection Total

Date Established 11 June 1939. The area of the reserve was increased from 30,000ha on 1 June 1966 by Decree 66-242.

Geographical Location 40km north-west of Taolanaro in the extreme south of the country. 24°30'-58'S, 46°32'-52'E.

Altitude 100-1,956m

Area 76,020 ha, in three noncontiguous blocks, one (Parcel 1) 63,100ha, one (Parcel 2) 12,420ha and the third (Parcel 3) 500ha.

Land Tenure Government

Physical Features Parcel 1 varies in altitude from 100m to 1,956m (Pic d'Andohahela); Parcel 2 from ca 110m to 1,005m (Pic de Vohidagoro); Parcel 3 is at ca 125m. Climate in parcel 1 is humid, with rainfall of 1500-2000mm, no dry season and mean annual temperature of about 23°C; that in parcel 2 is much drier, with rainfall usually lower than 500mm per annum and a dry season of five-six months. Parcel 1 is an important watershed, containing the source of

over ten rivers, including the Mananara, rising at Anpamosira and flowing westward and the Manampanihy flowing east from Vohibe (O'Connor *et al.*, 1985). The Mananara, which flows along the northern boundaries of Parcel 2, is the only permanent water source for that part of the reserve.

Vegetation Each of the three parcels has a distinct vegetation type. Vegetation in Parcel 1 is typical of submontane tropical rainforest, of which it constitutes the southernmost extension in Madagascar. Buttressed trees of up to 35m occur, though generally tree height does not exceed 25m. Genera characteristic of this forest type include *Tambourissa*, *Symphonia* and *Dalbergia*, with members of the families Lauraceae, Compositaceae and Rubiaceae represented on the higher slopes. The endemic family Humbertaceae is found within the reserve. Orchidaceae and Cycathaceae are common, and the epiphytic cactus *Rhipsalis* occurs. Epiphytes in general are abundant, and at higher altitudes mosses and lichens are found. Parcel 2 consists mainly of spiny thorn forest with some bush and scrub and also some gallery forest along the Menanara River in the northern part of the reserve. The highest hills have no forest cover and are generally covered with tussock grass and other herbaceous vegetation, with *Aloe* and *Pachypodium* spp.. In the thorn forest, the endemic genera *Alluaudia* and *Didierea* are well represented; one species of the former (*A. ascendens*) is endemic to the Mandrare region, as is the baobab *Adansonia za* (Bombaceae). Species of Euphorbiaceae, Leguminosae and Crassulaceae are also abundant. Parcel 3 has a high density of the endemic palm *Neodypsis decaryi* and was originally set up specifically to protect this species. It also has a belt of vegetation transitional between the spiny forest and the eastern rain forest. Leguminosae, particularly *Acacia* spp., are well represented as are Cucurbitaceae and Euphorbiaceae. There is some deciduous forest with *Tamarindus indica* along one of the non-permanent rivers, the Andehamara, and introduced *Eucalyptus* has become established along the eastern end of the parcel.

Fauna The avifauna is rich, with over 50 species to the Madagascan region present. Five amphibian species appear to be endemic to the Anosyenne Hills (*Anodonthyla rouxae*, *Madecassophryne truebae*, *Microhyla palmata*, *Mantidactylus grandisonae*, and *Boophis microtis*) and can be expected to occur in the reserve. Fifteen lemurs are reported to occur the greatest number for any Madagascan reserve, including the aye-aye *Daubentonia madagascariensis* (E), woolly lemur *Avahi laniger*, fork-marked lemur *Phaner furcifer*, ring-tailed lemur *Lemur catta*, Verreaux's sifaka *Propithecus verreauxi*, and diadem sifaka *P. diadema*. Two lepilemurs, *L. mujstelini* and *L. leucopus* also occur. At least four, possibly six, carnivores occur, including the fossa *Cryptoprocta ferox* and the Malagasy civet *Fossa fossa*.

Conservation Management Principal management at present is in the north-east of Parcel 1, near the village of Vohibaka, where a scheme to prevent fires spreading into the reserve has been started by the Chef de Cantonnement Forestier. Villagers have been using back fires to clear a 20m wide firebreak which also delineates the boundary of the reserve. Payment for this work up to the present has been in the form of food provided personally by the Chef de Cantonnement Forestier. O'Connor *et al.* have made several suggestions for improving management of the reserve: 1. Review of the present boundaries; there are large areas of the reserve which are devoid of forest and it is suggested that these be excluded from the reserve in exchange for equal areas of forest. This is particularly advocated for the thorn forest, of which there are considerable intact areas around parcel 2, as it is perceived as under increasing pressure for charcoal production and exploitation of *Alluaudia* wood. The boundaries of parcel 1 are in question at present as the original markers were incorrectly placed. 2. Clear delineation of boundaries, involving extension of the firebreak scheme around Vohibaka. The possibility of fencing parcel 3 should be investigated - its small size makes fencing feasible and its proximity to the main road makes it desirable. 3. An increase in the number of guards to ten, preferably employing local villagers, and provision of uniforms. 4. Provision of transport for the Chef de Cantonnement Forestier. 5. Promotion of local agricultural development schemes to alleviate pressure on the reserve. The critical need for funding for these activities is stressed.

Zoning None apart from the three defined areas.

Disturbances or Deficiencies All three parcels have deforested areas; in parcel 1 these are presumed to be largely the result of bush fires, in parcel 2 a product of wood-cutting and in parcel 3 a combination of the two. The lower, flat areas are used to cultivate rice while the higher areas are used as cattle pasture, and are burned annually to provide new growth for grazing. In parcels 1 and 2 these areas are extensive, though few are of recent origin; in parcel 1, however, bush fires are likely to be a problem near border villages, particularly near Eminiminy on the eastern side of the reserve. Slopes within the reserve here were noted by O'Connor *et al.* (1985) to be devoid of forest and it was thought likely that the villagers no longer considered them part of the reserve. There was also some evidence that the extent of cultivated land in the reserve was expanding in the southern end of parcel 1, north of the village of Isaka Ivondro; houses were noted within the reserve and new clearings were observed along the Ambahibe River. Fires have been recorded in the vicinity of Parcel 3 and could pose a serious threat to the area if not controlled. Livestock habitually graze within the reserve boundaries and wood-cutting is a problem where villages occur near to forested parts of the reserve. Wood taken from Parcel 1 is used mainly for fuel in homes whereas that taken from Parcel 2 is used for fuel and house building and is also taken for sale to markets in Ambovombe, Amboasary and Taolanaro. There is, however, as yet no evidence for large-scale logging within the reserve. Hunting is generally not a major problem, though may be of some importance in the north and east of Parcel 1 where cattle thieves hide and in parcel 3 where the *Lemur catta* population has been reduced as a result of hunting for food. Elsewhere such hunting as occurs appears to be mainly as a pastime rather than to provide a significant supply of protein. It is thought likely that some animals, particularly lemurs, are caught alive for sale as pets. The reserve is seriously understaffed, with only two guards and a Chef de Réserve covering over 76,000ha.

Visitor Facilities None. Access to Parcel 1 is difficult, although a road runs from Ranomafana to Isaka Ivondro on the eastern boundary. There are four paths, three of which follow the boundaries of the parcel with the fourth cutting through from east to west (Andonabe to Evasia). Parcel 2 is more accessible, from the road from Amboasary to Hazafotsy which continues to Ambatoabo, crossing the northern boundary of the parcel; this road is passable for most of the year and from it a path cuts south to Bevilany. Parcel 3 is easily accessible from R.N.13 which runs from Fort Dauphin to Amboasary.

Scientific Research The area has been surveyed in the past (Paulian *et al.*, 1973); *Propithecus* has been the subject of a brief study by Richard at Hazafotsy (Parcel 2). There area is at present the subject of study by O'Connor.

Special Scientific Facilities None, although there is a hut at Hazafotsy owned by the government agronomy service which has been used by visiting scientists.

Principal Reference Material

- * Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.
- * O'Connor, S., Pidgeon, M., and Randria, Z. (1985). A conservation program for the Andohahela Reserve (Réserve Naturelle No. 11). Paper given at 'Seminaire Scientifique international sur l'état de recherche sur l'équilibre des écosystèmes forestiers de Madagascar.' Antananarivo, October 1985.
- * Paulian, R., Blanc, C., Guillaumet, J.-L., Betsch, J.-M., Griveaud, P. and Peyrieras, A. (1973). Etude des écosystèmes montagnards dans la région malagache. II Les chaînes Anosyennes. Géomorphologie, climatologie et groupements végétaux. Campagne RCP 225 1971-1972. *Bull. Mus. Nain. Hist. Nat. Paris* 3° sér. no. 118 Ecol. 1: 1-40.

Staff A Chef de Réserve (i.e. the Chef de Cantonnement Forestier et Poste R.N. 11), a Chef de Poste Est and a second guard, posted at Hazafotsy (see below).

Budget Salaries paid by the government

Local Park or Reserve Administration Protection of the reserve is coordinated by the Chef de Cantonement Forestier et Poste R.N. 11, who is located at Amboasary-Sud. There are two guardposts, one at Eminiminy on the eastern side of Parcel 1 (Poste Est), the other at Hazafotsy on the northern boundary of Parcel 2.

Date 1986

RESERVE NATURELLE INTEGRALE DE L'ANDRINGITRA (NO. 5)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.03.01 (Malagasy rain forest)

Legal Protection Total

Date Established 31 December 1927

Geographical Location South of Ambalava in the Province of Fianarantsoa. The village of Antanifotsy is situated on the edge of the reserve. 22°07'-21'S, 46°47'-47°02'E.

Altitude 1,200-2,658m

Area 31,160ha

Land Tenure Government land

Physical Features The Andringitra mountain chain which constitutes the reserve is a very hilly, granitic massif in the form of a V with unequal length branches; where these meet the massif forms a plateau at about 2,500m with very uneven relief. The massif contains the sources of many streams and has the coldest climate of any of the Madagascan mountains, with severe frosts recorded at high altitude and several snowfalls at above 2,500m in the last 40 years; lower altitudes in the reserve generally have the characteristic cool climate of the high plateaux with three or four dry months. Annual rainfall is 1500-2000mm. On the eastern slopes, the climate is rather more equable.

Vegetation Part of the reserve is characteristic of the high plateaux and part is the same formation as the eastern province. In the early 1970s it was reported that much of the natural vegetation of the massif below 1,800m had long been destroyed by fire, apart from that on the south-east slopes and in some ravines and other sheltered areas. Where destroyed, the vegetation has been replaced by grassy steppe. The south-east slope contains mid-altitude evergreen rain forest. The surviving vestiges of the original vegetation suggest that the western slopes must have carried moss forest with herbaceous undergrowth and, up to 1,700m, a woodland containing the endemic palm *Ravenia glauca*. Above this ericaceous scrub is found, with scattered peaty depressions (notably carrying the remarkable *Restio madagascariensis*) and 'xerophytic lawn'. On the crags is a xerophytic flora with *Aloe*, *Kalanchoe* and *Helichrysum*. The whole area is rich in endemics: 80% of the flora of the humid depressions and the rocks is endemic to the massif.

Fauna At least 23 species of amphibian (all anurans) have been recorded from the massif. Most or all of these can be expected to occur in the reserve. These include seven believed to be endemic to the massif: *Anodonthyla montana*, *Mantidactylus bipunctatus*, *M. blanci*, *M. bourgati*, *M. madecassus*, *Boophis brygooi*, and *B. laurenti*. Two molluscs are also believed endemic to the massif, *Tachyphasis milloti* and *Imerinia fischeri*. Lemur species reported to

occur include: ring-tailed lemur *Lemur catta* (at the limit of its range), mongoose lemur *Lemur mongoz*, diadem sifaka *Propithecus diadema*, ruffed lemur *Varecia variegata* and russet mouse-lemur *Microcebus rufus*; the reserve is also within the range of *Lepilemur microdon*. Two little-known endemic rodents, *Brachyuromys betsiloensis* and *B. ramirohitra*, have been collected. Information on birds is scanty.

Conservation Management The boundaries were fixed in 1966; in 1971 it was reported that they were annually maintained by local inhabitants. The principal conservation measure is firefighting. It is reportedly one of the best protected reserves, and local inhabitants are said to be well aware of its value.

Zoning None

Disturbances or Deficiencies Little human occupation but there is a serious fire problem. Fires are usually started by lightning though are sometimes the result of spread from the firing of pasture-land outside the reserve.

Scientific Research Study of highland ecosystems in 1970 for RCP 225 (Paulian *et al.*, 1971). &k

Special Scientific Facilities None

Principal Reference Material

- ° Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.
- ° Paulian, R., Betsch, J-M., Guillaumet, J-L., Blanc, C. and Griveaud, P. (1971). RCP 225. Etude des écosystèmes montagnards dans la région malgache. I. Le massif de l'Andringitra. 1970-1971. Géomorphologie, climatologie et groupements végétaux. *Bulletin de la Société d'Ecologie* II(2-3): 189-266.

Staff One agent and two full-time auxiliaries

Budget Salaries paid by the government

Local Park or Reserve Administration Headquarters at Ambalavo and a guardpost at Ivohibe.

Date 1986

RESERVE NATURELLE INTEGRALE DE L'ANKARAFANTSIKA (NO. 7)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.09.04 (Malagasy woodland/savanna)

Legal Protection Total

Date Established The integral reserve was established by a decree of 31 December 1927, and updated by decree 66-242 of 30 June 1966.

Geographical Location In Mahajanga Province 40km north-west of Ambato-Boéni. 15°59'-16°22'S, 45°56'-47°12'E.

Altitude 75-390m

Area 60,520ha, bordering a Réserve Naturelle to the west which covers some 20-30,000ha.

Land Tenure Government

Physical Features Very rugged relief to the east, with a cliff which makes access difficult. Towards the west and north, the plateau descends gently. The soils of the plateau are very sandy. Precipitation is between 1000 and 1500mm a year with a marked dry season of five-six months (May-November). Mean annual temperature is c. 26°C, with maximum 35°C and minimum 17°C. The reserve protects a sample of habitats typical of the arenaceous soils of western Madagascar, and also protects the catchment of one of Madagascar's most important rice growing areas. Problems occur in the paddy fields downstream when sand eroded from cleared areas is carried by the rivers.

Vegetation Still largely covered in the original forest vegetation. Forest is dense and dry of the series *Dalbergia-Commiphora-Hildegardia*. Numerous Leguminosae and Myrtaceae. Some species adapted to dry environments such as *Pachypodium*, and members of the families Ampelidaceae and Passifloraceae. Numerous lianes, but epiphytes are virtually absent. The forest is deciduous, and contains a wide variety of trees and shrubs at a high density (about 170 species of 35 families).

Fauna There is a diverse avifauna, with some 90 recorded species; around 30 of these are endemic to Madagascar, including the white breasted mesite *Mesitornis variegata* (R), Van Dam's vanga *Xenopirostris damii* (R), and the Madagascar little grebe *Tachybaptus pelzelni* (K). The highly endangered Madagascar Fish Eagle *Haliaeetus vociferoides* (E) is also reported. Seven lemur species occur, namely: Verreaux's sifaka *Propithecus verreauxi*, woolly lemur *Avahi laniger*, brown lemur *Lemur fulvus*, fat-tailed dwarf lemur *Cheirogaleus medius*, mongoose lemur *Lemur mongoz*, lesser mouse-lemur *Microcebus murinus*, sportive lemur *Lepilemur*. The fossa *Cryptoprocta ferox*, two rodents, *Macrotrarsomys ingens* (only known from the Ankarafantsika forest) and *M. bastardi*, and two insectivores, the tail-less tenrec *Tenrec ecaudatus* and the greater hedgehog tenrec *Setifer setosus* have also been recorded. At least two swallowtail butterflies occur, *Papilio morondavana* and *P. grose-smithi*. Information on reptiles and amphibians is sparse, though reptiles are believed to be abundant and two chameleons, *Brookesia decaryi* and *Chamaeleo angeli*, and one skink *Pygomeles petteri* are apparently endemic to the area.

Conservation Management WWF/IUCN are assisting in the development of the reserve. The present project is aimed principally at improving the protection of the reserve, including the cutting of limited paths, seen as essential for the patrols of the Guard Force, and restoration of the deteriorated boundary markers and the forest station in the adjacent natural reserve. Allocation is made for the provision of equipment both for scientific study and for the better management of the reserve. The project covers an inventory of the flora and fauna by the University of Madagascar, and many other scientific studies including conservation-orientated research to be done on the vegetation of the reserve. It has been suggested that the Ampijoroa lake and the hills to the north of the lake should be included in the reserve, as it is here that tourists from Antananarivo and Mahajanga can best observe the typical fauna of the region.

Zoning None

Disturbances or Deficiencies Undermanning, frequent fires during the dry season and penetration by cattle; in 1972 it was reported that poaching was frequent. The reserve was burned over three-quarters of its area in 1966-67 and burned again in 1968, and it was at that time thought to be in a very degraded state. The area was surveyed by air in June 1981 and found not to have suffered major deterioration, except in the north and east where access is easy. Some regeneration is taking place over areas burned or cut. The borders of the reserve are not marked on official maps, and a review of the boundaries has become necessary.

Visitor Facilities No information

Scientific Research Some primate studies have been made in the reserve, particularly on range sizes and diet; the University of Madagascar also has study areas here. Entomological research has been carried out in the area.

Special Scientific Facilities The forestry station at Ampijoroa is used by research workers in the area.

Principal Reference Material

- ° Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.
- ° IUCN/WWF Project 1911. Protection and development of the Ankarafantsika Nature Reserve.
- ° Martin, C. (1982). Rapport de la mission technique WWF/IUCN à Madagascar 1981. IUCN/WWF, Gland, (contains a list of birds and mammals found within the reserve).

Staff Two full-time auxiliaries

Budget Salaries paid by the government. WWF allocated budget: US\$17,649 to 1981; US\$81,900 in 1982 and US\$20,000 in 1983. WWF Tropical Forest Campaign grant of US\$50,000 over 3 years from 1983.

Local Park or Reserve Administration The headquarters is at Bevazaha.

Date 1986

RESERVE NATURELLE INTEGRALE DE BETAMPONA (NO. 1)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.03.01 (Malagasy rain forest)

Legal Protection Total

Date Established 31 December 1927. The area of the reserve was fixed by Decree 66-242 of June 1966.

Geographical Location The reserve is situated 40km to the north-west of Toamasina in Toamasina Province. 17°51'-55'S, 49°12'-15'E.

Altitude 275-650m

Area 2,228ha

Land Tenure State land

Physical Features The reserve occupies a rocky spur which dominates the coastal plain and consists of a family of ridges varying in height from 320m to 650m above sea level. It is a rugged zone where numerous streams have their sources. Climate is humid tropical with precipitation over 2000mm a year and no dry months. Mean annual temperature is between 21° and 24°C, though in the colder months mean temperature can be as low as 12°C. The reserve is an example of the natural low altitude biotope of the eastern region of Madagascar.

Vegetation Betampona is the sole forested massif in a vast deforested area, and although the sides of the massif have been deforested, the vegetation has re-established itself to some degree (see below). The undegraded vegetation is low altitude dense evergreen rain forest which is extremely rich floristically and is the type locality for many species. It is characterised by species of Myristicaceae and *Anthostema* (Euphorbiaceae); other notable species are *Canarium madagascariensis* (Burseraceae), *Sideroxylon* sp., *Faucherea ursii* (both Sapotaceae), *Rhopalocarpus* sp. (Sphaerosepalaceae), *Hirtella* sp. (Chrysobalanaceae). Also present are members of the tribe Areceae (Palmae) and the families Rubiaceae, Araliaceae, Ebenaceae, Sapindaceae, Loraceae, Myrtaceae, Flacourtiaceae and Leguminosae. Local dominance of *Uapaca thouarsii* and glades of the bamboo *Cephalostachyum madagascariensis* occur. Much of the central southern edge of the reserve, notably along the Fontsimavo River and its tributaries, is composed of the colonising *Eugenia jambos*. Secondary forest has considerably advanced, especially along the central track from Sorintsandry to Marovato, an area which had not been cleared in 1947.

Fauna Information on many groups is lacking, though mammals appear to be particularly diverse, with nine species of Lemur, namely woolly lemur *Avahi laniger*, ruffed lemur *Varecia variegata*, grey gentle lemur *Haplemur griseus*, russet mouse-lemur *Microcebus rufus*, indri *Indri indri*, greater dwarf lemur *Cheirogaleus major*, diadem sifaka *Propithecus diadema*, brown lemur *Lemur fulvus* and a *Lepilemur*, probably *L. mustelinus*, the weasel lemur. Four viverrids, ring-tailed mongoose *Galidea elegans*, fassa *Cryptoprocta ferox*, Malagasy civet *Fossa fossa*, and falanouc *Eupleres goudotii* also occur. The endangered aye-aye *Daubentonius madagascariensis* has been reported, but this needs confirmation. Birds are also reported to be abundant, with many endemic species, and one frog *Plethodontohyla coudreaui* is apparently known only from this reserve.

Conservation Management The reserve is clearly delimited by a 3-metre wide band cleared around the perimeter and has a good internal path network. Insufficient funds and staff are available at present for further management.

Zoning There was formerly a 200m protective zone around the reserve, set up in 1935; Pollock reported in 1985 that it had recently been reclaimed by local villagers for residential and exploitative purposes.

Disturbances or Deficiencies A degraded zone some 1,000-1,500m wide lies within the reserve boundaries, consisting largely of 20-25 year old growth of *Ravenala madagascariensis* and other 'savoka' species. This represents an area of regeneration following cultivation: the existence of tavy cultivation and the corresponding threat to the forest edges was first remarked in 1908. The situation had not markedly improved in 1931 and although the Reserve Intégrale was first declared in 1932 and the protective zone in 1935, real protection was not initiated until 1949; the regeneration presumably dates from then. Forest cover within the reserve thus totals some 1,000ha. It is surrounded by numerous villages, situated within 1km of the reserve and often less, and there are incursions into the reserve: Pollock noted in 1984 that there were clear signs of crayfish catching in the upper Fontsimavo River within the reserve, and that a local merchant had recently been arrested for shooting lemurs in the central part of the reserve.

Visitor Facilities None. Access to the reserve is on foot (90 minutes walk) from the village of Fontsimavo, which is 90 minutes by car from Toamasina (Pollock, 1985).

Scientific Research None appears to have been carried out recently.

Special Scientific Facilities None

Principal Reference Material

- ° Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.

* Pollock, J.I. (1985). Preliminary report on a mission to Madagascar by Dr. J.I. Pollock in August and September 1984. Unpublished. 10pp.

Staff One agent and two auxiliaries, full-time

Budget Salaries paid by the government

Local Park or Reserve Administration Headquarters at Rendrirendry. This village consists of the dwelling quarters of two families, the local office of the Direction des Eaux et Forêts and a 'gite d'étape' or rest-post for the guardian of the reserve, who lives in Toamasina.

Date 1986

RESERVE NATURELLE INTEGRALE DE LOKOBE (NO.6)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.9.4 (Malagasy Woodland/savanna)

Legal Protection Total

Date Established 31 December 1927, though the Forêt de Lokobe was constituted as a reserve in 1913

Geographical Location On the south-eastern side of the island of Nosy-Bé with the coast forming the southern and eastern borders of the reserve. 13°23'-13°25'S, 48°18'-48°20'E.

Altitude 0-430m (the highest point on the island)

Area 740ha

Land Tenure Government

Physical Features The island of Nosy-Bé is formed of a neogenous basaltic block and marine sediments of the upper Lias. The relief is steep and rugged in places. The reserve is an important water catchment area for the island. There is a 'sambirano' type climate, similar to eastern Madagascar (moist sub-equatorial) but with a lower rainfall and more marked dry season.

Vegetation The reserve contains most of the island's remaining forest, a dense humid forest with species of the family Chlaenaceae (endemic to Madagascar) and numerous species of the genus *Anthostema*. Biologically and physiologically, it resembles the eastern rain forest, but is distinguished by the presence of numerous endemics.

Fauna The fauna is reportedly less rich than that on adjacent mainland areas, but it is still diverse, with a number of species apparently endemic to the island. Seven species of amphibian and 34 species of reptile have been recorded from the island; most or all of these can be expected to occur in the reserve. One amphibian, *Platyplepis milloti*, is only known from the reserve and seven reptiles have been recorded only from Nosy Bé, namely *Lygodactylus heterurus*, *Brookesia legendrei*, *B. minima*, *Chamaeleo boettgeri*, *C. parsonii*, *Amphiglossus stumpffi*, *Typhlops madagascariensis*, and *T. reuteri*. Thirty-six non-marine molluscs endemic to Madagascar have also been recorded from Nosy Bé, including four which are apparently endemic to the island, *Tropidophora felicitis*, *Sitala brancsikii*, *S. filomarginata* and *Ampelita stumpffi*. Of the lemurs, an important colony of black

lemur *Lemur macaco* occurs in the reserve, as well as *Lepilemur dorsalis*, brown lemur *Lemur fulvus*, russet mouse-lemur *Microcebus rufus*, and lesser mouse-lemur *M. murinus*. There is little information on bird species.

Conservation Management There are proposals to increase the effectiveness of the reserve both by increasing its size, and by providing vehicles for the staff. Use of surrounding areas for tourism could be a valuable source of income. Support under IUCN/WWF Project 1952 will help to buy motorcycles and assist in the protection of a 150-200ha buffer zone planned in the north-east.

Zoning No information

Disturbances or Deficiencies The reserve is very vulnerable because of its small size. The proposed buffer zone, which is not yet formally protected, is being cut down for cultivation of rice and manioc.

Scientific Research Prospecting and inventory work has been carried out (IUCN/WWF Project 1952). Much work has been done on the island of Nosy Bé generally and the sea area around it by scientists at the O.R.S.T.O.M. research station (ORSTOM, 1975).

Special Scientific Facilities The Centre National de Recherches Océanographiques owns a laboratory close to the reserve, but the work has always been marine-orientated.

Principal Reference Material

- ° IUCN/WWF Project 1952. Support and equipment for reserves and national parks.
- ° ORSTOM (1975). *Publications de la mission ORSTOM de Nosy-Bé du 1.1.1972 au 31.12.1974*. ORSTOM, Paris.

Staff One agent

Budget Salaries are paid by the government. WWF Funding (1982) - US\$22,000 over two years

Local Park or Reserve Administration Headquarters are at Hell-ville on the island of Nosy-Bé.

Date 1986

RESERVE NATURELLE INTEGRALE DE MAROJEJY (NO. 12)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.03.01 (Malagasy rain forest)

Legal Protection Total

Date Established 3 January 1952

Geographical Location To the north-west of Andapa in the province of Antseranana in the northern part of the country. 14°18'-39'S, 49°33'-52'E.

Altitude 90-2,137m

Area 60,150ha

Land Tenure Government

Physical Features The massif is, perhaps, the most important of the whole island on account of its spectacular scenery, its floristic richness and, above all, its appearance of being virtually untouched throughout, including the foothills (though some damage has been done at low altitude). Its slopes are protected by the frequency of rains and storms. It includes the massif of Marojejy, and its principal foothills, notably Ambatosoratra, Ambodilahitra and Beondroka. Very rugged massif chiefly composed of gneiss, which is divided into three main blocks. At around 1,100m, the mid-slopes become increasingly steep, leading up to narrow quartzite ridges which precede the rocky escarpments encircling the west slopes of the massif. There is a wide range of microclimates. Rainfall on the eastern and south-eastern slopes is thought to reach or exceed 3000mm a year, which would be the highest rainfall in Madagascar.

Vegetation Overall, plant species diversity is very high, with over 100 genera and 2000 species recorded, several apparently endemic to the massif. Humbert (1955) has given a detailed description of the vegetation of the Marojejy Massif, divided into four altitudinal zones. The lowest zone, from 50m to ca 800m is high, dense, closed canopy rainforest, with a canopy height of 25-30m and relatively clear horizontal stratification. Species diversity is very high. The most commonly represented families in the canopy are: Euphorbiaceae, Rubiaceae, Araliaceae, Ebenaceae (*Diospyros*), Sapindaceae, Sapotaceae, Anacardiaceae, Elaeocarpaceae (*Echinocarpus*), Lauraceae (*Ocotea*, *Ravensara*), Clusiaceae (*Ochrocarpus*), Myrtaceae, Burseraceae (*Canarium*), Moraceae, Bignoniaceae, Apocynaceae, Tiliaceae, Malpighiaceae, Monimiaceae, Flacourtiaceae, Loganiaceae. The intermediate stratum consists of small trees and large shrubs, mostly of the families Rubiaceae, Euphorbiaceae, Ochnaceae, Erthyroxyloaceae, Myrsinaceae, Celastraceae, Violaceae, Flacourtiaceae. The ground layer is generally patchy, consisting of grasses and herbs, generally of the families Labiaceae, Acanthaceae, Gesneraceae, Melastomaceae, Balsaminaceae. Epiphytes are abundant. Transition from this stage to mid-altitude rainforest is made gradually, at around 800-900m. This zone is characterised by a lower canopy height (18 to 25m), with canopy trees generally branching lower down their trunks; the intermediate stratum tends to disappear, while the ground layer becomes denser and more varied. Although the species represented are generally different from those in the lower altitude forest, the families, and to some extent the genera, tend to be the same. Trees which are notably abundant or considered characteristic include species of *Weinmannia*, *Apodocephala*, *Brachylaena* and *Podocarpus*. Pteridophytes, particularly members of the Cyathaceae, are also abundant. Lichen or moss forest is best developed between 1,450 and 1,850m, although it can be found as low as 1,200m altitude. Tree height is up to 6-10m (max. 12m), with trees often branching extensively from their bases. There is no intermediate stratum, but a dense and varied ground layer. Trees and shrubs mostly belong to the families Compositae (*Vernonia*, *Senecio*, *Apodocephala*, *Psiadia*), Lauraceae, Rubiaceae, Cunoniaceae (*Weinmannia*), Araliaceae (*Cussonia*), Euphorbiaceae (*Uapaca*, *Acalypha*, *Croton*), Rutaceae, Verbenaceae (*Vitex*, *Clerodendron*), Ericaceae (*Agauria*, *Philippia*), Sterculiaceae (*Dombeya*), Taxaceae (*Podocarpus*), Myricaceae (*Myrica*). Virtually monotypic stands of the bamboo *Arundinaria marojejensis* are found on the least developed soils. Mosses and lichens are very abundant, both as ground cover and festooning trees and shrubs. Other epiphytes include ferns, species of *Peperomia* and orchids such as *Bulbophyllum*. Above 1,850m altitude is found vegetation which, depending on soil conditions and microclimate, has the appearance either of maquis or of heath. Shrubs chiefly belong to the families Compositae, Ericaceae, Rubiaceae, Melastomaceae, Clusiaceae, Araliaceae, Euphorbiaceae, Myrtaceae; less numerous are members of the Cunoniaceae, Flacourtiaceae, Sapotaceae, Pittosporaceae, Sterculiaceae, Rutaceae, Verbenaceae, Vacciniaceae. *Arundinaria marojejensis* forms scattered dense stands and tree ferns (Cyatheaceae) are found to ca 2,000m altitude. Herbaceous plants consist largely of sedges (Cyperaceae) and grasses (Gramineae) and there are small marshes and swampy depressions with a distinctive floral community.

Fauna The reserve is an important area for birds; around 30 species endemic to Madagascar have been recorded, including four threatened species, the rufous-headed ground-roller *Atelornis crossleyi* (R), short-legged ground roller *Brachypteracias leptosomus* (R), scaley ground-roller *B. squamigera* (R), and Pollen's vanga *Xenopirostris polleni* (R). The endangered Madagascar Serpent Eagle *Eutriorchis astur* (E) is also reported to occur. Seventeen amphibians (all endemic to Madagascar) are recorded from the massif, including seven endemic

to the region (*Mantipus minutus*, *M. serratopalpebrosus*, *Stumpffia grandis*, *S. roseifemoralis*, *S. tridactyla*, *Mantidactylus klemmeri* and *M. pseudoasper*). Thirteen reptiles (including eleven chameleons) have been recorded; several of these are of uncertain taxonomic status, while two are believed endemic to the massif (*Brookesia griveaudi* and *B. karchei*). Lemur species recorded include: diadem sifaka *Propithecus diadema*, brown lemur *Lemur fulvus*, grey gentle lemur *Hapalemur griseus* and russet mouse-lemur *Microcebus rufus*. The fossa *Cryptoprocta ferox* and ring-tailed mongoose *Galidea elegans* also occur. Eleven molluscs have been recorded, including two endemic to the massif (*Ampelita gaudens* and *Malagrian paenelimax*).

Conservation Management Because of the climate and the severity of the terrain, pressure from the surrounding population is limited, as is the extent of clearing for tavy. Special attention must be made to protection of the high summits, whose vegetation remains as yet unburnt, and which represents one of the last vestiges of the original high altitude vegetation surviving intact in Madagascar.

Zoning None

Disturbances or Deficiencies Illicit cultivation at low altitudes which must be stopped as soon as possible, as deforestation of the lateritic slopes would have disastrous consequences for the economy of the Lokoho basin.

Visitor Facilities None, though the reserve is relatively easily accessible from Manantenina.

Scientific Research One of the best studied massifs, first surveyed in 1933.

Special Scientific Facilities None

Principal Reference Material

- ° Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.
- ° Guillaumet, J-L., Betsch, J-M., Blanc, C., Morat, P., Peyrieras, A. and Paulian, R. (1975). Etude des écosystèmes montagnards dans la région malgache. III. Le Marojezy. IV. L'Itremo et l'Ibity. Géomorphologie, climatologie, faune et flore (Campagne RCP 225, 1972-1973). *Bull. Mus. Natn. Hist. Nat.* (3). 309. (Ecol. generale): 25, 27-67.
- ° Humbert, H. (1955). Une merveille de la nature à Madagascar. Première exploration botanique du Massif de Marojezy et de ses satellites. *Mém. Inst. sci. de Madagascar. Série B*. Tome VI. P.271.

Staff An agent and three auxiliaries full-time

Budget Salaries paid by the government

Local Park or Reserve Administration Headquarters at Andapa, and guardposts at Doany and Ambalamanasy.

Date 1986

RESERVE NATURELLE INTEGRALE DE TSARATANANA (NO. 4)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.09.04 (Malagasy woodland/savanna)

Legal Protection Total

Date Established 31 December 1927

Geographical Location To the south-east of Ambanja in the province of Antseranana. 13°49'-14°05'S, 48°44'-59'E.

Altitude 700-2,876m (Mt. Maromokotra, the highest summit in Madagascar).

Area 48,622ha

Land Tenure Government

Physical Features Large mountain group of crystalline rocks and volcanic formations of the Miocene. Mont Maromokotra, the highest mountain in Madagascar, is found in this reserve. The climate has the same characteristics as the Malagasy rain forest and is extremely wet. During summer, especially the monsoon season (end of November to the beginning of May), there are virtually daily torrential rainstorms. From May to October, the summits are covered with fog accompanied by drizzle and fine rain. October and November are relatively dry.

Vegetation In general, the vegetation consists of primary and secondary tropical evergreen forests of both high and low altitude with both lichens and ericaceous species common. The flora is rich in endemics especially at high altitude. From 1,000 to 2,200m, the principal plants found are: *Podocarpus madagascariensis*, *Canarium*, *Aphloia theiformis*, *Ruvensara*, *Ocotea*, *Beilschmiedia oppositifolia*, *Malleastrum*, *Noronhia*, *Erythroxylum corybosum*, *Dichaetanthera*, *Eleacarpus*, *Coffea tsaratananae*, *Gardenia*, *Peddiea involucreata*, *Buddleia*, *Sennecio*, *Vernonia*, *Oncostemum*, *Acanthaceae*, *Labiaceae* (*Coleus*), *Urticaceae* (*Pilea*), *Panicum uvulatum*, *Poecilostachys tsaratananensis*, *Oplismenus*, *Leptaspis cochleata*. Tree ferns of the family Cyatheaceae do not seem to be very abundant; however this appears to be optimum habitat for epiphytes such as *Peperomia*, *Kalanchoe*, *Medinilla*, *Viscum*, *Rhipsalis* and numerous ferns and orchids. From 2,000 to 2,200m there is a belt of virtually pure giant bamboo. Above 2,200m there is moss forest with *Araliaceae*, *Cunoniaceae* (*Weinmannia*), *Compositae*, *Ericaceae* (*Agauria*, *Philippia*), *Sterculiaceae* (*Dombeya*), and *Taxaceae* (*Podocarpus rostratus* and *P. madagascariensis*). *Chrysalidocarpus* (Palmae) is also found. Epiphytes are very common. Understorey, when it exists, is composed of small trees: *Schismatoclada*, *Helichrysum*, *Philippia*. Around 2,600m there is a second band of bamboos, then shrubby and herbaceous vegetation on the summits, secondary and depauperate through fire, of blackened *Philippia* in a grassy lawn (*Danthonia*, *Bromus*, *Anthoxanthum*, with scattered *Helichrysum*).

Fauna Around 50 bird species endemic to Madagascar have been recorded, including Crossley's ground roller *Atelornis crossleyi* (I). Three amphibians are believed endemic to the massif: *Mantopus guentherpetersi*, *Platyhyla alticola* and *P. tsaratananaensis*, as are two reptiles: *Chamaeleo tsaratananensis* and *Amphiglossus tsaratananensis*. The massif is the most important area on Madagascar for molluscs, with 45 species recorded; 30 of these are apparently endemic to the massif. Lemurs are represented by: black lemur *Lemur macaco*, brown lemur *Lemur fulvus*, fork-maked lemur *Phaner furcifer*, grey gentle lemur *Hapalemur griseus*, greater dwarf lemur *Cheirogaleus major*, a *Lepilemur* species (possibly *L. flavifrons*), and red-bellied lemur *Lemur rubriventer*.

Zoning No information

Disturbances or Deficiencies Some illicit cultivation; however, apart from the burned summits, the reserve is largely intact, as the very cold winter temperatures and the steepness of the terrain limit attempts at planting. Formerly, parts of the reserve were adversely affected by illicit plantations of tobacco and indian hemp. In 1968 and 1969, a police operation was organised to destroy the plantations and arrest the miscreants. These people were sufficiently well organized to make entry to the reserve dangerous if unarmed and unaccompanied. Outside the plantations were found herds of zebu cattle belonging to the same people. It is not known if this has been a problem more recently.

Scientific Research Numerous collecting trips have been carried out.

Special Scientific Facilities None

Principal Reference Material

- ° Albignac, R. (1970). Mammifères et oiseaux du Massif de Tsaratanana. *Mem. ORSTOM* 37: 223-229.
- ° Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.
- ° Milon, P. (1957). Etude d'une petite collection d'oiseaux du Tsaratanana. *Naturaliste Malgache* 3(2): 167-183.

Staff Two full-time forest agents.

Budget Salaries paid by the government

Local Park or Reserve Administration Headquarters are at Ambanja with a guard post at Mangindrano.

Date 1986



RESERVE NATURELLE INTEGRALE DE TSIMANAMPETSOTSA (NO. 10)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.10.04 (Malagasy thorn forest)

Legal Protection Total

Date Established 31 December 1927

Geographical Location 100km south of Toliara in the province of Toliara. 24°02'-11'S, 43°36'-51'E.

Altitude 10-160m

Area 43,200ha

Land Tenure Government

Physical Features The western part of the reserve comprises the shallow, brackish Tsimanampetsotsa lake (20 x 3km), saturated with sulphates of lime. The lake, which has shores of virtually unvegetated arenaceous soil, is aligned north-south and lies about 7km from

the west coast. To the east of the lake is xerophytic forest on calcareous bedrock. There are numerous underground caves. The climate is dry with precipitation below 400mm a year and 9-11 dry months. Amount and timing of rainfall can be very variable. Other forms of precipitation are likely to have a significant impact on the vegetation. The minimum temperature in the coolest months is between 15°C and 20°C.

Vegetation Xerophytic scrub on the calcareous plateau, and typical south-western brush formation on the arenaceous soils. The vegetation is a remarkable assembly of Didiereaceae (an endemic family of trees or shrubs with the habit of cacti or cactiform euphorbias) and Euphorbiaceae. Tree species 10-12m high dominate a stratum of impenetrable scrub, rich in lianas. The ground stratum is sparse. Generic endemism in the southern flora has been estimated at 48%. The reserve covers a part of the very restricted distribution of *Alluaudia montagnacii*. Plants show a wide variety of adaptations to xerophytic conditions. Numerous species of Leguminosae, Combretaceae, Tiliaceae and Liliaceae are found.

Fauna The reserve's avifauna includes at least 28 species endemic to the Madagascar region, including the plover *Charadrius thoracicus* (R). There are numerous other waterbirds, including the flamingoes *Phoenicopterus ruber* and *Phoeniconaias minor*. There is little information on reptiles and amphibians, though the radiated tortoise *Geochelone radiata* (V) (endemic to the southern *Didierea* forests) and probably the spider tortoise *Pyxis arachnoides* (I) occur. The lemurs *Lepilemur leucopus*, ring-tailed lemur *Lemur catta*, and Verreaux's sifaka *Propithecus verreauxi* are all present.

Conservation Management The boundaries are not marked on the ground, though the reserve was apparently, at least up to 1972, still well respected, as a local 'fady' (taboo) acted on local villagers in conjunction with the official protection, and the villagers did not like accompanying visitors into the reserve. The particular characteristics of the site (calcareous plateau surrounded by very rocky hillsides covered with an unflammable xerophytic bush and lakesides of practically bare soil) also shelter it from bush fires. The reserve is reportedly the only one without feral zebu cattle as there is apparently no, or very little, fresh water. There being no fish in the lake, there is no human disturbance for fishing. Overall, the reserve is therefore reported to be little disturbed and in good condition. The area in which it is situated is one of very low population density, and efficient surveillance could easily be carried out by controlling the exit to Androka and that to Toliara. The plateau which borders the lake should be included in the reserve and it would be advisable, for example, to protect the potholes facing Itampolo in which lives *Typhleotris madagascariensis*, a legally protected blind fish.

Zoning None.

Disturbances or Deficiencies Apparently relatively few (see above)

Visitor Facilities None

Scientific Research Little recent research appears to have been carried out.

Special Scientific Facilities None

Principal Reference Material

- ° Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.
- ° Germain, L. (1935). Etude du reserve naturelle du lac Manampetsa [sic]. *Ann. Sci. Nat. Zool.* XVII: 421-481.
- ° Milon, P. (1950). Deux jours au lac Tsimanampetsoa [sic]. Observations ornithologiques. *Naturaliste Malgache* 2(1): 61-67.

Staff One full-time auxiliary

Budget None

Local Park or Reserve Administration None

Date 1986

RESERVE NATURELLE INTEGRALE DU TSINGY DE BEMARAHA (NO. 9)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.09.04 (Malagasy woodland/savanna)

Legal Protection Total

Date Established 31 December 1927

Geographical Location To the east of Antsalova in the region of Antsingy, 18°13'-19°07'S, 44°34'-57°E.

Altitude 75-700m

Area 152,000ha, the largest natural reserve in Madagascar

Land Tenure Government land

Physical Features The reserve forms a part of the Antsingy region, a limestone karst area of very dissected relief with many caves and springs. Much of the eastern edge of the region is delimited by the Bemaraha cliff, several tens of kilometres long and 300 to 400m high. To the east of the reserve there are three north-south flowing rivers separated by successive ridges, while the whole western region of the reserve forms a plateau with rounded hillocks which slopes away, with decreasing steepness, to the west. The climate is generally dry and there are seven or eight dry months. Temperatures decrease from north to south but are always above 20°C.

Vegetation Vegetation is characteristic of the calcareous karst regions of the west, with many species unique to this formation, such as *Diospyros perrieri* (the ebony of the west coast), *Delonix regia*, and other species of the genus *Delonix*, and *Musa perrieri* (the only wild banana in Madagascar). Also baobabs *Adansonia*, and xerophytic plants such as *Aloe*. Other notable families include Flacourtiaceae, Orchidaceae, Leguminosae, Euphorbiaceae, Annonaceae, Bombacaceae and Moraceae. Climate and vegetation are very similar to that of the R.N.I. du Tsingy de Namoroka (No. 8), and the main vegetation types are dense, dry forest and savannah, but the much larger area and the greater height of the karst relief make the vegetation richer here.

Fauna A number of animals endemic to the region are found in the reserve, though published information is scanty. Particularly noteworthy is *Brookesia perarmata*, one of the strangest Malagasy chameleons. Various lemurs have been reported including: Verreaux's sifaka *Propithecus verreauxi*, brown lemur *Lemur fulvus*, grey gentle lemur *Hapalemur griseus*, lesser mouse-lemur *Microcebus murinus*, Coquerel's mouse-lemur *M. coquereli*, fork-marked lemur *Phaner furcifer*, and *Lepilemur edwardsi*. The area has greater species diversity than the similar though smaller Tsingy de Namoroka reserve.

Conservation Management There appears to be no active conservation management at present.

Zoning None

Disturbances or Deficiencies Access to much of the reserve is very difficult, resulting in many areas being naturally protected. However, a track crosses the reserve from east to west and accessible valleys are populated with zebu cattle; there are also reportedly illegal settlements within the reserve. Poaching has occurred, though it is not known if this continues to be a problem.

Scientific Research Very little. The area was apparently surveyed in the 1930s, though it is not known if the results have been published; in 1972 it was reported that a recent evaluation of the vegetation had been carried out, though further details are lacking. The reserve is of considerable archaeological interest, containing numerous ancient cemeteries.

Special Scientific Facilities None

Principal Reference Material

* Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.

* Leandri, J. (1938). La forêt d'Antsingy. *La Terre et la Vie*: 18-27.

Staff One agent and two full-time auxiliaries

Budget Salaries provided by the government

Local Park or Reserve Administration Reserve headquarters is at Antsalova with a guard post at Bekapaka

Date 1986

RESERVE NATURELLE INTEGRALE DU TSINGY DE NAMOROKA (NO. 8)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.09.04 (Malagasy woodland/savanna)

Legal Protection Total

Date Established 31 December 1927

Geographical Location To the south of Soalala in the province of Mahajanga. 16°19'-30'S, 45°16'-25'E.

Altitude 180-370m

Area 21,742ha

Land Tenure Government land

Physical Features The area comprises a calcareous massif (karst) with many cliffs and numerous caves and springs. Average rainfall is between 1000 and 1500mm a year, with a distinct dry season between May and November. Mean temperature in the coolest month is above 20°C.

Vegetation Like the Tsingy de Bemaraha (R.N.I. no 9), the reserve is a mosaic of dense dry forest, savanna and vegetation adapted to the calcareous karsts, belonging to the Dalbergia-Commiphora-Hildegardia association. The mean height of the trees is 12-15m. *Adansonia rubrostipa* is especially frequent. Many xerophytic and crassulacean plants. The area has a spring-fed stream with a remarkable aquatic flora. This reserve has lower species diversity than Tsingy de Bemaraha, whilst containing essentially the same biotopes.

Fauna Detailed information for most groups is lacking; birds are reported to be diverse, with records of around 20 Madagascan endemics, including at least four species of coucal *Coua* present. There are many reptiles and at least one species, the chameleon *Brookesia bonsi* is believed endemic to the area. Nine molluscs have been recorded, including one, *Bathia madagascariensis*, which is apparently endemic to the area. Four lemurs are known to occur: *Lepilemur edwardsi*, lesser mouse lemur *Microcebus murinus*, Verreaux's sifaka *Propithecus verreauxi*, and brown lemur *Lemur fulvus*.

Conservation Management Some 14km of footpaths are delimited within the reserve as passable at all times of the year.

Zoning None

Disturbances or Deficiencies Fires are frequent during the dry season. The human population around the reserve is fairly low and there is only one important village - Vilanandro. In 1972 it was noted that the local inhabitants were largely indifferent to the laws protecting the reserve, which was inadequately guarded; no fady (local taboo) protected the animals or plants of the region. Plantations of indian hemp have been found in the interior of the reserve and zebu cattle also occur within the reserve.

Visitor Facilities No information

Scientific Research No research appears to have been carried out recently.

Special Scientific Facilities None

Principal Reference Material

- * Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.

Staff One agent and a full-time auxiliary

Budget Salaries paid by the government

Local Park or Reserve Administration Reserve headquarters at Vilanandro

Date 1986

RESERVE NATURELLE INTEGRALE DE ZAHAMENA (NO. 3)

Management Category I (Strict Nature Reserve)

Biogeographical Province 3.03.01 (Malagasy rain forest)

Legal Protection Total

Date Established 31 December 1927

Geographical Location To the east of Ambatondrazaka in the Province of Toamasina, bordered to the south by the Onibe, to the east by the Ihofika River, to the west by the Vohimahery and to the north by the track running from Sahatavy to Imerimandroso. 17°26'-44'S, 48°56'-49°00'E.

Altitude 500-1,500m

Area 73,160ha, essentially divided into two blocks

Land Tenure State land

Physical Features The reserve consists of two zones well separated by a large piece of enclosed land. Relief is very uneven with steep-sided valleys; large landslides were recorded in the 1950s. Climate varies with altitude from an equatorial or tropical humid type, to one with a two or three month dry season (August to October). Mean annual rainfall is 1500-2000mm but may be considerably higher in the east. Average temperature of the coolest month is between 10°C and 15°C at higher altitudes.

Vegetation Generally characteristic of the eastern escarpment, with primary and secondary tropical evergreen forest, changing from forest with Myristicaceae and *Anthostema* typical at low altitude to forest with *Tambourissa* and *Weissmannia* between 800 and 1,300m. With increasing altitude, plants with temperate affinities appear, and there are notable deciduous species and belts of bamboo; the higher altitude forest when degraded transforms into ericaceous scrub with *Philippia*, *Agauria* and *Helichrysum*.

Fauna The fauna is typical of the eastern moist forest region. Nine lemur species have been recorded, namely indri *Indri indri*, diadem sifaka *Propithecus diadema*, ruffed lemur *Varecia variegata*, greater dwarf lemur *Cheirogaleus major*, woolly lemur *Avahi laniger*, grey gentle lemur *Haplemur griseus*, russet mouse lemur *Microcebus rufus*, brown lemur *Lemur fulvus*, and a *Lepilemur*, possibly *L. mustelinus*, the weasel lemur. Typical carnivores of the east coast found here are the fossa *Cryptoprocta ferox*, falanouc *Eupleres goudotii* and ringtailed mongoose *Galidea elegans*. Nearly 60 bird species endemic to the Madagascar region have been recorded in the reserve or the central enclave, as have 14 endemic amphibians and eight reptiles, although the number of reptile species occurring is certainly much higher.

Conservation Management Relatively little at present as the reserve is undermanned; the 1985 University of London Expedition financed the construction of a 2km firebreak along the western edge of the reserve.

Zoning None

Disturbances or Deficiencies Most of the western half and south-eastern parts of the reserve were noted in 1985 as having an unbroken canopy of good forest; a trail through the south-centre of the reserve passed through an abandoned clearing which was reverting to forest. Other than this, only a few trees had been selectively felled. However, the north-eastern corner of the reserve (near the enclave - see below) was under greater threat: the trail there was heavily used, an area of ca 1sq.km had been cleared for tavy and three lemur traps were found. The western edge of the reserve adjoined eucalyptus plantations and cultivated land, and faced threats from logging and fire. The central enclave was part of the

reserve as it was originally gazetted; the continued presence of several villages there led to the area being degazetted in 1966 (Decree 66-242). These villages were reported in 1971 as growing in size and representing a long-term threat to the integrity of the reserve; cultivation (by tavy), livestock grazing and poaching apparently occurred around the edges of the enclave (in the north-east corner of the reserve). In 1985, it was noted that the enclave had been cleared for agriculture except for some secondary scrub and a tiny area of relict forest.

Visitor Facilities None. Much of the reserve is virtually impenetrable and lacks trails.

Scientific Research Important entomological work has been conducted in the area. In 1985 a five person expedition from the University of London spent 32 days in the reserve, primarily surveying the avifauna, though also collecting amphibians and making observations on mammals and plants (particularly pteridophytes).

Special Scientific Facilities None

Principal Reference Material

- ° Andriamampianina, J. and Peyrieras, A. (1972). Les réserves naturelles intégrales de Madagascar. In: *Comptes rendus de la Conférence internationale sur la Conservation de la Nature et de ses Ressources à Madagascar, Tananarive, Madagascar 7-11 octobre 1970*. IUCN, Switzerland.
- ° Preliminary Report of the 1985 University of London Expedition to Madagascar.

Staff One agent and two auxiliaries full-time

Budget Salaries paid by the government

Local Park or Reserve Administration Headquarters at Manakambahiny Est

Date 1986

RESERVE SPECIAL BOTANIQUE AMBOHITANTELY

Management Category IV (Managed Native Reserve)

Biogeographical Province 3.09.04 (Malagasy woodland/savanna)

Legal Protection No information

Date Established 12 February 1982, upgraded from Forêt classée to a Réserve Spéciale Botanique.

Geographical Location On the Tampoketsa d'Ankazobe close to Antananarivo

Altitude 1,200-1,650m

Area 5,600ha

Land Tenure Government

Physical Features The reserve consists of 'tampoketsa', that is levelled off remains of ancient erosion surfaces at high altitude, generally forming highly dissected plateaux bordered by steep escarpments. The formation is assumed to be late Cretaceous in origin. Altitude of the

tampoketsa is 1,600m, though the forest descends to around 1,450m. Rainfall averages around 1,500mm per annum, with a marked wet season from November to March. Mean maximum temperature is 26°C, minimum 12°C.

Vegetation The area contains one of the few remaining vestiges of the central plateau forest, the rest having been destroyed, almost certainly largely by fire, over the past 1,000 years. In 1964, the forest consisted of a single tract of some 2,000ha on the eastern slope of the tampoketsa, with an additional 1,000ha of small scattered fragments mainly at the heads of valleys on the tampoketsa itself. The forest has very close floristic affinities with the eastern rain forest, especially at lower altitudes, where it appears to be more or less primary.

Fauna Virtually no information, although four amphibians and the widespread brown lemur *Lemur fulvus* have been recorded.

Conservation Management Ambohitantely is the focus for IUCN/WWF Project 1912, Protection and Management of Ambohitantely Forest Reserve. The reserve was first set up on the initiative of the Directorate of Water and Forests, with the support of WWF. This project, under the responsibility of the Plant Biology and Biochemical Service of Antananarivo University, is mainly scientifically orientated in support of management. Work is in progress on an inventory of the flora. The Plant Biology and Biochemical Service made two visits to the area in 1982 and three in 1983, with the aid of the WWF Representation, which provided the vehicle and fuel. WWF will also support the development of this newly established reserve. The area could be particularly valuable as a training area because of its proximity to Antananarivo. Studies made here will help in developing plans to reafforest the tampoketsa region using native trees, and will form the basis of a public conservation education campaign.

Zoning None

Disturbances or Deficiencies The most serious danger is fire, but boundaries also need to be marked, guards installed, access controlled, and paths maintained.

Scientific Research Studies of the fauna and flora, carried out by Antananarivo University, under IUCN/WWF Project 1912, concentrate on plants of medicinal, ornamental, or possible economic use, and on endangered or rare species. Studies also concentrate on the effect of fire on the vegetation.

Special Scientific Facilities There are no facilities within the reserve, but there are nearby facilities at Antananarivo.

Principal Reference Material

- ° Bastian, G. (1964). La forêt d'Ambohitantely, Madagascar. *Revue de Géographie* 5: 1-42.
- ° IUCN/WWF Project 1912. Protection and Management of Ambohitantely Forest Reserve.

Staff No information

Budget WWF/IUCN funding 1982/1983 - US\$37856

Local Park or Reserve Administration There is a forest station at Manankazo

Date 1986

RESERVE SPECIALE DE BEZA MAHAFAHY

Management Category IV (Managed Nature Reserve)

Biogeographical Province

Legal Protection Total

Date Established 1979; inaugurated November 1985.

Geographical Location Just west of the Sakamena River, about 35km north-east of Betioky-Sud; 23°30'S, 44°40'E. The reserve is divided into two non-contiguous parcels, one lying along the Sakamena River, the second some 5km west of the Sakamena.

Altitude Approximately 100-200m

Area 600ha in two parcels (one of 100ha, the second of 500 ha)

Land Tenure Government land

Physical Features The first (100ha) parcel borders the Sakamena River, which normally contains water during the rainy season, from November or December to March; for the rest of the year it is a dry sandy river bed (Richard *et al.*, 1985).

Vegetation The first parcel consists of low gallery forest, dominated by *Tamarindus indica*; the second consists of spiny forest dominated by *Alluaudia procera* with other members of the Didiereaceae and Euphorbiaceae (Richard *et al.*, 1985).

Fauna Four lemur species are present, namely Verreaux's sifaka *Propithecus verreauxi*, the ring-tailed lemur, *Lemur catta*, the white-footed sportive lemur *Lepilemur leucopus* and the grey mouse lemur *Microcebus murinus*; the fossa *Cryptoprocta ferox*, an endemic Madagascan viverrid has also been recorded as well as an endemic shrew *Suncus madagascariensis*, and four species of tenrec, *Echinops telfairi*, *Setifer setosus*, *Geogale aurita*, and *Tenrec ecaudatus*. This is the only known site where *Geogale aurita* is common (M. Nicoll, *in litt.*, 28.10.86). Thirty-eight bird species endemic to Madagascar or the Madagascan region have been recorded, including three Coua species and five Vangas. At least 18 species of reptile have been recorded, including the Radiated tortoise *Geochelone radiata* (V), the Madagascar side-necked turtle *Erymnochelys madagascariensis* (I), and *Acrantophis dumerilii*, an endemic boa confined to the south and south-west.

Conservation Management The smaller parcel is bounded by a barbed-wire fence, erected in 1979; the larger has a 3m swathe cut around it to delineate the boundaries. *Opuntia* has been planted to provide an effective barrier. Grids of trails have been cut within the reserve, these being 100m-to-a-side in the smaller parcel and 500m-to-a-side in the larger (Richard *et al.*, 1985).

Zoning None apart from the two defined areas.

Disturbances or Deficiencies The reserve appears to be well protected at present. Cattle and goats formerly ranged throughout the forests at Beza Mahafaly; since 1979 these have been excluded from the smaller parcel by the boundary fence, though it is not clear if they still enter the larger (Richard *et al.*, 1985).

Scientific Research The Beza Mahafaly project is based on an Inter-University Accord between the University of Madagascar, Yale University and Washington University. One of its principal roles is to provide a site for research on the flora and fauna of the south-west of Madagascar, and on the relations between the Madagascan people and the natural environment. The importance of baseline survey work as a preliminary to more detailed studies has been emphasised (Richard *et al.*, 1985). Up to the present, more or less detailed inventories of primates, insectivores and rodents, birds and insects, particularly Hymenoptera, have been

carried out (see Fauna) along with a study of the structure and composition of the vegetation inside and outside the reserve. This last study is intended to give information on the regeneration of the natural vegetation and the impact of livestock grazing on this, with the reserve, being fenced, effectively acting as a large scale enclosure. A more detailed study of the demography and behaviour of *Propithecus verreauxi* in the larger parcel of the reserve was begun in 1984. Plans for further research include: a study of the ethnomedicine of the region, to be expanded to a general ethnobotanical survey of the area; extending the study of forest structure, diversity and regeneration to the second parcel; establishment of an on-site herbarium; exploration of the phenology and pollination ecology of dominant tree and shrub species in the two parcels; a study of the behavioural ecology of *Lemur catta*; research on the reptile community of the reserve with a detailed study of *Geochelone radiata* (Richard *et al.*, 1985).

Special Scientific Facilities Huts for equipment and cooking.

Principal Reference Material

- Rakotomanga, P., Richard, A.F. and Sussman, R.W. (1985). Beza Mahafaly. Formation et Mesures pour la conservation. Paper given at 'Séminaire Scientifique international sur l'état de recherche sur l'équilibre des écosystèmes forestiers de Madagascar.' Antananarivo, October 1985.
- Richard, A.F., Rakotomanga, P. and Sussman, R.W. (1985). Beza Mahafaly: recherches fondamentales et appliquées. Paper given at 'Séminaire Scientifique international sur l'état de recherche sur l'équilibre des écosystèmes forestiers de Madagascar.' Antananarivo, October 1985.

Staff One chief warden, five permanent guards plus auxiliary guards.

Budget The Beza Mahafaly project has received financial support from WWF-US since 1980.

Local Park or Reserve Administration Reserve headquarters are at Betioky-Sud.

Date

RESERVE SPECIALE DE NOSY MANGABE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.3.1 (Malagasy Rain Forest)

Legal Protection Total. Access is not restricted by the establishing decree.

Date Established 14 December 1965 by Decree No. 65-795.

Geographical Location A small island situated to the east of Maroantsetra, 6 km off the coast of Madagascar, in the Bay of Antogil. 15°25'S, 49°45'E.

Altitude From sea level to 331m

Area 520ha (the whole island)

Land Tenure Government

Physical Features The island is composed of Cretaceous limestone, with a very rugged topography and rapid changes of altitude over relatively short distances.

Vegetation The vegetation comprises typical east coast rain forest, including species of *Canarium*, *Ocotea* and *Ravenala*, along with many palms and ferns. Much of the forest is secondary.

Fauna The reserve was established to protect the aye-aye *Daubentonia madagascariensis* (E), which has recently been introduced to the island. Amphibians in the reserve include the Antongil frog *Dyscophus antongili*, a scarlet frog confined to a small area in the Antongil Bay region, and *Boophis leucomaculatus* known only from the type specimen collected from the island. One chameleon *Brookesia peyrieresi* is also only known from Nosy Mangabé. Four other lemur species occur, namely ruffed-lemur *Varecia variegata*, russet mouse-lemur *Microcebus rufus*, greater dwarf lemur *Cheirogaleus major*, and brown lemur *Lemur fulvus*.

Conservation Management The island is the focus for IUCN/WWF Project 1953 which will help to ensure the protection and survival of the aye-aye together with its habitat through the provision of a boat and the construction of a building for the warden. A laboratory had already been built before the WWF Representation was established. It needs repair and some interior arrangement. Work has not yet begun (1984) because of difficulties on the road from Tamatave to Maroantsetra as well as a shortage of building materials. A boat with outboard motor has arrived. A guard to patrol the island will be recruited by the 'Direction des Eaux et Forêts'. Native plant species may be planted to enhance the habitat for the aye-aye, and other endangered lemurs may be introduced. Funds will also cover the maintenance of paths and provide a small rest hut for visitors. In association with the project is an environmental education programme; a film has been made on Nosy Mangabé and will be shown in cinemas and on television.

Zoning None

Disturbances or Deficiencies The island can only support limited tourism, which should be strictly controlled. There is a manned lighthouse on the island, and a 'public works' shop.

Visitor Facilities The reserve will opened to the public if authorisation is obtained from the 'Direction des Eaux et Forêts' at Tananarive.

Scientific Research Several attempts have been made to introduce the aye-aye to the island; nine individuals were released in 1967, and 12 in 1971, and the most recent sighting was in March 1983, when a female and her young were seen. Introduction of aye-aye. Censuses of the aye-aye and Antongil frog have been recommended.

Special Scientific Facilities There is a small laboratory on the island which is undergoing repair.

Principal Reference Material

° IUCN/WWF Project 1953. Study and protection of the aye-aye, Nosy Mangabé.

Staff Two agents and two auxiliaries

Budget Salaries are paid by the Government. WWF Funding 1982/1983 - US\$2,219.

Local Park or Reserve Administration No information

Date 1986

RESERVE DE FAUNE DE PERINET ANALAMOZAOTRA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.03.01 (Malagasy rain forest)

Legal Protection Protection of all resources within the reserve is total. Access is not restricted by the establishing decree.

Date Established 21 June 1970

Geographical Location 100km east of Antananarivo to the east of Moramanga. 18°30'S, 48°20'E.

Altitude 930-1,000m

Area 810ha

Land Tenure Government land

Physical Features A mountainous massif with winter temperatures which fall as low as 10°C. Rainfall of 1721mm per annum.

Vegetation Medium altitude tropical moist forest characteristic of the eastern escarpment region. The area was a logging concession which was never exploited, and the flora and fauna is hence much richer than in the surrounding areas which have suffered from logging and hunting.

Fauna The area has representative species of the mid-altitude eastern moist tropical forest. At least 70 birds endemic to the Madagascan region have been recorded, including eight threatened species: the slender-billed flufftail *Sarothrura watersi*, Madagascar red owl *Tyto soumagnei* (I), short-legged ground roller *Brachypteracias leptosomus* (R), Crosley's ground roller *Atelornis crossleyi* (R) (this species occurs at least seasonally), Pollen's vanga *Xenopirostris polleni* (R), Madagascar yellow-brow *Crossleyia xanthophrys* (I), brown mesite *Mesitornis unicolor* (K), and dusky greenbul *Phyllastrephus tenebrosus* (R). Twenty-five amphibian species, including six not recorded elsewhere (*Paracophyla tuberculata*, *Mantella aurantica*, *Mantidactylus acuticeps*, *M. eiselti*, *Boophis reticulatus*, and *B. viridis*) are recorded and at least five reptiles, including three possibly endemic to the area (*Lygodactylus guibei*, *Phelsuma flavigularis*, *Brookesia therezieni*). The reserve was originally set up to conserve an important population of indris *Indri indri* (E); other mammals in the reserve include eight other species of lemur, namely mouse-lemur *Microcebus* sp., greater dwarf lemur *Cheirogaleus medius*, *Lepilemur* sp., woolly lemur *Avahi laniger*, brown lemur *Lemur fulvus*, ruffed lemur *Varecia variegata*, and gentle lemur *Hapalemur* sp.. The diadem sifaka *Propithecus diadema* previously occurred but reportedly no longer does so. The aye-aye *Daubentonia madagascariensis* and the red-bellied lemur *Lemur rubriventer* have recently been recorded nearby. Several species of tenrec occur.

Conservation Management The reserve is well marked on the ground; there are numerous well used trails.

Zoning None

Disturbances or Deficiencies The reserve is too small to protect this forest type adequately and has now become largely isolated from previously contiguous forest blocks. There is some evidence of hunting and exploitation of hardwoods within the reserve.

Visitor Facilities The reserve is easily accessible from Antananarivo, either by rail or by road; the latter passes alongside the reserve.

Scientific Research Many studies have been carried out on the fauna and flora of the reserve.

Special Scientific Facilities The forest station associated with the reserve has accommodation, though this is in a poor state of repair.

Principal Reference Material None listed

Staff A forest agent and a technical assistant

Budget 1983: WWF Tropical Forest Campaign grant of US\$ 75 000 over years for the purchase of essential equipment and a local education campaign.

Local Park or Reserve Administration No information

Date 1986

BERENTY RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.10.04 (Malagasy thorn forest)

Legal Protection The reserve is privately owned, though is held in a trust which should ensure long-term protection.

Date Established 1930s; precise date unknown

Geographical Location Near Amboasary and 80km from Taolanaro (Fort Dauphin). 24°50'S, 46°20'E.

Altitude No information

Area Berenty Reserve is composed of five parcels, comprising some 250-265ha in total. Parcel 1 (known as Malaza) is 200ha, parcel 2 ca 20ha, parcel 3 ca 12ha, parcel 4 ca 2ha, parcel 5 (Anjapolo) is 20-30ha. In addition the 97ha forest of Bealoka some 7km north of Berenty is to be incorporated into the reserve system.

Land Tenure Owned by the de Heaulme family

Physical Features The reserve is situated in a sisal plantation and is bordered by the Mandrare River.

Vegetation Parcel 1 consists of a corridor of spiny forest dominated by Euphorbiaceae, Didiereaceae and crassulids, with gallery forest with *Acacia* and *Tamarindus* close to the river; parcels 2 and 5 consist of spiny forest; parcel 3 is a planted forest of *Pithecelobium dulce* mixed with old *Acacia* and *Tamarind* trees; parcel 4 is a 2ha sacred spiny forest with tombs. Bealoka consists of degraded gallery forest.

Fauna Six lemurs occur in the reserve, namely ring-tailed lemur *Lemur catta*, red lemur *Lemur fulvus rufus*, Verreaux's sifaka *Propithecus verreauxi*, weasel lemur *Lepilemur mustelinus*, fat-tailed dwarf lemur *Cheicogallus medius* and rufous mouse lemur *Microcebus rufus*. Over 40 endemic bird species have been recorded. There is also a captive group of the radiated tortoise *Geochelone radiata* and a large colony of the giant fruit bat *Pteropus rufus*.

Conservation Management Reportedly well protected, being fenced and guarded. Little active management takes place at present.

Zoning None

Disturbances or Deficiencies Principal problems are: river flooding and river bank erosion, with areas of river bank up to 20m wide having been lost from parts of the reserve since the 1960s; mature tree die-off, mainly affecting *Tamarindus*, *Acacia* and *Nestina*, the causes of which are unknown; poor regeneration in many parts of the forest, due to invasion of the rubber vine.

Visitor Facilities There are guest houses and a museum. A small entrance fee is charged.

Scientific Research Work has been carried out on the lemurs since the early 1960s, most recently by O'Connor.

Special Scientific Facilities No information

Principal Reference Material

- ° Jolly, A. (1966). *Lemur behaviour*. Chicago University Press.
- ° Jolly, A., Oliver, W.L.R. and O'Connor, S.M. (1982). Population and troop ranges of *Lemur catta* and *Lemur fulvus* at Berenty, Madagascar: 1980 census. *Folia primatologica* 39(1-2): 115-123.
- ° Jolly, A., Gustafson, H.L., Mertl, A.S. and Ramanantsoa, G., (In press). Population, espace vital, et composition des groupes chez le maki (*Lemur catta*) et le sifaka (*Propithecus verreauxi*) à Berenty, République Malagasy. *Bull. Acad. Malgache*.
- ° Mertl-Millhollen, A.S., Gustafson, H.L., Budnitz, N., Dainis, K. and Jolly, A. (1979). Population and territory stability of the *Lemur catta* at Berenty, Madagascar. *Folia primatol.* 31: 106-22.

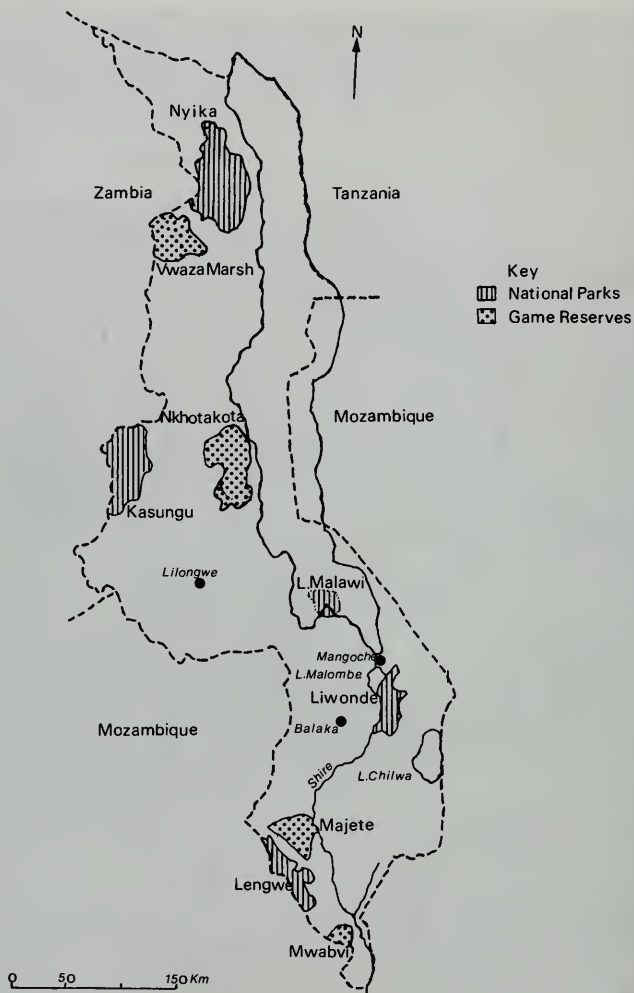
Staff The whole reserve is under the control of the manager of the sisal concession in which it is situated. There are four guards in parcel 1, two in parcel 2, one each in parcel 3 and 5, and two at Bealoka.

Budget No information

Local Park or Reserve Administration See 'staff' above.

Date 1986





Malawi

MALAWI

Area 94,276 sq.km

Population 6,100,000 (1981)

Parks and Reserves Legislation The Land Act authorizes acquisition of customary land and its declaration as public land which is then available for gazettelement as national park by order of a motion passed by the National Assembly. The National Park Act 1969 provides for control of all activities within national parks. Game reserves are established under the Game Act 1954 which identifies prohibited activities within the reserves. All park and reserve lands are under government control and there is no private land use within them. No national park may be reduced in area without a specific resolution of Parliament. A new comprehensive Flora and Fauna Act is in preparation designed to supercede the Game Act and make provision for stricter protection of wildlife resources outside the parks. It will rationalise protection by identifying categories of land, wildlife and interaction and is given in full in Clarke (1983).

Parks and Reserves Administration Prior to 1973, national parks and game reserves were the responsibility of the Game Division of the Department of Forestry and Game. In April 1973, as directed by the President, a separate Department of National Parks and Wildlife was established within the Ministry of Agriculture and Natural Resources. This department now manages the five national parks and four game reserves. The Chief Parks and Wildlife Officer, who is responsible to the Secretary for Forestry and Natural Resources, has three subordinate Senior Parks and Wildlife Officers. Each national park is managed by a Parks and Wildlife Officer (see Clarke 1983). The forest estate is the responsibility of the Department of Forestry.

Address

- ° Department of National Parks and Wildlife, PO Box 30131, Lilongwe 3. Department of Forestry, PO Box 30048, Lilongwe 3.

Additional Information Soil and water conservation are the basic concerns in the establishment and management of the parks and reserves, and scientific research is considered a priority use for all areas. Game and timber exploitation is possible in all game reserves providing that: the resource is able to support harvesting; permissible harvest levels have been established and quotas set at no more than sustainable yield levels; and the Parks Department is able to monitor and regulate any offtake. The main threats to the integrity of the reserves are poaching and wildfire, but there is also heavy pressure from encroachment by the expanding population. It has been suggested by Kombe (1982) that to overcome these pressures, production should be increased on agricultural land. An integrated approach to conservation has been successful in improving the habitat of a mountain immediately north-west of Blantyre, which was being seriously degraded. The Michiru Mountain Conservation Area was set up for water catchment protection, recreation, to conserve some of the remaining moist tropical forest and to provide poles and firewood for the local population by planting pine and eucalypts (Hough 1984).

References

- ° Bell, R.H.V. and McShane, E. (Eds) (1984). *Conservation and Wildlife Management in Africa*. Peace Corps: Washington D.C.
- ° Clarke, J.E. (1983). *Principal master plan for National Parks and Wildlife Management*. Department of National Parks and Wildlife. Lilongwe, Malawi.
- ° Clarke, J.E. (1983). *Protected areas master plan for Northern Region*. Department of National Parks and Wildlife. Lilongwe, Malawi.
- ° Clarke, J.E. (1983). *Protected areas master plan for Central Region*. Department of National Parks and Wildlife. Lilongwe, Malawi.
- ° Clarke, J.E. (1983). *Protected areas master plan for Southern Region*. Department of National Parks and Wildlife. Lilongwe, Malawi.
- ° Croft, T.A. (1980). Around the National Parks and Game Reserves. *Nyala* 6(1): 53-54.
- ° Department of National Parks and Wildlife. National Land Use Atlas.

- ° Hayes, G.D. (1977). *A guide to Malawi's National Parks and Game Reserves*. Government Printer, Zomba, Malawi. 118 pp.
- ° Hayes, G.D. (1983). *A Guide to Malawi's National Parks and Game Reserves*. Montfort Press, Malawi.
- ° Hough, J. (1984). An approach to an Integrated land use system on Michiru Mountain, Malawi. *Parks* 9(3/4): 1-3.
- ° Kombe, A.D.C. (1982). The role of protected areas in catchment conservation in Malawi. In: McNeely, J.A. and Miller, K.R. (Eds) *National Parks, Conservation and Development. The Role of Protected Areas in Sustaining Society*. Smithsonian Institution Press, Washington D.C.
- ° Mossman, A.S. and Hall-Martin, A. (1969). Report to the Government of Malawi on a wildlife survey of Malawi. FAO, Rome. Unpublished.

Protected Areas

	(hectares)
<i>National Parks</i>	
Kasungu	231,600
Lake Malawi National Park	9,400
Lake Malawi	9,400
Lengwe	88,700
Liwonde	54,800
Nyika	313,400
Subtotal	707,300
<i>Game Reserves</i>	
Majete	78,400
Mwabvi	10,400
Nkohota-Kota	180,200
Vwaza Marsh	100,000
Subtotal	369,000
<i>Proposed areas</i>	
Michiru Mountain Conservation Area	4,600

KASUNGU NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established Declared a forest reserve in 1922 as an anti-tsetse fly measure; Game reserve status in 1930 and national park status in 1970

Geographical Location West of Kasungu, about 175km north of Lilongwe, extending along the Zambian border. 13°00'S, 33°10'E.

Altitude 1,000-1,330m

Area 231,600ha

Land Tenure Government

Physical Features The park comprises a relatively flat plateau embracing much of the higher catchment of the Dwangwa River. The river and its tributaries are seasonal, but usually have water in deep pools during the dry season. Several prominent inselbergs break the plateau surface. Soils are leached and relatively infertile. The climate is typical of central Malawi with the daily maximum often exceeding 29°C from September to May and a daily minimum of 4-7°C from June to August. The mean annual rainfall is 750-1000mm, but may vary significantly between years.

Vegetation The vegetation comprises a mosaic of open country and medium height 'miombo' woodland dominated by *Brachystegia* spp. and *Julbernardia globiflora*. A more varied woodland dominated by *Combretum* spp., *Acacia piliostigma* and *Terminalia* sp. occurs along the Dwangwa River and some larger tributaries. An area of moderately dense *Hyparrhenia* spp. grassland borders the rivers in places.

Fauna Mammals include: about 800 elephant *Loxodonta africana* (T)(conspicuous but thought to be decreasing), sable antelope *Hippotragus niger*, roan antelope *Hippotragus equinus*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, eland *Taurotragus oryx*, greater kudu *Tragelaphus strepsiceros*, reedbuck *Redunca arundinum*, impala *Aepyceros melampus*, waterbuck *Kobus ellipsiprymnus*, oribi *Ourebia ourebi*, grey duiker *Sylvicapra grimmia*, Sharpe's grysbok *Raphicerus sharpei*, Burchell's zebra *Equus burchelli*, warthog *Phacochoerus aethiopicus*, bushpig *Potamochoerus porcus*, chacma baboon *Papio ursinus*, vervet monkey *Cercopithecus aethiops*, lion *Panthera leo*, leopard *Panthera pardus* (T), spotted hyena *Crocuta crocuta*, side striped jackal *Canis adustus*, serval *Felis serval*, wild dog *Lycaon pictus* (T), cheetah *Acinonyx jubatus* (T), and black rhinoceros *Diceros bicornis* (T). There is also a wide variety of other wildlife typical of *Brachystegia* woodland including many small mammals. Three hundred bird species have been recorded including wattled crane *Bugeranus carunculatus* (of special concern).

Zoning The area is zoned according to five land-use classes developed by the Canadian National Parks Service: Class I Special Areas; II Natural Environment Areas; III Lower Category Natural Environment Areas; IV General Outdoor Recreation Areas; and V Intensive Use Areas. A buffer zone of about 16,000ha has been added to the south-eastern boundary and was gazetted in 1977.

Disturbances or Deficiencies The eastern boundary adjoins an expanding project based on tobacco grown by smallholders. Even though a buffer zone has been added to the parks' south-eastern boundary, conflicts with wildlife still persist. In order to control movements of large herbivores from the park into adjacent farmland, the 8km solar-powered electric fence in the buffer zone should be extended along the entire southern and eastern park boundaries. There is some poaching of elephant for ivory.

Visitor Facilities There are about 4,000 visitors annually. Facilities in the park include accommodation at Lifupa Lodge or a fixed-tent site, and about 120km of game-viewing tracks. There is a landing strip for light aircraft near the administration camp. There are rock paintings at two sites in the Solonje Hills.

Scientific Research A survey, supported by WWF/IUCN Project 1665, was carried out in 1981/82 to assess the status of elephant populations in the park, in Nkhotakota Game Reserve and Malawi in general. The project formed part of the general research programme of the Wildlife Research Institute of the Malawi Department of National Parks and Wildlife. Research involved population dynamics as well as monitoring mortality from poaching, crop protection, shooting and natural factors. Additional research looked at spatial distribution changes and social organisation within the population. Methods were also tested on the use of elephant droppings to estimate numbers, distribution and age structure. Such methods are cheaper and more suitable than aerial surveys in forest or mountainous country. Research on elephant browsing on *Brachystegia* woodland was carried out in conjunction with the Wildlife Research Unit Woodland Monitoring programme. The main current research is in archaeology.

Special Scientific Facilities None

Principal Reference Material

- ° Bell, R.H.V. (1981). An outline of a management plan for Kasungu National Park, Malawi. In: *Problems in management of locally abundant wild mammals*. Jewell, P.A., Holt, S. and Hard, D. (Eds). Academic Press, New York. Pp. 69-89.
- ° Clarke, J.E. (1983). *Protected areas master plan for the Central Region*. Department of National Parks and Wildlife, Lilongwe.
- ° Elephants of Malawi. *WWF Monthly Report* January 1983: 377-379.
- ° IUCN/WWF Project No. 1665. Ecology of the Elephant in Kasungu National park, Malawi.
- ° Savory, R. and Moore, G. (1972). A survey of the possibilities of sward improvement in Kasungu Game Park. Bunda College of Agriculture, University of Malawi.

Staff 1984 - 28 full-time and 41 temporary workers

Budget 1976/1977 financial year: US\$78,500 allocated by the Government for development and a similar amount for recurrent expenditure. WWF Funding in 1982 - US\$873 (total since 1981 - US\$11,862). 1983/1984: about US\$50,000

Local Park or Reserve Administration Parks and Wildlife Officer, Kasungu National Park, PO Box 43, Kasungu.

Date 1985

LAKE MALAWI NATIONAL PARK

Management Category II (National Park)

World Heritage Site (criteria: ii, iii, iv)

Biogeographical Province 3.29.14 (Lake Malawi)

Legal Protection The park protects several disjunct terrestrial areas and all lake waters within 100m of these areas.

Date Established 24 December 1980, under the National Parks Act. Most of the area was previously classified in forest reserves; some of the islands have been protected since 1934.

Geographical Location On and around Nankumba Peninsula at the southern end of Lake Malawi, including Boadzulu, Maleri and other offshore islands, Mwenya and Nkhudzi Hills, and Nkhudzi Spit and including a 100m strip of water around these land areas. Approximately centred 14°02'S, 34°53'E.

Altitude Up to 1,140m

Area 9,400ha

Land Tenure Government

Physical Features The Nankumba Peninsula, projects into Lake Malawi, and has poor soils susceptible to erosion. Cape Maclear at the north of the peninsula is an area of steep wooded rocky hills, predominantly composed of biotite-granite. In general, the hills rise steeply from the lakeshore but there are a number of sandy bays including a fine beach in the Chembe-Otter Point area. The lake is unique, forming a separate biogeographical province. It is estimated to be between one and two million years old. By virtue of its tropical setting, Lake Malawi is permanently stratified, having a warm epilimnion overlying a cooler

hypolimnion. Lake water is remarkably clear. The lake experiences marked seasonal variations in wind, temperature and rainfall. Water level fluctuates according to season with a long-term cycle of fluctuation over years, recent years having seen increases to the highest levels since recording began (probably due to increased rainfall and forest clearing on the high plateau). All islands are entirely, or mainly, of rock separated from one another and from the mainland by sandy plains and deep water. Habitat types vary from rocky shorelines to sandy beaches and from wooded hillsides to swamps and lagoons. Mean annual temperature is 27°C. Annual rainfall averages 500mm, but is very variable.

Vegetation The terrestrial areas of the park, excluding the smallest islands, were once heavily wooded. Originally, this was a characteristic community containing baobab *Adansonia digitata* and several species of *Ficus*, *Sterculia*, *Khaya*, and *Albizia*. The ground flora has not been studied in depth. Due to clearing of the forest, some woodland areas have been altered to shrubby vegetation. The upper slopes are covered by escarpment *Brachystegia* dominated by *B. glaucescens*.

Fauna Lake Malawi contains the largest number of fish species of any lake in the world - probably over 500 from ten families with perhaps half occurring in the park area. Endemism is high (thought to exceed 90%) and adaptive radiation and speciation within the lake is remarkable. Particularly noteworthy are the Cichlidae of which all but five of over 400 species are endemic to Lake Malawi. The lake contains 30% of all known cichlid species (Ribbink *et al.* 1983). Of particular interest are the 'mbuna' rock fish. More than 70% of the mbuna are undescribed and the taxonomic affinities of many are uncertain. Other fish species include 28 endemic to the lake. Mammals include: hippopotamus *Hippopotamus amphibius*, leopard *Panthera pardus* (T), greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, zebra *Equus burchelli*, klipspringer *Oreotragus oreotragus*, impala *Aepyceros melampus*, grey duiker *Sylvicapra grimmia*, chacma baboon *Papio ursinus*, vervet monkey *Cercopithecus aethiops*, bush pig *Potamochoerus porcus* occasional elephant *Loxodonta africana* (T) (reported as coming down to the lake between the Mwemba and Nkhudzi Hills). The varied birdlife includes: fish eagle *Haliaeetus vocifer* along the shoreline. The islands, especially Mumbo and Boadzulu, are important nesting areas for several thousand white-breasted cormorant *Phalacrocorax lucidus*. Reptiles include: crocodile *Crocodylus niloticus* (V) and abundant water monitor lizards *Varanus niloticus* on Boadzulu Island. A list of snakes is given in Tweddle (1984).

Conservation Management The management plan is being implemented. As part of the preparation of the plan, a special study of the area was carried out to assess the impact of the park on the local population, including a comprehensive review of the resources. There are plans to plant trees in a 1,200ha section in the south of the peninsula to supply fuelwood and poles to local people.

Zoning A managed fishing zone is to be established off the mainland incorporating some islands within the park, but trawling will be prohibited. Conservation zones are proposed around the park. The management plan details four zones within the park: Special Zone, Wilderness Zone, Natural Zone and General Zone. Most of the terrestrial area is in the Natural or Wilderness Zones and the lacustrine area is in the Special Zone.

Disturbances or Deficiencies Although there are no human settlements within the boundaries, much of the lakeshore is heavily populated. Villages on the peninsula (population of about 5,400 in 1977) are cut off between the park and the lake and local people are dependent on fishing for a livelihood as the soil is poor and crop failure frequency is about 50%. The brightly coloured 'mbuna' provide a substantial export trade to collectors. The clearing of timber for building, firewood and cultivation has increased (particularly on Nankoma Island, part of Mumbo Island, around Chembe village and the Mwenya and Nkhudzi Hills). The unsightly and unplanned visitor shacks at Cape Maclear will be removed when a new lodge is built. The lake is polluted by powerboats at Cape Maclear. Because of the limnological aspects of the lake, should it be contaminated, the renewal time would be in the order of 1,700 years. The size of water area of the park is only 700ha (0.04% of total lake area) and it is recognised that the integrity of the park can only be ensured by the proper management of the whole lake.

Visitor Facilities There is some tourist development within the boundaries. Several small hotels are planned which will be designed to blend in with the environment. The recreation site at Cape Maclear is heavily used and includes a resthouse, bar, caravan and camping site.

Scientific Research There are research and monitoring programmes. Research has concentrated on the fish, mainly by the Department of Fisheries which has its research headquarters near the park at Monkey Bay.

Special Scientific Facilities No information

Principal Reference Material

- Clarke, J.E. (1983). Protected areas masterplan for the Southern Region. Department of National Parks and Wildlife, Lilongwe.
- Croft, Trevor A. (1981). Lake Malawi: A Case Study in Conservation Planning. *Parks* Vol 6, No. 3. Pp. 7-11.
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- Lake Malawi National Park Master Plan, August 1981. Department of National Parks and Wildlife, Lilongwe.
- Ribbink, A.J. Marsh, A.C., Ribbinck, A.C. and Sharp, B.J. (1983). A preliminary survey of the cichlid fish of the rocky habitats of Malawi. *African Journal of Zoology* Vol. 18 (3): 149-310.
- Tweddle, D. (1984). Snakes of the Lake Malawi National Park. *Nyala* 10(1): 43-44.

Staff 1984 - five full-time and seven temporary workers

Budget Annual budget of US\$ 50,000

Local Park or Reserve Administration Parks and Wildlife Officer, Lake Malawi National Park, PO Box 48, Monkey Bay.

Date 1985

LENGWE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established Established as a game reserve in 1928. National park status in 1970. Extended in 1975.

Geographical Location About 80km south of Blantyre, west of the Shire River, extending along the Mozambique border. Centred at 16°15'S, 34°45'E.

Altitude 130-393m

Area 88,700ha; near Majete Game Reserve (64,000ha) to the north

Land Tenure Government

Physical Features The park is composed of three physiographic units: a gently undulating area sloping up to the watershed between the Shire and Zambezi Rivers; extensive plains of alluvial deposits; and seasonally flooded depressions or 'dambos' along drainage lines. Late in the dry season, water is only available at four artificial waterholes (Main, North Thicket, Joss and Makanga) and even these dry up at times. The extension includes an area of rough stony country. Daily temperatures often exceed 35°C during September to May and may occasionally be experienced in cooler months. Annual rainfall is about 800mm, but extremely variable.

Vegetation The vegetation is dominated by mopane woodland *Colophospermum mopane* in the south and 'miombo' woodland of *Brachystegia* and *Combretum* spp. in the north with tall grasses. The most important plant communities for wildlife are the dry deciduous thickets of *Pterocarpus antunesii* and *Lecaniodiscus fraxinifolius*, particularly for nyala antelope. Only a small area of this forest, which once extended intermittently from Chiromo in the south to Mangochi in the north, now remains. Several sandstone ridges support a taller woodland of *Pterocarpus angolensis* and *Azelia quanzensis*.

Fauna Mammals recorded include: samango monkey *Cercopithecus albogularis*, vervet monkey *Cercopithecus aethiops*, chacma baboon *Papio ursinus*, spotted hyena *Crocuta crocuta*, side-striped jackal *Canis adustus*, leopard *Panthera pardus* (T), warthog *Phacochoerus aethiopicus* and bush pig *Potamochoerus porcus*. The park is one of two areas in Malawi in which nyala antelope *Tragelaphus angasi* occur at their northern limit of distribution. Other ungulates include buffalo *Syncerus caffer*, bushbuck *Tragelaphus scriptus*, greater kudu *Tragelaphus strepsiceros*, duiker *Sylvicapra grimmia*, Livingstone's suni *Neotragus moschatus livingstonianus*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, Sharpe's grysbok *Raphicerus sharpei*, impala *Aepyceros melampus*, and some sable antelope *Hippotragus niger*. The park contains a striking assortment of lowland tropical birds, including crested guineafowl *Guttera edouardi*, Rudd's apalis *Apalis ruddi* (the subspecies *caniciridis* is endemic to Malawi) and Woodward's batis *Batis fratum* (both uncommon and may become threatened), crested francolin *Francolinus sephaena*, and mouse-coloured sunbird *Nectarinia veroxii* (both confined within Malawi to this park).

Conservation Management Before 1975, emphasis was on the conservation of nyala. The park extension should make adequate provision for many other species. Population growth of nyala is such that culling is necessary. Several artificial waterholes were constructed in 1967 and 13km of fencing has been erected but more will be necessary.

Zoning The area is zoned according to the five land-use classes developed by the Canadian National Parks Service: Class I Special Areas; II Natural Environment Areas; III Lower Category Natural Environment Areas; IV General Outdoor Recreation Areas; and V Intensive Use Areas.

Disturbances or Deficiencies The park is almost surrounded by agricultural schemes including a major sugar production project and there is no buffer zone. Poaching is a problem in certain areas. Fires and overgrazing by nyala are destroying the habitat of thicket birds like Woodward's batis and Rudd's apalis.

Visitor Facilities An educational field centre was established in 1976/77 by the National Fauna Preservation Society of Malawi. Game-viewing hides have been built overlooking the artificial pans.

Scientific Research There is a permanent research officer working on the nyala and their effect on habitats and other species. The National Fauna Preservation Society began a 'census' of nyala and other species in 1967. An annual count is now carried out which provides an index to population changes.

Special Scientific Facilities No information

Principal Reference Material

- ° Anon. (1982). The Lengwe National Park Game Count. *Nyala* 8(2): 102.
- ° Bell, R.H.V. (1981). Notes on Nyala and discussion of management options. Report to the Malawi Government. 35 pp.
- ° Bell, R.H.V. and Dudley, C.O. (1982). Two methods of estimating nyala *Tragelaphus angasi* populations in Lengwe National Park, Malawi. *Nyala* 8(2): 63-68.
- ° Clarke, J.E. (1983). Protected areas masterplan for the Southern Region. Department of National Parks and Wildlife, Lilongwe.
- ° Habgood, F. (1963). The geology of the country west of the Shire River between Chikwawa and Chiromo. *Geol. Survey Dept. Bull.* 14.
- ° Hall-Martin, A.J. (1970). Report on the Lengwe and Mwabvi Game Reserves in relation to land use of the Lower Shire Valley. Wildlife Research Unit, Kasungu. Unpublished.
- ° Hutson, J. (1977). The Lengwe Game Counts 1967-1977. *Nyala* 3(2): 14-25.

Staff 1984 - 24 full-time and up to 41 temporary workers

Budget 1983/1984: About US\$28,400

Local Park or Reserve Administration Parks and Wildlife Officer, Lengwe National Park, PO Box 25, Chikwawa.

Date 1985

LIWONDE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established May 1973

Geographical Location Located on the upper Shire River plain, east of the river, 140km north of Limbe. 14°50'S, 35°20'E.

Altitude 472-961m

Area 54,800ha; there is a 7,450ha extension (1972) which provides a corridor for elephant to Mangochi Forest Reserve

Land Tenure Government

Physical Features The park is geographically well defined, being bounded on the west by the Shire River and Lake Malombe, and on the other sides by hills and ridges. The topography is a gentle slope upward from the river, broken only by two isolated groups of hills. Mean annual temperature on the plain is 13°C, with extremes of 7°C and 39°C. Mean annual rainfall is 650-2250mm.

Vegetation A series of seven main vegetation types occurs up the gentle slopes of the Shire River, the most widespread being mopane woodland *Colophospermum mopane* with short grass. There are also areas of mopane, *Acacia* and *Albizia* with high quality tall grasses. The shore of Lake Malombe and the margins of the Shire have typical riverine and floodplain vegetation

intergrading with small areas of gallery forest, palm savanna of *Hyphaene ventricosa*, and woodland savanna.

Fauna Early reports suggested an abundance of game in the area, but this is now much reduced although nearly all species are still present. Mammals include: lion *Panthera leo*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T) (about 200 recorded in 1983 but thought to be declining), hippopotamus *Hippopotamus amphibius* (stable population), greater kudu *Tragelaphus strepsiceros*, reedbuck *Redunca arundinum*, impala *Aepyceros melampus*, waterbuck *Kobus ellipsiprymnus*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, oribi *Ourebia ourebi*, bushbuck *Tragelaphus scriptus*, grey duiker *Sylvicapra grimmia*, Sharpe's grysbok *Raphicerus sharpei*, klipspringer *Oreotragus oreotragus*, and large numbers of sable antelope *Hippotragus niger*. There are now only a few crocodile *Crocodylus niloticus* (V) in the river. It is proposed to reintroduce the race of wildebeest *Connochaetes taurinus johnstonii* which used to occur in Malawi although the area is outside this species' past distribution and the habitat may be unsuitable. A preliminary bird checklist records 207 species including the Nyasa lovebird *Agapornis lilianae* (rare in Malawi), and many aquatic species (Stead, 1979).

Zoning The area is zoned according to the five land-use classes developed by the Canadian National Parks Service: Class I Special Areas; II Natural Environment Areas; III Lower Category Natural Environment Areas; IV General Outdoor Recreation Areas; and V Intensive Use Areas.

Disturbances or Deficiencies The park originally included only the east bank of the Shire River and was vulnerable to insensitive use. However, it is planned to extend the boundary to include the entire river. Periodic closure of Liwonde Barrage, immediately downstream of the park, floods substantial areas for varying periods but the ecological impact of this is not yet clear.

Visitor Facilities It is planned to open the park to the public for day visits only. There is (1980) a visitor's camp near Makanga.

Scientific Research The Liwonde Research Project was set up in 1974 by the University of Malawi to carry out a detailed survey of the plants and animals with descriptions of population dynamics.

Special Scientific Facilities An Ecological Research and Monitoring field station is planned.

Principal Reference Material

- Clarke, J.E. (1983). Protected areas masterplan for the Southern Region. Department of National Parks and Wildlife, Lilongwe.
- Hall-Martin, A.J. (1969). An ecological review of the Liwonde area, Kasupe District and recommendations on the proposal to create a National Park in the area. Unpublished Departmental typescript.
- IUCN/WWF Project No. 1665. Elephants of Malawi. *WWF Monthly Report* January 1983: 377-379.
- Stead, D.E. (1979). Liwonde National Park Part II - the birds. *Nyala* 5(1): 12-27.
- Stead, D. and Dudley, C. (1977). Liwonde National Park Part II - the mammals. *Nyala* 3(2): 29-38.
- Sweeney, R.C.H. (1959). A checklist of the mammals of Nyasaland. Nyasaland Society, Malawi.

Staff 1977 - 10 full-time and up to 30 temporary workers

Budget 1976/1977 financial year - US\$41,000 allocated by the Government to the park development and a similar amount to cover recurrent expenditure.

Local Park or Reserve Administration Senior Game Warden, Liwonde National Park, Private Bag 18, Kasupe.

Date 1983

NYIKA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.20.12 (Central African Highlands)

Legal Protection Total

Date Established 1 January 1966 under the Game Ordinance (also known as Malawi National Park). Part of the area was previously a non-hunting area. Extended from 93,000ha on 5 June 1978.

Geographical Location On Nyika Plateau in northern Malawi, about 480km by road north of Lilongwe and 35km west of Livingstonia. Extending along part of the Zambia border. 10°20'-11°00'S, 33°30'-34°00'E.

Altitude 600-2,606m

Area 313,400ha. About 10km from Vwaza Marsh Game Reserve. Borders some 20km of the Nyika National Park, Zambia (8,000ha).

Land Tenure Government

Physical Features The park lies on a roughly ovoid plateau, with a long north-east to south-west axis, which forms part of the western margin of the East African Rift Valley system. Structurally, the plateau comprises a large intrusion of granite forced into sediments of the Malinga series with several blocks of metamorphosed sediments and younger dolerite intrusions. The area is one of the most important water catchments in Malawi and contains the sources of four large rivers which drain into Lake Malawi, including the North Rukuru which enters the lake at Karonga. Soils are rather poor and tend to be acidic. Temperatures range from below 0°C in winter (June/July) to over 21°C in summer. Mean annual rainfall is 1140mm.

Vegetation Ninety percent of the plateau over 1,800m is covered by short open grassland dominated by *Loudetia simplex*, red oat grass *Themeda triandra* and *Exothea abyssinica*. Relict evergreen forest covers an estimated 2-4% occurring mainly on valley heads, valley slopes and in hollows. Lower elevations are dominated by mixed *Brachystegia* woodland and some game migrates to these areas during the cold dry season. The Nyika is one of several highland areas in Central Africa which are remarkable for the high level of local plant speciation. Fifteen endemic species have been reported in the area, but this is thought to be an underestimate. A genus of orchid *Cardiophyllos* is thought to be endemic to the plateau. Several species which occur here are at the extreme south of their range, including *Hagenia abyssinica*.

Fauna Mammals in the park include: leopard *Panthera pardus* (T), lion *Panthera leo*, spotted hyena *Crocuta crocuta*, side-striped jackal *Canis adustus*, samango monkey *Cercopithecus albogularis*, vervet monkey *Cercopithecus aethiops*, zebra *Equus burchelli*, warthog *Phacochoerus aethiopicus*, reedbuck *Redunca arundinum*, bushbuck *Tragelaphus scriptus*, greater kudu *Tragelaphus strepsiceros*, eland *Taurotragus oryx*, common duiker *Sylvicapra grimmia*, roan antelope *Hippotragus equinus*, red duiker *Cephalophus natalensis harveyi*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, klipspringer *Oreotragus oreotragus*, and puku *Kobus vardonii* (only vagrants). Fewer than 50 elephants *Loxodonta africana* (T) have been recorded in the park and numbers are decreasing. Birds include red-winged francolin *Francolinus levaillantii*, wattled crane *Bugeranus carunculatus* (of special concern), Denham's bustard *Neotis cafra jacksoni* and seven species rare in Malawi, including churring cisticola *Cisticola njombe*, mountain yellow warbler *Chloropeta similis* and mountain marsh wydah *Euplectes hartlaubi psammocromius*. More details of the birds are given in

Dowsett-Lemaire (1983). The upper South Rukuru contains several fish *Barbus* and *Clarias* spp., which do not occur elsewhere in Lake Malawi rivers. There are also several sub-species of reptiles, amphibians and butterflies endemic to the area.

Conservation Management There is a management plan, but staff and resources are below that required. The park was extended and more effectively patrolled to enable the Malawian Government to execute control over the large network of waterways, inhibit erosion, and reduce poaching. Burning is used as a management tool.

Zoning Zoning is proposed in the 1975/1976 Master Plan according to the five land-use classes developed by the Canadian National Parks Service: Class I Special Areas; II Natural Environment Areas; III Lower Category Natural Environment Areas; IV General Outdoor Recreation Area; and V Intensive Use Areas. Not yet implemented.

Disturbances or Deficiencies The greatest threat is wildfire originating in and outside the park. Protection of the remaining forest patches from these annual burns is a critical problem. There is poaching, especially in the dry season. Four major streams (Chilinda, Rumphu, Runyina and North Rukuru) and three dams near Chelinda have been stocked with rainbow trout and fishing is permitted under licence from 1 September to 30 April.

Scientific Research There is a permanent wildlife research officer and a general monitoring programme.

Special Scientific Facilities An office with minimal equipment, reference books and specimens was reported in 1977, but no recent information is available. A research laboratory was planned at Chilinda.

Principal Reference Material

- Chapman, J.D. and White, F. (1970). *The evergreen forests of Malawi*. Commonwealth Forestry Institute, Oxford.
- Clarke, J.E. (1983). Protected areas master plan for the Northern Region. Department of National Parks and Wildlife, Lilongwe.
- Dowsett-Lemaire, F. (1983). Ecological and territorial requirements of montane forest birds on the Nyika Plateau, south-central Africa. *Gerfaut* 73: 345-378.
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- Lemon, Paul C. (1964). The Nyika Wildlife. *Nyasaland Journal* 17 (July): 19-41.
- Mill, T.A. (1979). Resource inventory and management plan for Nyika National Park, Malawi. M.Sc. Thesis, University of Calgary.
- Tweddle, D. (1981). The fishes of the Malawi northern region Game Reserves. *Nyala* 7(2): 99-108.
- Wye College (1973). Final Report on area north of Nyika Plateau. Wye College, Malawi Project 1972, London University. 151 pp.

Staff 1984 - 38 full time and 48 temporary workers

Budget 1983/1984 - US\$42,512

Local Park or Reserve Administration Senior Parks and Wildlife Officer, Nyika National Park, Private Bag 6, Rumphu.

Date April 1985

MAJETE GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established 1955 (Boundaries extended in 1976 to present area)

Geographical Location Southern Malawi on the west bank of the Shire River, just north of Chikwawa. Approximately 16°00'S, 34°45'E.

Altitude 150-856m, average 300m

Area 78,400ha. Near Lengwe National Park (12,800ha; extension to 90,720ha planned).

Land Tenure Government

Physical Features The reserve lies on a sloping area of the rift valley floor at the point where the rift descends from the middle Shire Valley at about 450m to the lower Shire Valley at 100m. The western half of the reserve is hilly, with large rocky outcrops and steep faulted valleys. The eastern half slopes gently towards the south-east towards the Shire River and is dissected by small sand rivers and gullies. Surface water is very scarce in the dry season, being confined to a few small seepages and the Shire and Mkurumadzi Rivers at the eastern boundary. At the south-east corner of the reserve the Shire River goes over the spectacular Kalpichila (Livingstone) Falls.

Vegetation The western hills are covered by tall closed woodlands dominated by *Brachystegia boehmii* and *Julbernardia globiflora* with narrow riverine forest strips in the larger valleys. The eastern slopes support a short open woodland of *Terminalia*, *Combretum* and *Sclerocarya*, leading to a tall parkland of *Sclerocarya*/*Adansonia* near the Shire. The grass is tall throughout the reserve and is subject to fierce fires which are not followed by regrowth because of the stony soils.

Fauna There are small populations of elephant *Loxodonta africana* (T) (about 100 use the reserve at times and this population is probably stable), eland *Taurotragus oryx*, greater kudu *Tragelaphus strepsiceros*, waterbuck *Kobus ellipsiprymnus*, sable antelope *Hippotragus niger*, reedbuck *Redunca arundinum*, and occasional Lichtenstein's hartebeest *Alcelaphus lichtensteini*. There are some leopard *Panthera pardus* and crocodile *Crocodylus* sp.

Conservation Management There is a waterhole in the Pwadzi stream by a sub-surface dam which was constructed by the National Fauna Preservation Society in 1952.

Zoning Different zoning schemes have been suggested by Bell (1964) and Carter (1985). At present the river frontage is zoned for tourism and wilderness trails and the eastern slopes are used for hunting.

Disturbances or Deficiencies There is a high level of trespass and minor illegal activity, but poaching of major species such as elephant is slight.

Visitor Facilities There is an unfurnished chalet available at Mkurumadzi camp, overlooking the Shire and a picnic and camp site at the Kapichila Falls. The system of tracks is limited and can only be used in the dry season and plans to extend these are given in Carter (1985).

Scientific Research A comprehensive preliminary survey was carried out by Bell (1984) in 1983. A study is now being made of the impact of elephant on woodland by Brian Sherry.

Special Scientific Facilities No information

Principal Reference Material

- ° Bell, R.H.V. (1984). Majete Game Reserve; report of an ulendo (trek) and suggestions for management and utilisation. Report to the Malawi Government. 63 pp.
- ° Carter, J.R. (1985). Tourism master plan.
- ° Clarke, J.E. (1983). Protected areas masterplan for the Southern Region. Department of National Parks and Wildlife, Lilongwe.
- ° IUCN/WWF Project No. 1665. Elephants of Malawi. *WWF Monthly Report* January 1983: 377-379.

Staff 1985 - seven game scouts plus four porters stationed at four camps, plus a game ranger stationed at Lengwe camp 30km away.

Budget About US\$5000 plus occasional funds from the National Fauna Preservation Society.

Local Park or Reserve Administration Senior Parks and Wildlife Officer, P.O. Box 5599, Limbe.

Date 1985

MWABVI GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Partial

Date Established 1951. Reduced in size by about 60% in 1982.

Geographical Location In the extreme south of Malawi, just north of Chiromo and west of the Shire River. Centred 16°40'S, 35°05'E.

Altitude 100-300m

Area 10,400ha (originally declared as 34,000ha)

Land Tenure Government

Physical Features The reserve lies on the edge of the rift valley. The terrain is very broken with gullies, small hills and steep sided rock outcrops. There are some relatively flat dambos, and the reserve is drained by tributaries of the Thangadzi River, which is seasonal. Several waterholes persist in the dry season. Rainfall is about 750mm per year. Mean monthly temperatures vary between 20°C (June and July) and 28°C (October and November).

Vegetation This includes dry deciduous thickets, *Colophospermum mopane* woodland, woodlands on fertile areas with species including *Adansonia*, *Cordyla* and *Acacia*, and *Acacia nigrescens* woodland/savanna with high quality tall grasses.

Fauna The reserve is one of only two remaining areas in Malawi for nyala *Tragelaphus angasi*. Other mammals include sable antelope *Hippotragus niger* (reported to be decreasing), greater kudu *Tragelaphus strepsiceros* (possibly decreasing), reedbuck *Redunca arundinum*, suni *Neotragus moschatus* (rare in Malawi), a small population of impala *Aepyceros melampus* and occasionally Lichtenstein's hartebeest *Alcelaphus lichtensteini*, black rhinoceros *Diceros bicornis* (T), and samango monkey *Cercopithecus albogularis*.

Zoning No information

Disturbances or Deficiencies There has been de-gazettement of 60% of the reserve with return of settlement. There is poaching, and law enforcement is difficult due to lack of funds.

Visitor Facilities The road system is poor, but research groups occasionally visit and there are limited facilities.

Scientific Research Limited studies by the Department of Fisheries and some outside agencies.

Special Scientific Facilities None

Principal Reference Material

- ° Bell, R.H.V. (1981). Notes on Nyala and discussion of management options. Report to the Malawi Government. 35 pp.
- ° Bell, R.H.V. and Dudley, C.O. (1982). Two methods of estimating nyala *Tragelaphus angasi* populations in Lengwe National Park, Malawi. *Nyala* 8(2): 63-68.
- ° Clarke, J.E. (1983). Protected areas masterplan for the Southern Region. Department of National Parks and Wildlife, Lilongwe.
- ° Ridding, C.J. (1975). Report on Mwabvi Game Reserve, Southern Malawi. Report to the Ministry of Agriculture and Natural Resources, Lilongwe.

Staff 1984: seven full-time and five temporary workers

Budget Managed within the budget of Lengwe National Park

Local Park or Reserve Administration Parks and Wildlife Officer, Lengwe National Park, P.O. Box 25, Chikwawa.

Date April 1985

NKHOTA-KOTA GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.20.12 (Central African Highlands)

Legal Protection Total

Date Established 1930; extended in 1970

Geographical Location Central Malawi, on the escarpment west of Lake Malawi. Approximately 13°00'S, 34°00'E.

Altitude 550-1638m

Area 180,200ha

Land Tenure Government

Physical Features The reserve is on the escarpment between the Kasungu plain on the pre-Cambrian Central African Plateau and the plain around Lake Malawi. This fault scarp runs the whole length of the reserve from north to south. The upper part of the reserve consists of a dissected plateau with deep faulted valleys. There are some large hills, including Chipata

Mountain (1,638m), an ancient igneous plug. The lower part of the reserve consists of rugged topography with many small valleys and streams. The reserve is bisected by the rocky valley of the Bua River and the northern boundary is marked by the steep gorge of the Dwangwa River. There is a plentiful supply of water by many clear permanent rivers, streams, and springs.

Vegetation The vegetation is predominantly miombo *Brachystegia-Julbernardia* woodland of the escarpment variety, taller and closed in the uplands, shorter and more open in the lowlands. The major valleys contain tall grass savanna with *Terminalia*, *Combretum*, *Piliostigma* etc. with montane forest on the slopes of Chipata.

Fauna Mammals include: lion *Panthera leo*, leopard *P. pardus* (T), elephant *Loxodonta africana* (T)(about 300 recorded in 1983 but thought to be decreasing), zebra *Equus burchelli*, sable antelope *Hippotragus niger*, roan antelope *Hippotragus equinus*, bushbuck *Tragelaphus scriptus*, greater kudu *Tragelaphus strepsiceros*, eland *Taurotragus oryx*, reedbuck *Redunca arundinum*, waterbuck *Kobus ellipsiprymius*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, impala *Aepyceros melampus*, and samango monkey *Cercopithecus albogularis*. Black rhinoceros *Diceros bicornis* (T) have not been recorded since the 1960s and are probably extinct.

Conservation Management Firebreaks have been maintained around Chipata mountain.

Zoning Plans for zoning are given in Clarke (1963) and Carter (1985).

Disturbances or Deficiencies There is some poaching, particularly of fish. Development has been delayed by lack of funds.

Visitor Facilities There is an unfinished rondavel house available to visitors on request at Chipata camp. Sport fishing for mpasa *Opsaridium microleptis* (a migratory fish which spawns in the Bua river) has been opened on a trial basis.

Scientific Research In 1980, a study to examine the basic ecology of the area was initiated. There has also been work done on the impact of elephant browsing on *Brachystegia* woodland. The Wildlife Research Unit, based at Kasungu National Park, has carried out a number of surveys since 1980 on a wide variety of topics including an elephant census by counting droppings in 1981 (Jachmann, 1984).

Special Scientific Facilities None

Principal Reference Material

- ° Carter, J.M. (1985). Tourism Master Plan.
- ° Clarke, J.E. (1983). *Protected areas master plan for the Central Region*. Department of National Parks and Wildlife, Lilongwe.
- ° IUCN/WWF Project No. 1665. Elephants of Malawi. *WWF Monthly Report* January 1983: 377-379.
- ° Jachmann, H. (1984). Assessment of elephant numbers by means of droppings counts on tracks and its use in the Nkhotakota Game Reserve, Malawi. *Nyala* 10(1): 33-38.

Staff 1985 - one game ranger, 15 game scouts, and eight porters

Budget About US\$10,000 per annum

Local Park or Reserve Administration Senior Parks and Wildlife Officer, PO Box 65, Lilongwe.

Date April 1985

VWAZA MARSH GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.20.12 (Central African Highlands)

Legal Protection Total

Date Established 1977 by Government Notice 33. Previously a controlled area.

Geographical Location Northern Malawi on the border with Zambia, south-west of Nyika Plateau. Approximately 11°00'S, 33°20'E.

Altitude About 1,000m

Area 100,000ha; about 10km from Nyika National Park (304,385ha)

Land Tenure Government

Physical Features The reserve is at the foot of Nyika Plateau, from where the marsh derives most of its waters.

Vegetation Vwaza marsh occupies about 10% of the reserve. It consists of swamp grassland with woody plants restricted to thickets on termite mounds perched above seasonal floodlevels. Surrounding the marsh are extensive *Brachystegia* woodlands with *Colophospermum mopane* (at the extreme northern limit of its range). There is also deciduous thicket, *Piliostigma/Acacia* tree savanna and some areas of secondary immature woodland, particularly along the pediments facing the South Rukuru river. There are also large areas of dense *Landolphia* thicket in the south-east of the reserve.

Fauna Mammals include: elephant *Loxodonta africana* (T) (about 300 recorded in 1983 but thought to be decreasing), lion *Panthera leo* and leopard *Panthera pardus*, buffalo *Syncerus caffer*, hippopotamus *Hippopotamus amphibius*, sable antelope *Hippotragus niger*, roan antelope *Hippotragus equinus*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, eland *Taurotragus oryx*, greater kudu *Tragelaphus strepsiceros*, reedbuck *Redunca arundinum*, impala *Aepyceros melampus* a few waterbuck *Kobus ellipsiprymnus*, and puku *Kobus vardonii*. Species composition of fish fauna is listed by Tweddle (1981).

Conservation Management There has been a recent upgrading of law enforcement in the reserve.

Zoning Plans for zoning are given in Clarke (1983) and Carter (1985).

Disturbances or Deficiencies Since the reserve was gazetted in 1977, the majority of the human population has been relocated with compensation. However, a number of small settlements remain within the reserve, notably in the Mowa salient in the west. Negotiations are in progress to complete their removal. There is considerable pressure on the eastern boundary and there are negotiations to re-align the boundary to reduce pressure points. Vwaza is subject to a great deal of illegal activity, including hunting of elephant and other wildlife, fishing and timber extraction. Previously, about 25 elephant were killed per year, but in 1984, this had declined to 15. There is a dense tsetse fly population and is a focus of human sleeping sickness as well as bovine trypanosomiasis.

Scientific Research A preliminary ecological survey of the reserve was carried out in 1979 by Bell and Mphande (1980). Since 1982 there has been a wildlife research unit at Vwaza headed by a Peace Corps volunteer. Preliminary results of their work are given in McShane and McShane-Caluzi (1985). The response of woodland to elephant damage is given in Bell and McShane (1985).

Special Scientific Facilities There is a well-maintained field unit which will continue to operate under a Malawian PWO from October 1985. The research unit and offices are at Thazima, the headquarters of Nyika National Park, 10km from the reserve's boundary.

Principal Reference Material

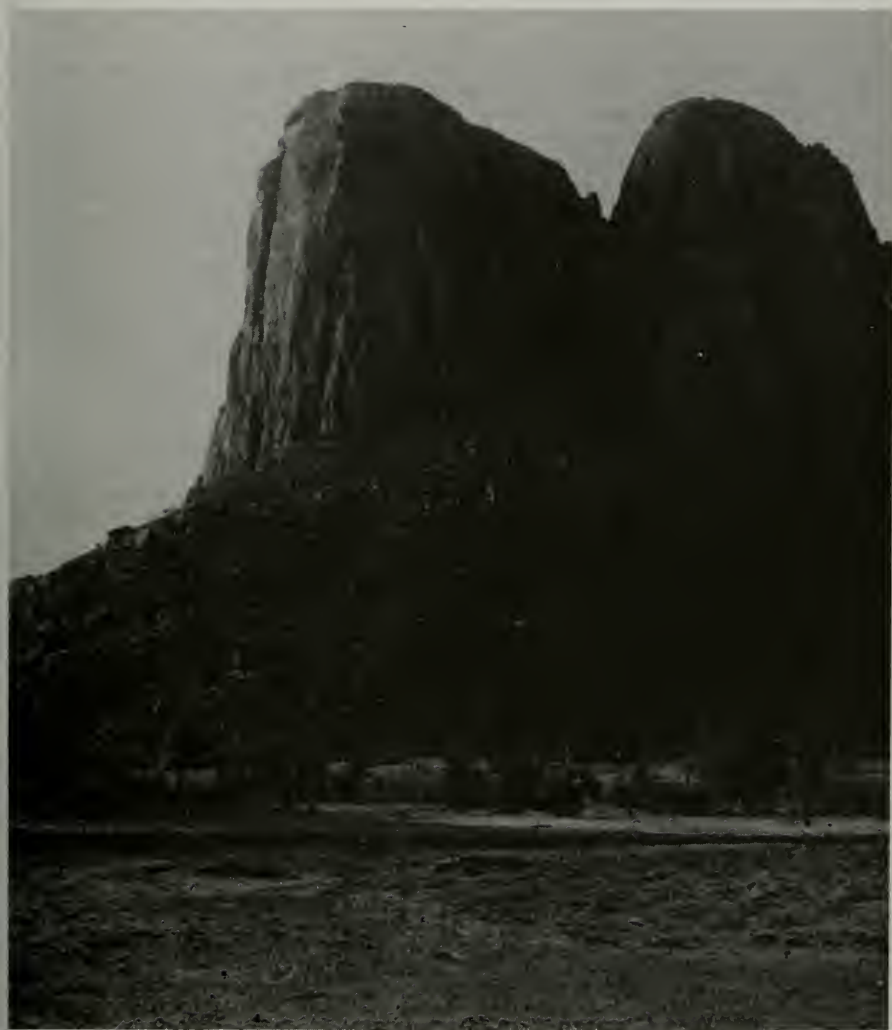
- ° Bell, R.H.V. and Mphande, J.M.B. (1980). Vwaza Marsh Game Reserve; report of survey and recommendations for management. Report to the Malawi Government. 101 pp.
- ° Bell, R.H.V. and McShane, T.O. (1985). Tree response to elephant damage. In: Bell, R.H.V. and McShane-Caluzi, E. (Eds) *Conservation and Wildlife Management in Africa*. Proceedings of a workshop organised by the U.S. Peace Corps at Kasungu National Park, Malawi, October 1984.
- ° Clarke, J.E. (1983). Protected areas master plan for the Northern Region. Department of National Parks and Wildlife, Lilongwe.
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- ° McShane, T.O. and McShane-Caluzi, E. (1985). Vwaza Marsh Game Reserve, Malawi. In: Bell and McShane-Caluzi (as above).
- ° Tweddle, D. (1981). The fishes of the Malawi northern region Game Reserves. *Nyala* 7(2): 99-108.

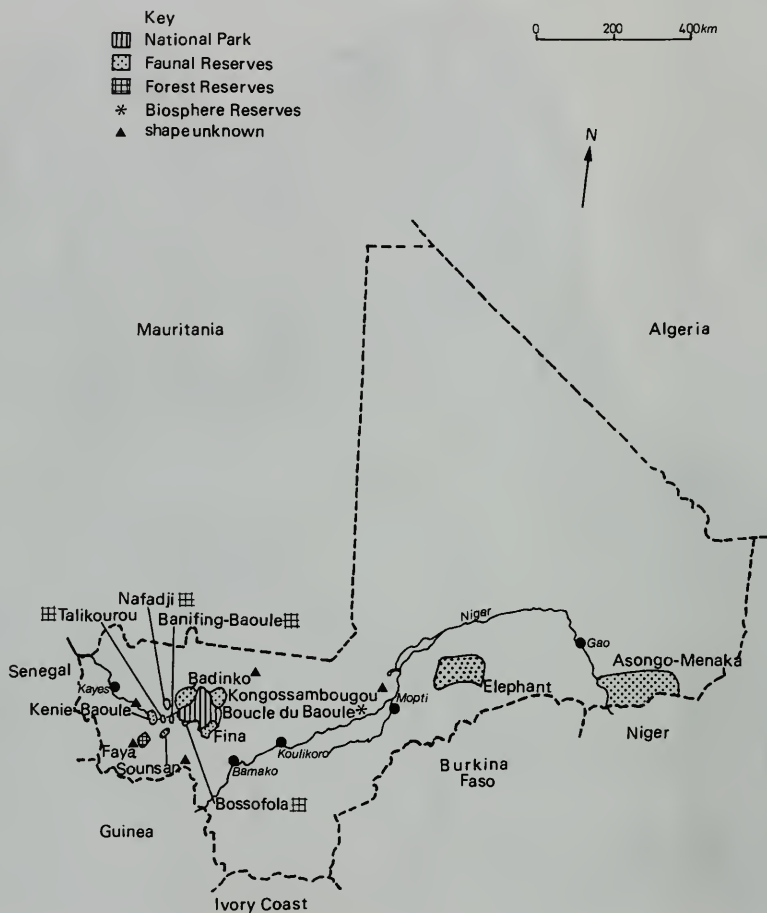
Staff One senior game ranger, six game scouts, and four porters. Patrols from Nyika also work in Vwaza.

Budget About US\$10,000 per annum, including salaries

Local Park or Reserve Administration Senior Parks and Wildlife Officer, Thazima Camp, Private Bag 6, Rumphu.

Date 1985





Mali

MALI

Area 1,204,022 sq.km

Population 7,720,000 (1984)

Parks and Reserves Legislation The current legislation relating to protection of natural resources has its origins in two decrees promulgated by the French colonial authorities, a decree of 18 November 1947 which controlled hunting in French overseas territories, and another of 4 July 1935 which established the forestry regime in French West Africa. Since independence, these acts have been superceded by Law No. 68-8/AN-RN of February 1968 which sets out the Forestry Code, and Ordinance No. 60/CMLN of 11 November 1969 which sets out the Hunting Code. Definitions of protected areas originate principally from the Convention for Protection of African Flora and Fauna (London, 1938), and there are six main types. National parks are defined as areas where all human intervention is prohibited save that necessary for management and visitor access. Réserves de faune are areas where all hunting is forbidden, but in which land uses such as grazing, cultivation, and forestry may be allowed; Réserves naturelles are areas set aside in which human intervention of any sort is kept to an absolute minimum, and where particularly strict control is required. Réserve spéciale or sanctuaire are terms used for areas set aside to protect/conservé particular species or communities, and where all other activities are subordinate to this aim. It would appear that the Zone cynégétique is not a legally defined area, but a zone where the Direction nationale des eaux et forêts aims to facilitate hunting with the provision of tracks and camps. National Parks and the more strictly controlled reserves are established by individual laws, or equivalent acts, but other protected areas can be created by a decree from the Council of Ministers. Classified Forests are basically managed in the same way as réserves de faune (hunting is forbidden) though control of exploitive activity is likely to be more severe. Other areas may receive further protection under the Forestry Code.

Parks and Reserves Administration This is the responsibility of the National Parks Department (Direction des parcs nationaux) which is supervised by the Department of Water and Forests (Direction générale des eaux et forêts). The Ministry responsible for the parks is the Ministry of Natural Resources and Animal Husbandry (Ministère des ressources naturelles et de l'élevage). The Forestry Service, also within the Direction générale des eaux et forêts, is responsible for management of classified forests.

Address

* Direction des parcs nationaux, Direction générale des eaux et forêts, BP 275 Bamako.

Additional Information Mali is one of a number of countries in which drought is a particular problem. Overgrazing of the resultant poor pastures and destruction of woodland cover for firewood is leading to serious erosion and desertification. With the clearance of forest the overall climate in the Sahel is becoming drier and accelerating the desertification process.

The Government of Mali is considering the establishment of a new national park or wildlife reserve fairly near Bamako. This is partly to compensate for loss of habitat which will be caused by flooding associated with a new dam on the Bafing River at Mananatali. The area is not particularly rich in wildlife, but has scenic beauty and is fairly easily accessible. It may protect the habitat of 50-150 chimpanzee. Apart from this, IUCN/WWF are providing assistance in the creation and development of reserves in the Niger delta.

References

- * IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- * IUCN/WWF Project 3026. Mali, Niger Delta.
- * Moison, G. (1969). Aménagement de la faune, des parcs et réserves. Rapport au gouvernement du Mali. FAO, Rome.

- ° Poulton, R. (1983). Cooperation against drought. *Geographical Magazine* 55(10): 524-532.
- ° Sanogho, N.N. (1983). La législation au Mali. In: *Rapport de la Session de formation sur l'aménagement et la gestion des réserves de la biosphère en Afrique soudano-sahélienne*. Comité National Malien du MAB.
- ° Sayer, M.J. (1975). Aménagement de la faune. Rapport au gouvernement du Mali. FAO, Rome.

Protected Areas

(hectares)

National Parks

Boucle du Baoule	350,000
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Faunal Reserves

Asongo-Menaka	1,750,000
Badinko	193,000
Elephant	1,200,000
Fina	136,000
Kenie-Baoule	67,500
Kongossambougou	92,000
Sounsou	37,600
Subtotal	3,476,100

Forest Reserves

Banifing-Baoule	13,000
Bossofola	12,000
Faya	80,000
Nafadji	43,000
Talikourou	13,900
Subtotal	161,900

Biosphere Reserves

Parc national de la Boucle du Baoule (etc)	771,000
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PARC NATIONAL DE LA BOUCLE DU BAOULE AND ASSOCIATED RESERVES

Management Category II, IV and IX (National Park, Managed Nature Reserve and Biosphere Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Protection is not complete within the reserves, where some traditional practices are still allowed.

Date Established Boucle du Baoulé was protected as a Reserve in 1950 and established as a National Park in 1953. The Badinko Reserve was established in 1951-1952, Fina Reserve in 1954, and Kougossambougou Reserve in 1955. The park, and all three reserves, were accepted as a Biosphere Reserve in June 1982.

Geographical Location On the Baoulé River approximately 200km north-west of Bamako in western Mali. 13°45'-14°23'N, 8°23'-9°25'W.

Altitude 300m

Area Boucle du Baoulé Biosphere Reserve (771,000ha); Boucle du Baoulé National Park (350,000ha); Fina Faunal Reserve (136,000ha); Badinko Faunal Reserve (193,000ha), and Kounghossambougou Faunal Reserve (92,000ha).

Land Tenure Government

Physical Features The main part of the area is made up of the hard, horizontally bedded Ordovician sandstone of the Madingue Plateau. This rock has been weathered and eroded to form inselbergs with almost vertical sides, rising 200m above the surrounding area, steep rubble slopes, piedmonts covered with sediment, and canyons whose walls overlook the alluvial river beds below. There are also mudstones of marine origin, schists, permeable sandstones and dolomite. The area also contains a broad alluvial belt which is a relic of the geological period when the upper Niger drained through the Baoulé into the Senegal River. The mean annual temperature is 29.7°C and the mean annual precipitation 950mm, falling between June and October.

Vegetation The reserves contain three biogeographical zones: 1) the sudano-guinean zone to the south, characterised by a tree layer particularly of Combretaceae and *Acacia* spp. and a grass layer made up mainly of annual grass species; 2) the Sahelian zone to the north characterised by spiny vegetation adapted to xeric conditions and a sparse grass cover; 3) and the riverine forest bordering the Baoulé River, which is very dense and contains many creeping plants and bamboo. The park also contains examples of *Butyrospermum paradoxum* savanna, an artificial vegetation type which results from cultivation of *Isoblerlinia* woodland.

Fauna There is a large diversity of species although individual populations are rather small as a result of repeated bushfires and poaching in the past. Large mammals include: roan antelope *Hippotragus equinus*, Defassa waterbuck *Kobus ellipsiprymnus*, giant eland *Taurotragus derbianus* (with Niokolo-Koba in Senegal, are of the last two populations in West Africa) eland *Taurotragus oryx* (in the Fina reserve), hartebeest *Alcelaphus buselaphus*, oribi *Ourebia ourebi*, warthog *Phacochoerus aethiopicus*, giraffe *Giraffa camelopardalis*, elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), olive baboon *Papio anubis*, vervet monkey *Cercopithecus aethiops* and patas monkey *Erythrocebus patas*. There is also an abundant avifauna, including many migratory species. A list of mammal and bird species can be found in Sayer (1975).

Conservation Management Attempts are being made to relocate the settlers that currently live within the park. However, application of the laws has been concentrated on areas used for tourism, so in the past Boucle de Baoulé has received little attention while Fina has been treated as a National Park. Under the bilateral project on agronomic research between the Netherlands and Mali, attempts are being made to regulate and rationalise land use. Geerling (1983) makes a number of management proposals, suggesting different management objectives for the different sectors of the whole area. Earlier, FAO/UNDP were involved in development of the area and Sayer (1975) makes a number of recommendations.

Zoning The core area is made up of the Boucle du Baoulé National park where theoretically all human intervention is excluded. The reserves adjacent to the park, Fina, Badinko, and Kounghossambougou, make up the buffer zone, where certain traditional land use practices such as hunting are permitted.

Disturbances or Deficiencies The whole area has suffered from a long history of human impact mainly by overgrazing, fire, and hunting. These impacts are shown by the decrease in annual grass species and a corresponding increase in perennial species, increase in pyrophytes and spread of laterisation in the sudano-guinean zone, decrease in vegetation cover and encroaching desertification in the soudanian and sahelian zones. Because areas surrounding the park were managed for hunting until recently, the situation arose where game was more readily visible outside the park - probably because of reduced poaching where there were licensed hunters and guards. Grazing of domestic animals within the park is also a problem, particularly during time of drought.

Visitor Facilities There is limited accommodation at Baoulé and Madina and guides are available.

Scientific Research A comprehensive study on the Boucle du Baoulé National Park was undertaken by FAO from 1972 to 1974. The Netherlands/Mali project on Recherche sur l'Utilisation Rationnelle du Gibier du Sahel (RURGS), which began in 1977, is continuing integrated studies to improve utilisation of the natural resources by local populations and also to enable the remaining wildlife to build up population numbers. This reserve has been selected as a pilot biosphere reserve in arid/semi-arid lands.

Special Scientific Facilities Research is also carried out by students from the Institute Polytechnique of Katibougou.

Principal Reference Material

- ° Boudet, G. and Duverger, E. (1961). Etudes des pâturages sahéliens. CRNZ-Bamako-Sotuba.
- ° Geerling, C. (1983). The Boucle du Baoulé, Mali. Presented at the First International Congress on Biosphere Reserves, organized by UNESCO/UNEP in co-operation with FAO/IUCN, Minsk, USSR, 26 September-20 October 1983.
- ° Keita, J.D. (1967). Les problèmes forestiers au Mali. Pub. Service Eaux et Forêts, Bamako.
- ° Lamarche, B. (1980). Liste commentée des oiseaux du Mali (Part I). *Malimbus* 2: 121-158.
- ° Lamarche, B. (1981). Liste commentée des oiseaux du Mali (Part II). *Malimbus* 3: 73-102.
- ° RURGS (Recherche pour l'Utilisation Rationnelle du Gibier au Sahel) (1982). L'aménagement de la zone du Baoulé: Propositions préliminaires. Wageningen Agricultural University, Netherlands.
- ° Sayer, J.A. (1975). National Park Planning and Practise - Case Histories from Dahomey and Mali. Garoua/Ibadan Conference on Wildlife Management in Savanna Woodlands.
- ° Sayer, M.J. (1975). Aménagement de la Faune. Rapport au gouvernement du Mali. FAO, Rome.

Staff A total of 49 persons work in the park and adjacent reserves, mainly for protection activities. There are also visiting scientists under the RURGS Project (Recherche pour l'Utilisation Rationnelle du Givier en Sahel).

Budget No information

Local Park or Reserve Administration Opération Parc National de la Boucle du Baoulé, Testard, Bamako, BP 275 (which also manages the adjacent reserves).

Date June 1982

RESERVE DE KENIE-BAOULE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial

Date Establlshed 1952

Geographical Location Koulikoro Province.

Altitude No information

Area 67,500ha

Land Tenure No information

Physical Features No information

Vegetation Sudano-guinean savanna

Fauna Mammals include: buffalo *Syncerus caffer*, and reportedly giant eland *Taurotragus derbianus* (though this has not been confirmed).

Zoning No information

Disturbances or Deficiencies Poaching, forest exploitation, and agriculture.

Scientific Research Inspection by Mr Namosie Traoré, an employee of Direction des Eaux et Forêts, Projet RURGS (Recherche pour l'Utilisation Rationnelle du Gibier en Sahel).

Special Scientific Facilities No information

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Direction des Parcs Nationaux, Direction Générale des Eaux et Forêts, BP 275 Bamako.

Date 1982





Mauritania

MAURITANIA

Area 1,118,604 sq.km

Population 1,830,000 (1984)

Parks and Reserves Legislation No information, except for the decree of 1976 to establish the Parc national Banc d'Arguin

Parks and Reserves Administration This is the responsibility of the Directorate of Nature Protection within the Ministry of Rural Development. The Parc national Banc d'Arguin is directly controlled by the government and is managed by an Administrative Council.

Address

° Direction de la protection de la nature, Ministère du développement rural, BP 170, Nouakchott.

Additional Information Mauritania in general needs to develop programmes to conserve desert fauna. Immediate concerns, however, are protection of the last population of elephants using southern Mauritania; wetlands in the lower Senegal valley on the Senegal-Mauritania border; and Banc d'Arguin (IUCN/UNEP, 1983). IUCN/WWF are assisting in the elaboration of a management plan for the Banc d'Arguin National Park, and with the provision of logistical support contributing to the development and management of the park. They are also working with other groups towards the creation of the Diaouling Reserve in the Delta of the River Senegal.

References

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- ° IUCN/WWF Project 1333. Mauritania, Banc d'Arguin National Park.
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- ° Scott, D.A. (1980). A Preliminary Inventory of Wetlands of International Importance for Waterfowl, in West Europe and Northwest Africa. IWRB Special Publication No. 2.
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Protected Areas

	(hectares)
<i>National Parks</i>	
Banc d'Arguin	1,173,000
<i>Integral Reserves</i>	
Baie du Levrier	310,000
Las Cuevecillas	
	Subtotal 310,000
<i>Faunal Reserves</i>	
El Agher Partial	250,000
<i>Other Reserves</i>	
Adrar Mouflon Reserve	
Tilemsi Reserve	
<i>Proposed areas</i>	
Diaouling Reserve	13,000

PARC NATIONAL DU BANC D'ARGUIN

Management Category II (National Park)

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Total

Date Established August 1976, by Decree No. 76-147/PR; designated as a Ramsar site in 1982

Geographical Location On the West Africa coast, midway between Nouakchott and Nouadhibou. 19°21'-21°51'N, 16°00'-16°45'W.

Altitude From sea level to 15m

Area 1,173,000ha; 50% marine and 50% terrestrial environment; contiguous to two reserves; at Cap Blanc (Baie du Lévrier Integral Reserve); and on the Côte des Phoques (Las Cuevecillas Integral Reserve).

Land Tenure Government

Physical Features The park is a vast area of islands and shore, composed mainly of sand blown in from the Sahara, together with a large expanse of coastal seas and mudflats. The arid terrestrial component mainly comprises areas of sand, sand hills, and cliffs. The coastal waters between Cap Blanc and Cap Timiris are very shallow, and only in places more than 5m deep up to 60km offshore. Maximal tidal range at spring tides is 2m and at some neap tides is 0.6m. The park provides a unique example of a transition zone between the Sahara Desert and the Atlantic Ocean. A summary of the geology of the area can be found in Elouard (1976), and Rosso *et al.* (1977). Extrapolations from the weather stations at Nouakchott and Nouadhibou are difficult due to the large difference in latitude. The area is of great interest meteorologically with a contrast between the coastal, 'desert cold' and hot continental climates. Strong winds up to 8m/sec, have been reported. Rainfall is irregular and very low with an average of 34mm per year. Temperatures are fairly similar all year, with a mean monthly minimum in December of 8°C and maximum in September of 34°C.

Vegetation Islands and coastline are dominated by *Avicennia africana* with shrubs of *Spartina maritima* and species of Chenopidiaceae; mudflat vegetation comprises *Zostera noltii*, *Cymodocea nodosa*, *Halodule wrightii*, and various seaweeds. The terrestrial component of the park is dominated by an African-type of Saharen vegetation although there is a mediterranean influence; there are tree species such as *Acacia tortilis*, *Balanites aegyptiaca*, *Maerua crassifolia*, *Capparis decidua*, and herbacious species *Panicum turgidum*, *Cassia italica*, *Pergularia tomentosa*, and *Heliotropium bacciferum*. The dunes are dominated by *Stipagrostis pumgens*, *Cornulaca monacantha*, *Euphorbia balsamifera*, and *Calligonum comosum*. On the southern fringe of the park, *Euphorbia balsamifera* predominates. There is a two-way gradient; littoral between the marine and continental flora; and north-south with many species at the extreme limits of their distributions.

Fauna The Banc d'Arguin is situated in the Atlantic flyway used by approximately seven million waders breeding in northern Europe and the USSR which winter along the shores of the Atlantic Ocean. Approximately 30% spend the winter in this particular area. Species include broad-billed sandpiper *Limicola falcinellus*, ringed plover *Charadrius hiaticula*, grey plover *Pluvialis squatarola*, knot *Calidris canutus*, curlew sandpiper *Calidris ferruginea*, dunlin *Calidris alpina*, and bar-tailed godwit *Limosa lapponica*. The area is one of the most important wintering grounds for the European spoonbill *Platalea leucorodia leucorodia*, of which the West European population is particularly threatened. Thousands of aquatic birds of several species or subspecies with an African distribution breed on the islands. They include: white pelicans *Pelecanus onocrotalus*, endemic subspecies of heron *Ardea cinerea monicae* and spoonbill *Platalea leucorodia balsaci*, reed cormorant *Haliëtor africanus*, western reef

heron *Egretta gularis*, slender-billed gull *Larus genei*, several species of tern *Sterna* spp., *Hydroprogne caspia*, and *Gelochelidon nilotica*, and flamingoes *Phoenicopterus ruber*. Mammals include Dorcas gazelle *Gazella dorcas*, jackal *Canis aureus*, fennec fox *Fennecus zerda*, sand fox *Vulpes rueppelli*, sand cat *Felis margarita*, wild cat *Felis silvestris*, Saharan striped weasel *Poecilogale albinucha*, ratel *Mellivora capensis*, striped hyena *Hyaena hyaena*, and in the marine section, several species of dolphin, such as the killer whale *Orcinus orca*, Atlantic hump-backed dolphin *Sousa teuszii*, common dolphin *Delphinus delphis*, rough toothed dolphin *Steno bredanensis*, bottle-nosed dolphin *Tursiops truncatus*, and Risso's dolphin *Grampus griseus*. The fin whale or common rorqual *Balaenoptera physalus*, and common porpoise *Phocoena phocoena* have also been recorded. There is a small population of monk seal *Monachus monachus* (E) in the reserve at Cap Blanc, near Nouadhibou. There are four species of threatened turtle frequenting the area *Chelonia mydas* (E), *Caretta caretta* (V), *Eretmochelys imbricata* (E), and *Dermochelys coriacea* (E). Fish are one of the most important components of the fauna. The shallow tidal flats are important breeding and nursery areas for most of the fish offshore. Further details can be found in the Bulletin de la Laboratoire des Peches de Nouadhibou.

Conservation Management Two reserves have been established outside the park boundaries at Cap Blanc and on the Cote des Phoques (Las Cuevecillas) in order to protect the Mediterranean monk seal *Monachus monachus* (E). These are administered by the park. There was an international meeting held in Paris, April 1982, to discuss future research and management of the park. As a result, a preliminary management plan was published by the World Wildlife Fund and IUCN with the collaboration of the Royal Institute of Natural Sciences in January 1984.

Zoning None

Disturbances or Deficiencies Much of the area has had little or no disturbance by man. The principal deficiency is that there is no organised protection or supervision as yet. There is a population of 300 Imragens who live and fish in the area, although they need to go outside the boundaries for freshwater. However, nomadic herdsman also use the area and overgrazing by several hundred camels and goats has been reported, although this has become less common as the area becomes increasingly subject to desertification. There is illegal hunting of gazelle (by motorcycle) and marine turtles (particularly for tourist demand in Dakar). Non-biodegradable waste is found along the shore-line. Fishing nets could interfere with the monk seals, but this has not been studied. The status of the monk seal population is critical after the collapse of their breeding caves in 1982. Overfishing by international fishing fleets in the waters just off the Banc d'Arguin may cause a decline of the breeding colonies of fish-eating bird species such as cormorants and pelicans.

Visitor Facilities The area is unsuitable for large-scale tourism

Scientific Research Ornithology and oceanography includes inventories of species, study of the phytoplankton biomass, and studies on the reproductive biology of the white pelican *Pelecanus onocrotalus*. The Netherlands Ornithological Mauritanian Expedition 1980 gathered comprehensive data on waders, crustacea, and other fauna (NOME, 1982).

Special Scientific Facilities There is a station inside the park (Iwik) equipped for six persons with three Zodiacs, one motor launch, and three radio stations for both broadcasting and receiving. It is accessible by four-wheel drive, motor launch or light aircraft.

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- ° A comprehensive reference list is given in NOME, 1982.

Staff Some 14 Mauritians and three French, although only two members of staff are stationed within the park

Budget Seven million UM (ougyas) (FF700,000). Much of the equipment has been supplied by the World Wildlife Fund.

Local Park or Reserve Administration Parc national Banc d'Arguin, BP 124, Nouadhibou.

Date August 1980, with supplementary 1983 information

DIAOULING STRICT NATURE RESERVE

Management Category Proposed I (Strict Nature Reserve)

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Total protection recommended

Date Established To be gazetted. Establishment of reserves is in the hands of the Ministry of Rural Development.

Geographical Location Delta of River Senegal. 16°26'N, 16°21'W.

Altitude Near sea level

Area 13,000ha

Land Tenure Government

Physical Features The Senegal delta is one of the major wetlands of Sahelian Africa and provides a staging point and wintering area for many birds that breed in Eurasia. It consists of a vast basin of impermeable halomorphic soils forming saline flats, which are subject to annual flooding. The development of various dyke systems over the last 20 years on the Senegalese bank of the river has allowed the retention of water in some areas of the basin longer than they would normally have persisted, whilst in other areas the effect has been to desiccate the fragile soils and enhance desertification. Salinity varies with water level from nearly fresh during autumn inundations, to brackish as the water levels fall. The climate is Sahelian with alternate wet and dry seasons. Mean annual rainfall is 300mm and mean annual temperature 27°C. The reserve receives fresh water from distributaries of the River Senegal from August to November. During the dry season, the basin is the wettest area in the region, but recent rainfalls have been very low, and the reserve, which usually begins to dry out in January, has not retained its moisture for as long.

Vegetation The vegetation reflects the three habitat types found in the lower delta: dunes, alluvial plains and an interconnecting network of rivers, lakes and pools. Tree cover on the dunes comprises *Acacia tortilis*, *A. senegal*, *Euphorbia balsamifera*, and *Balanites aegyptiaca*. Herbaceous cover comprises *Cenchrus biflorus*, *Chloris prierii* and *Schoenefeldia gracilis*, amongst others. Towards the edge of the dunes, tree cover is more varied and abundant, with *Borassus aethiopum*, *Acacia nilotica*, *A. seyal*, and some *Parkinsonia aculeata*. There is little tree cover on the alluvial plain, but *Tamarix senegalensis* and *Arthrocnemum glaucum* occur on sandy knolls and *Acacia nilotica* beside creeks and pools. Herbaceous cover on the lower zones of the plain is dominated by halophiles, with *Salsola baryosma* being replaced by *Sporobolus robustus* in the most frequently flooded areas. Grasses are more important in less saline areas, with *Echinochloa colonum* or *Vetiveria nigriflora* in depressions, and *Schoenefeldia gracilis* on higher ground. Tree cover is well developed on the network of rivers and pools, with *Tamarix senegalensis* and dense stands of *Arthrocnemum glaucum*. The reed *Paspalum vaginatum* is found along river banks. There is a 5ha mangrove swamp mainly composed of *Avicennia nitida*, but with some specimens of *Rhizophora racemosa*. All of the vegetation has been significantly affected by drought and overgrazing, and trees have been cropped for firewood. Sand dunes are beginning to form in areas where grass has failed to regenerate. The mangrove swamp is receding owing to the incursion of sand and some felling.

Fauna The lower delta of the River Senegal is an important collecting and breeding ground for waterfowl. Together with the Senegalese part of the delta, where the Parc National des Oiseaux du Djoudj is situated, this area provides an important feeding and watering site for numerous Palearctic migrants. Fewer birds breed or gather on the Mauritanian part of the delta, owing to a poorer supply of fresh water, but it provides feeding grounds for birds breeding on the opposite bank. In this respect, the proposed nature reserve will be an important complement to Djoudj which has insufficient feeding grounds. The mangrove swamp supports breeding colonies of purple heron *Ardea purpurea*, night heron *Nycticorax nycticorax*, african spoonbill *Platalea alba*, cormorant *Phalacrocorax carbo*, and white pelican *Pelecanus onocrotalus*. Away from the water, small numbers of bustards (Otididae), guinea fowl *Guttera* sp., and francolins *Fringilla* sp. are present. The warthog *Phacochoerus aethiopicus* is the predominant mammal, with jackal *Canis* sp. and smaller carnivores also found. Elephant *Loxodonta africana*, hippopotamus *Hippopotamus amphibius*, gazelles *Gazella* sp., and the larger carnivores are no longer present. The brackish water, where the river water meets the sea, provides an important breeding ground for fish such as *Ethmalosa fimbriata*, bass *Dicentrarchus punctatus*, the mullets *Mugil curema* and *Liza falcipinnis*, and for marine crustacea such as prawn *Penaeus duorarum* and blue crab *Callinectes* sp.. These provide an important source of food for the breeding birds. The West African manatee *Trichechus senegalensis* and the Nile crocodile *Crocodylus niloticus* have almost disappeared, both being formerly abundant.

Conservation Management The Mauritanian government is well aware of the conservation interest of its delta wetlands and a proposal includes the creation of an artificial estuary to maintain the highly productive mixing of fresh and salt waters, a process condemned to end once the Diama dam (see below) is finished. An area has been earmarked for reserve creation and the Mauritanian government has requested help in equipping the protected zone. The Ministry of Rural Development, with the help of a resident FAO wildlife expert, is drawing up plans for this reserve and a series of others, including the creation of an international protected area. This would incorporate Diaouloung Reserve, Djoudj National Park in Senegal, and the area between the right and left banks of the Diama dam. It is recommended that Diaouloung reserve employs a permanent conservator who is trained in wildlife management and who would be in charge of controlling public access, permit distribution, poaching and forest exploitation, prohibiting pastoralism and human activity, and providing guided tours for visitors (Prévost, 1983).

Zoning No information

Disturbances or Deficiencies The area has undergone considerable ecological modification because of hydro-agricultural development over the last 20 years, which has had the effect of intensifying agriculture in some areas whilst causing desiccation, deforestation, overgrazing, and desertification in others. This process has been aggravated by the droughts which have

struck this region in the last 15 years. The governments of the surrounding countries regard dams as the solution to the problems of supplying food and water to the human population. The Senegalese bank of the river has been subject to damming since the 1960s to control the annual flood and to permit irrigation and agricultural development, notably rice and sugar cane, but the Mauritanian bank so far remains relatively untouched. The major threat now comes from the construction of the Diama dam 30km upstream of St Louis, due to be completed by about 1986, which would affect both banks of the river. It will block the river completely, preventing the summer incursion of saltwater. Low water levels due to lack of rain in recent years have affected breeding birds. White pelicans abandoned breeding in 1983 because of this. Less moisture has also meant that dunes have become destabilised and even blocked river channels.

Visitor Facilities Restricted access

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

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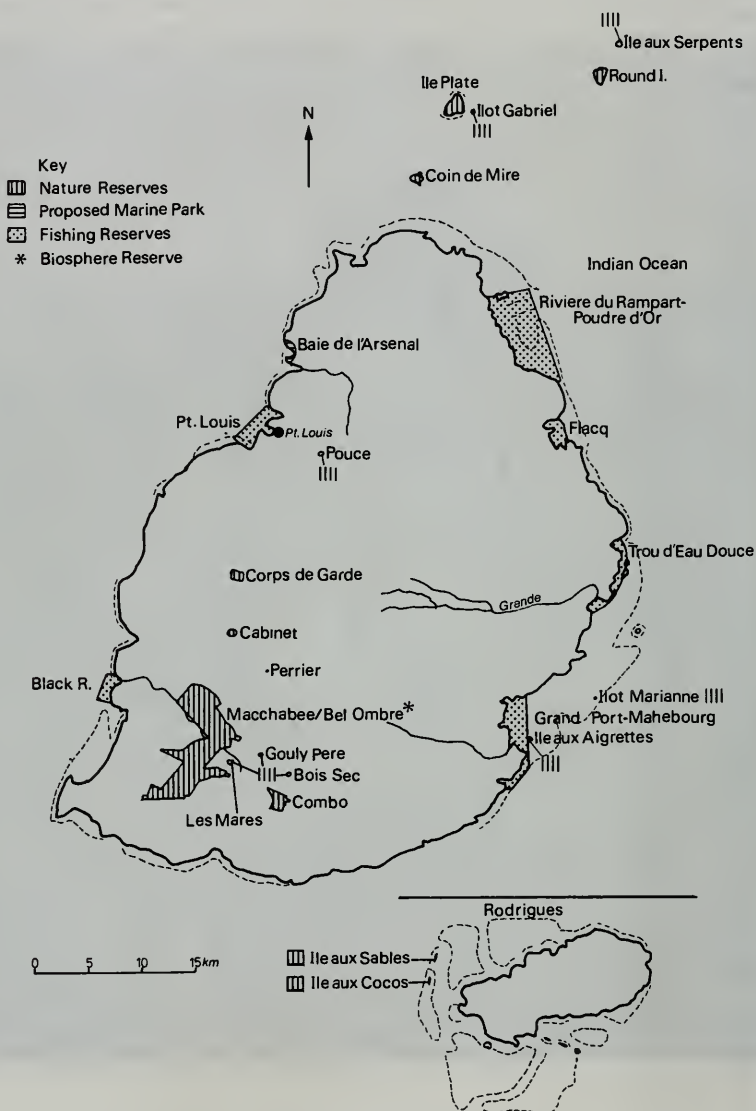
Staff Conservator, deputy conservator, three wardens, and a driver are recommended.

Budget Some Mauritanian funds available for Mauritanian personnel and part of running cost. Outside finance is necessary for equipment and training. A Budget of US\$50,000 sought from WWF.

Local Park or Reserve Administration No information

Date October 1984





Mauritius

MAURITIUS

Area 1,843 sq.km (or 2,085 sq.km inclusive of dependencies)

Population 969,191 (1983)

Parks and Reserves Legislation The Forests and Reserves Act 1983 amends and consolidates the law governing forests, reserves and related matters. Under this act the Nature Reserves Board (previously the Ancient Monuments Board) was set up to advise the Government on protected areas and preservation of the flora and fauna. All existing nature reserves were created under the Ancient Monuments Act of 1944, and jurisdiction and restrictions are outlined in the 1983 Act. The 1944 Act defines a nature reserve as meaning "any forest, park, garden or other open space, the preservation of which is, in the opinion of the Board, a matter of public interest by reason of the aesthetic, geological, historical, archaeological, or scientific interest attaching thereto". A nature reserve can be in private ownership and include inhabited buildings. Private nature reserves must still comply with the regulation laid down by the 1983 act, but the primary aim of these areas is not nature conservation *per se*. New areas must first be approved by the board, then submitted for the Government's approval. The Government also has authority to declare any forested Crown land as National Forest. The total area of such Crown forest lands was 21,027ha in 1980. The Fisheries Act 1980, defines reserved areas where large net or gill net fishing is prohibited. These reserves are detailed in Government Notice No. 18 of 1983. Restrictions in these areas are rarely enforced. It is also worth noting that under the Maritime Zones Act (1977) the Prime Minister can create a 'designated area' for, amongst other possible reasons, protection of the marine environment. Mountain Reserves and River Reserves can be established under the Forests and Mountain and River Reserves Act (1971) but these areas are not intended primarily for nature conservation. In a similar way, additional control is maintained over Crown Land and the reserved lands along the sea coast. The Four Year Plan for Social and Economic Development is the definite statement of Government Policy for the years 1981-1985. It contains outline proposals for the establishment of one land national park (the Black River Gorges and adjacent areas) and three marine national parks.

Parks and Reserves Administration The Nature Reserves Board is advisory in function and has the duty of recommending to the Government areas for the creation of nature reserves, or buildings or other structures as ancient monuments. The board provides a means for the participation of local people and other conservation orientated groups in the selection and management of protected areas. Actual management is the responsibility of the Forestry Service which has a policy that concentrates on sustained utilization of forests and their use for the protection of water supply and soils. The marine environment is the concern of the Fisheries Division. Both the Forestry Service and the Fisheries Division come under the Ministry of Agriculture, Fisheries and Natural Resources. The management of protected areas does not yet involve the use of elaborate management plans, and provisions of the relevant acts governing the protected areas are merely enforced by the various agencies concerned.

Address

° Forestry Service, Ministry of Agriculture, Fisheries and Natural Resources, Curepipe.

Additional Information Unfortunately many reserves still receive little management, although there are hopes that the situation will improve. Under IUCN/WWF Project 3149 proposals are being made for improving the management of some of the existing reserves and establishing new areas. In the first phase of this project, an inventory of areas of the highest plant endemism will be compiled. Emergency propagation of critically endangered species will be carried out where feasible. The second phase of the project will entail *in situ* and *ex situ* plant conservation and the establishment of garden reserves. It is hoped that reserves will be declared on Rodrigues since there is little protection for plants there. The principle causes of habitat decline on Mauritius and Rodrigues are introduced plants and animals that outcompete or predate the native species. Top plant offenders are the guava *Psidium guajava* from Brazil, privet from Sri Lanka and *Rubus alaeifolius*, *Hiptage benghalensis* and *Furcraea foetida*.

Control of these species is difficult and eradication impossible. Exotic monkeys *Macaca fascicularis*, deer, pigs and birds are also decimating the flora. So far, several new locales and new information on threatened and endemic plants have been gathered under the project.

The privately-owned reserves which occupy the upper slopes of mountains are rocky and bare in parts but many areas are densely covered with native forest of the exotic traveller's palm *Ravenala madagascariensis*. However, increasing use is being made of these areas for deer ranching, and the deer are reported to be inhibiting natural regeneration as well as weed infestation. River reserves (3-16m) along the edges of streams are patrolled by forest officers, but demand for firewood in both these and mountain areas is intense and many areas are degraded. Forest recreation is becoming more and more popular among the local public and tourists and there is a need for education programmes to make people more fully aware of the problems concerning adequate nature conservation.

Mauritius is also the focus for a project which aims to provide help and advice to the Mauritius Government on the conservation of endangered bird species. Mauritius kestrels *Falco punctatus* have been reared in captivity from eggs taken from the wild and pink pigeons *Nesoenas mayeri* have also been bred in captivity. The echo parakeet *Psittacula echo*, however, continues to decline in numbers.

In March 1984, an agreement was signed by the Government of Mauritius with ICBP and JWPT (Jersey Wildlife Preservation Trust) for a comprehensive wildlife research programme for Mauritius.

Legislation involving the protection of wild birds has evolved since 1869, when they were afforded some protection under the Game Ordinance. Laws of 1922 and 1939 were specifically for the protection of birds. They were replaced in 1967 by the Bird Protection Ordinance, which is currently in force. Reptiles are protected under Proclamation No. 13 of 1973. These laws are purely protective and do not cover the management of the animals' habitat. It is an offence to damage trees under the Forests, Mountains and River Reserves Act of 1971.

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Protected Areas

	(hectares)
<i>Nature Reserves</i>	
Bois Sec	6
Cabinet	18
Coin de Mire (Gunner's Quoin)	76
Combo	207
Corps de Garde	90
Gouly Pere	11
Ile aux Aigrettes	25
Ile aux Cocos	15
Ile aux Sables	8
Ile aux Serpents	31
Ile Plate	253
Ilot Gabriel	42
Ilot Marianne	2
Les Mares	5
Macchabee/Bel Ombre	3,611
Perrier	1
Pouce	69
Round Island	159
Subtotal	4,629
<i>Fishing Reserves</i>	
Black River	900
Flacq	600
Grand Port - Mahebourg	2,200
Port Louis	500
Riviere du Rampart - Poudre d'Or	3,500
Trou d'Eau Douce	700
Subtotal	8,400
<i>World Heritage Sites</i>	
Macchabee/Bel Ombre Nature Reserve	3,594
<i>Proposed areas</i>	
Baie de l'Arsenal	100

COIN DE MIRE (GUNNER'S QUOIN)

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection Total. Protected under the Forest and Reserves Act 1983.

Date Established 14 January 1970

Geographical Location About 4km north of Cap Malheureux, between the Cape and Flat Island. 19°56'S, 57°37'E.

Altitude Sea level to 162m

Area 76ha

Land Tenure Government

Physical Features The island comprises a mass of volcanic rocks, forming a wedge-shaped cliff with stratification dipping on one side towards Mauritius and the other towards Ile Plate (Flat Island). The top of the cliff is flat with a layer of volcanic soil. The island is composed of tuff, though this is overlain by basalt flows in the eastern part. The coast is rugged, and the surrounding rough sea prevents reef formation. Rainfall averages 900mm per year, and falls mainly between November and April during the warm, wet summer. Mean temperature during February is 27.8°C, and during July 21.9°C. The islands are subject to cyclones in winter.

Vegetation Seventy species of plant are found on the island, with eight species being endemic to the Mascarenes. These form four basic vegetation types, *Zoysia* grassland, *Padanus/Latania* scrub, *Heteropogon* thorn scrub, and coastal communities. There are extensive colonies of the endemic liliaceous aloe-like plant *Lomatophyllum tormentorii* (a species endemic to Gunners Quoin and Round Island) in the *Zoysia* grassland, and a few individuals of *Dracaena concinna*, and the endemic shrubs *Scutia myrtina* and *Eugenia lucida* is the thorn scrub. The fan pine *Latania loddigesii* is now rather less common than the screw pine *Pandanus vandermeerschii*. The islet is much invaded by exotic weed species (there are some 36 introductions), and thicket of introduced *Santalum album* has become established over a large area on the top of the cliff.

Fauna The island is a breeding site for three species of seabird, the white-tailed tropic bird *Phaethon lepturus*, the red-tailed tropic bird *Phaethon rubricauda rubricauda*, and the wedge-tailed shearwater *Puffinus pacificus chlororhynchus*. Four species of reptile are also found, two skinks *Scelotes bojerri* and *Ablepharus boutonii*, and two geckos *Phelsuma ornata* and *Nactus coindemirensis* sp. nov. (the last endemic to Gunner's Quoin), although three further species were known to be present before the introduction of exotic mammals.

Conservation Management According to North and Bullock (1986), effective control of invasive plants and rats is necessary before any reintroduction of native plants and animals could be reasonably contemplated. However substantial resources, currently beyond the Mauritian authorities, would be required.

Zoning None

Disturbances or Deficiencies The effects of various exotic species, both plant and animal, have had very severe effects on the native vegetation. For example, rats are reported to be contributing to the low regeneration rate of fan palm and screw pine. Also contributing to this is the invasion by exotic ruderal species such as *Santalum album*. The black-necked hare *Lepus nigricollis* is also found as an exotic, though numbers are reported to be low. (This was introduced following an abortive attempt to introduce rabbit.)

Scientific Research A survey of the islet was recently carried out (Bullock *et al.*, 1983), as part of an expedition to this islet and Round Island. One aim was to assess the suitability of Gunner's Quoin for the introduction of Round Island reptiles, which have been captive bred by the Jersey Wildlife Preservation Trust. The island was considered unsuitable because of the presence of black rats *Rattus rattus*.

Special Scientific Facilities None

Principal Reference Material

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Staff Periodic visits are made by Forestry and Fisheries Department staff.

Budget None

Local Park or Reserve Administration Forest Department, Ministry of Agriculture, Fisheries and Natural Resources, Curepipe.

Date 1984

ILE AUX AIGRETTES

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection Total. Protected under the Forest and Reserves Act 1983.

Date Established 30 November 1965

Geographical Location About 1km east of Pte. d'Esny in Mahebourg Bay. 20°25'S, 57°43'E.

Altitude Sea level to 4-5m

Area 25ha

Land Tenure Government

Physical Features The island is composed of calcarenite (coralline dune rock) with a jagged eroded coastline subjected to the eastern trade winds. Soil consists of coral sand enriched by plant debris.

Vegetation This is one of the best examples of the original coastal plant communities of calcarenitic substrates. The island harbours some 40 native species of plant, of which ten are endemic to Mauritius and a further six to the Mascarenes. There is a typical strand salt-spray zone scrub with *Suriana*, *Pemphis* and *Scaevola* well represented. Inland flora comprises endemic coastal trees and shrubs which have now mostly disappeared from the island's coastal belt due to human settlements in the past and, more recently, illegal wood-cutting. Native indigenous species are represented by ebony *Diospyros egrettarum*, *Gastonia cutispongia* (endemic), and *Dracaena concinna*. The orchid *Oeniella aphrodite* is noteworthy and requires additional protection. More rare on the island are the endemics, *Sideroxylon boutonianum* (only 2 or 3 left on the island), and the screwpine *Pandanus vandermeerschii*.

Fauna The name 'Ile aux Aigrettes' was probably derived from the reef heron, 'egrettes'. Reptiles include *Phelsuma ornata*.

Conservation Management None

Zoning None

Disturbances or Deficiencies Rats are now plentiful on the islet. The easy accessibility of this islet, together with the fact that there is no watchman posted there, has led to the virtual decimation of most indigenous trees. There is no natural freshwater source. Several introduced exotic plant species, for example *Flacourtia indica*, *Lantana camara*, and *Leucaena glauca*, are seriously threatening the survival of some of the rare endemic plants.

Scientific Research Vegetation mapping is planned for 1985.

Special Scientific Facilities None on the island

Principal Reference Material

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Staff Occasional visits by Forest Service and Fisheries Department Officer.

Budget No information

Local Park or Reserve Administration Forest Department, Ministry of Agriculture, Fisheries and Natural Resources, Curepipe.

Date 1985

ILE AUX COCOS

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection Total. Protected under the Forest and Reserves Act 1983

Date Established 30 May 1981

Geographical Location 3.7km off the west coast of Rodrigues within the lagoon. 19°43'S, 63°17'E.

Altitude Sea level to 4m

Area 15ha

Land Tenure Government

Physical Features This island comprises a sand cay, with coarse granular sand and other debris of marine organisms accumulated by sea currents and tides lying in shallow lagoon waters. The more protected shores merge into extensive sand flats which are largely exposed at low tide.

Vegetation The island is largely under mixed plantation of *Casuarina equisetifolia* and coconut *Cocos nucifera* trees. There are large expanses of grassy sward with *Stachytarpheta jamaicensis*, *Desmanthus virgatus*, and *Achyranthes aspera*. Dense *Pisonia grandis* thicket occurs along part of the western littoral and inland as isolated clumps which are sharply delimited from the cultivated tree plantation. A fairly extensive inland salt marsh supports a lush vegetation of *Sesuvium ayresii* (Mascarene endemic) with patches of *Bacopa monnieri*.

Fauna Small colonies of between 400 and 700 noddy *Anous stolidus pileatus* and lesser noddy *Anous tenuirostris tenuirostris* are present, and the favourite nesting sites are the *Casuarina* trees and *Pisonia* thickets. The white tern *Gygis alba* is now almost extinct here.

Zoning None

Disturbances or Deficiencies Bird eggs are extremely vulnerable. Indiscriminate collecting has caused considerable disturbance and damage to bird life.

Visitor Facilities Government Notice No. 157 of 1982 requires all visitors to obtain prior authorization from the Resident Commissioner before visiting the islet and all visitors must be taken there by Government boat.

Scientific Research The vegetation of the island has been surveyed by Gueho (1980).

Special Scientific Facilities None

Principal Reference Material

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Staff The island is visited as often as possible by Fisheries and Forestry Service officers from the main island of Rodrigues. One watchman is posted on the islet, but is ineffective against egg collecting.

Budget Virtually nil

Local Park or Reserve Administration Forest Department, Ministry of Agriculture, Fisheries and Natural Resources, Curepipe.

Date 1985

ILE AUX SABLES

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection Total. Protected under the Forest and Reserves Act 1983

Date Established 30 May 1981

Geographical Location 3.7km north-west from Pointe La Fouche in the west of Rodrigues within the lagoon. 19°42'S, 63°18'E.

Altitude Sea level to about 2m

Area 8ha

Land Tenure Government

Physical Features The island comprises a sand cay with coarse granular sand and other debris of marine organisms. Extensive sand flats merge with the sandy west coast.

Vegetation The islet has been mostly under *Casuarina* cultivation. Flora consist of less common exotic and native species than those of Ile aux Cocos, including *Stachytarpheta jamaicensis*, *Desmanthus virgatus*, and *Achyranthes aspera*. A few isolated individuals of the native *Pisonia grandis* can be found inland. *Thespesia populnea* is scantily represented on higher ground.

Fauna There are small colonies of noddy *Anous stolidus pileatus*, lesser noddy *Anous tenuirostris tenuirostris*, and a few white tern *Gygis alba*. *Casuarina* trees are the favourite nesting sites for these birds. There is a colony of roseate terns *Sterna dougallii*.

Zoning None

Disturbances or Deficiencies Birds eggs are extremely vulnerable. Indiscriminate collecting has caused considerable disturbance and damage to bird life. Due to inadequate transport, surveillance cannot be carried out and increasing tourism and the supply of illegal cheap transport threaten the integrity of the reserve.

Visitor Facilities Government Notice No. 157 of 1982, requires all visitors to obtain prior authorization from the Resident Commissioner before visiting the islet and all visitors must be taken there by Government boat.

Scientific Research The vegetation of the islet has been surveyed by Gueho (1980).

Special Scientific Facilities None

Principal Reference Material

- ° Gueho, J. (1977). Guide des principales plantes indigenes de l'Ile Rodrigues. *Rev. Agric. Sucr. Ile Maurice* 56(1): 6-23.
- ° Gueho, J. (1980). A survey of vegetation of the lagoon islets of Rodrigues. *Rev. Agric. Sucr. Ile Maurice* 59(1).
- ° Staub, F. (1973). Birds of Rodrigues Islands. *Proc. R. Soc. Arts & Sci. Mauritius*. 4(1): 17-59.
- ° Staub, F. (1977). L'avifaune de Rodrigues. *Rev. Agric. Sucr. Ile Maurice* 56(1): 24-26.
- ° Vinson, J. (1956). Quelques remarques sur l'Ile Rodrigues et sur sa faune terrestre. *Proc. R. Soc. Arts & Sci. Mauritius* 2: 263-277.

Staff Visited as often as possible by Fisheries and Forestry Service officers from the main island of Rodrigues.

Budget No information

Local Park or Reserve Administration Forest Department, Ministry of Agriculture, Fisheries and Natural Resources, Curepipe.

Date 1985

ILE AUX SERPENTS

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection Total. Protected under the Forests and Reserves Act 1983.

Date Established 1983

Geographical Location 26.8km to the north-east of Cap Malheureux. 19°49'S, 57°48'E.

Altitude From sea level to 177m

Area 31ha

Land Tenure No information

Physical Features Dome-shaped volcanic islet, with many precipitous rock overhangs

Vegetation The islet is guano covered and bare of vegetation except for patches of *Portulaca* and *Brachiaria*, which grow in rock crevices.

Fauna About two million birds use the islet. There are about a million sooty tern *Sterna fuscata nubilosa*, 200,000 noddy *Anous stolidus pileatus*, 500,000 lesser noddy *Anous tenuirostris tenuirostris*, and 20-40 masked booby *Sula dactylatra melanops* (Feare 1984). These tern and noddy colonies are some of the biggest in the world for these species. The rock overhangs are particularly favoured by birds as egg laying sites. The only reptiles on the islet are skink *Gongylomorphus bojerii* (fairly large numbers) and the Serpent Island gecko *Nactus serpensinsula* (E).

Zoning None

Disturbances or Deficiencies Considerable disturbance is caused by people sounding boat sirens on purpose so that they can watch huge flocks of birds taking off.

Visitor Facilities Landing by boat is almost impossible

Scientific Research The islet has rarely been visited by scientists, as access is so difficult.

Special Scientific Facilities None

Principal Reference Material

- * Bullock, D. and North, S. (1975). Report of the Edinburgh University Expedition to Round Island.
- * Feare, C.J. (1984). Seabird status and conservation in the Tropical Indian Ocean. In *Status and Conservation of the World's Seabirds*. ICBP, Cambridge. Pp 457-472.
- * Lloyd, J.A. (1846). Relation d'un voyage a l'Ile Ronde et a l'Ile aux Serpents en December 1844. *Proc. Soc. Hist. Nat. Maurice* pp 154-162.
- * Vinson, J. (1950). l'Ile Ronde et l'Ile aux Serpents. *Proc. R. Soc. Arts & Sci. Mauritius* 1(1): 32-52.
- * Vinson, J. (1953). Some present data on fauna of Round and Serpent Island. *Soc. Art & Sci. Mauritius* (13): 253-257.

Staff None

Budget Nil

Local Park or Reserve Administration Forest Department, Ministry of Agriculture, Fisheries and Natural Resources, Curepipe.

Date 1985

ILE PLATE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection Total. Protected under the Forest and Reserves Act 1983.

Date Established 15 July 1972

Geographical Location About 11km north-north-east of Cap Malheureux, off the northern most point of Mauritius. 19°53'S, 57°39'E.

Altitude Sea level to 116m

Area 253ha

Land Tenure Government

Physical Features The islet is roughly circular, about 2km in diameter, comprising a rocky hill, 116m high, and a volcanic plateau which stretches northward over more than half of the islet. The eastern and western sections of the plateau are composed of sand ridges, some of which rise 9m above mean sea level. Towards the coast, the ridges degrade into a mass of loose coral and finally into loose volcanic blocks. The slopes below the hill are covered with a thin layer of volcanic soil and volcanic sand. There is a pocket of basaltic foreshore on the southern side of the islet, near Palisade Bay. A continuous peripheral fringing reef joins the northern points of Ile Plate and Ile Gabriel to form a lagoon. Surf piles in over this reef, building up the level of lagoon water which pours back out to sea through a channel to the south. The entire north-western arm is a series of calm pools with patches of coral. A reef to the south of the islet has elements of spur and groove structure, but this is only poorly developed.

Vegetation There is a coastal strand flora along part of the sandy eastern coast. The inland native flora has almost completely been destroyed by man, periodic fires and establishment of exotic tree plantation. The spinose shrub *Lantana camara* is widespread. A few *Pandanus vandermeerschii* trees persist on the basaltic foreshore near Palisade Bay. A few *Lantania* and *Pandanus* trees still occur inland fixing themselves in rock crevices. Open ground is sparsely covered by grass and shrub savanna with *Cassipoupa*, *Tylophora*, and Graminae. The coral colonies have a dense cover of green, red, and brown seaweeds.

Fauna The skink *Gongylomorphus bojerii bojerii* has been observed on coral and open ground. The lizard *Phelsuma ornata* is often seen on rocks near the sea. Only a few migratory bird species nest on the islet. The lagoon floor is almost entirely covered by coral. *Acropora* spp., exhibiting digitate, tabular and staghorn growth forms, are the dominant corals over most of the lagoon. The reef flat exhibits three stages of formation - a young zone of dead staghorn coral on the lagoon side, a zone of loose coral rubble with small coral colonies outside the staghorn, and an outer algal zone of coral rubble consolidated by calcareous algae and brown algae. The patches of coral vary in structure, mainly being large tabular colonies

of *Acropora* and covered by stands of foliaceous *Montipora*. Fish include tiger cowrie *Cypraea tigris* and *Cypraea lynx*, blue spotted boxfish *Ostracion cusculus*, and *Acanthurus nigroris* in large schools. There are numerous nudibranchs, aplysiids and blue-green sea cucumbers *Stichopus chloronotus*. The fore reef slope is particularly interesting for populations of large fish (Carengids, Lutjanids, Nasinids, Scarids). Altogether 150 species of fish have been recorded from the Ile Plate reefs (Procter and Salm, 1975). The abundant and beautiful blue coral *Heliopora coerulea* is a feature that is unique (among Mauritian reefs) to this area.

Zoning None

Disturbances or Deficiencies Both feral cats and rats exist on the islet. Periodic fires often cause enormous damage to vegetation.

Scientific Research There have been studies on flora and fauna

Special Scientific Facilities There are no facilities on the islet, except for a lighthouse.

Principal Reference Material

- ° Ayres, P.H.B. (1860). Geology of Flat and Gabriel Islands. *Trans R. Soc. Arts and Sci. Mauritius*, New Series Vol. I (II): 220-232.
- ° Horne, J. (1887). Notes on flora of Flat Island. *Trans R. Soc. Arts & Sci. Mauritius*, New Series Vol. 19: 116-151 (Annex G).
- ° Procter, J. and Salm, R. (1974). Conservation in Mauritius 1974. IUCN/WWF Report to the Government of Mauritius. Unpublished.

Staff Visited as often as possible by Forestry Service, Fisheries, and Port Officers

Budget None

Local Park or Reserve Administration Forest Department, Ministry of Agriculture, Fisheries and Natural Resources, Curepipe.

Date 1984

ILOT GABRIEL

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection Total. Protected under the Forest and Reserves Act 1983.

Date Established 4 December 1972

Geographical Location 12km to the north-north-east of Cap Malheureux, close to Ile Plate. 19°53'3S, 57°40'E.

Altitude Sea level to 28m

Area 42ha

Land Tenure Government

Physical Features The centre of the volcanic islet is broken into ridges and boulders and covered with a thin layer of volcanic soil. This is bounded by low sand banks, except to the south-east where the beach is composed of long spurs of volcanic rock projecting into the sea. Toward the centre, the shore sand intermixes with coral blocks and volcanic detritus in a narrow belt.

Vegetation The islet is covered with shrubby vegetation mainly comprising *Psiadia trinervia*, the 'Baume de l'Ile Plate' of renowned medicinal value. There is also a coastal scrub of *Suriana*, *Scaevola*, and *Tournefortia*.

Fauna The presence of two species of reptile, *Gongylomorphus bojerii* and *Phelsuma ornata* is noteworthy. The islet does not appear to be an important nesting site for seabirds now, though Newton (1956) reported that white-tailed *Phaethon lepturus* and red-tailed tropic birds *Phaethon rubricauda* bred here at one time.

Zoning None

Disturbances or Deficiencies Rabbits and rats have become numerous on the islet. Erosion is still at a moderate level but increasing.

Scientific Research Vegetation surveys are carried out occasionally.

Special Scientific Facilities None on the islet

Principal Reference Material

- ° Ayres, P.H.B. (1860). Geology of Flat and Gabriel Islands. *Trans. R. Soc. Arts & Sci. Mauritius*, New Series Vol. I, Part II: 220-232.
- ° Horne, J. (1887). Notes on flora of Flat Island. *Trans. R. Soc. Arts & Sci. Mauritius*, New Series Vol. 19: 116-151 (Annex G).
- ° Newton, R. (1956). Bird islands of Mauritius. *Ibis* 98: 296-302.
- ° Procter, J. and Salm, R. (1974). Conservation in Mauritius 1974. IUCN/WWF Report to the Government of Mauritius. Unpublished.

Staff Visited occasionally by Forest and Fisheries Service Officers

Budget None

Local Park or Reserve Administration Forest Department, Ministry of Agriculture, Fisheries and Natural resources, Curepipe.

Date 1985

MACCHABEE-BEL OMBRE NATURE RESERVE

Management Category IV and IX (Managed Nature Reserve and Biosphere Reserve)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection Total

Date Established Various nature reserves were established in 1951 and united in 1974 by the addition of the Black River Gorges area (Les Mares and Plaine Champagne), which joined Macchabée, Petrin, and Bel Ombre reserves. It was accepted as a Biosphere Reserve in October 1977.

Geographical Location Composed of Petrin, Ste. Marie and Cocotte, Bel Ombre, Macchabée and Mare Longue, Petites Gorges, Florin, Desgranges, Les Mares, Mesliers, Plaine Champagne and Black River Gorges. Centred at 20°25'S, 57°26'E.

Altitude 50-650m

Area 3,611ha (Biosphere Reserve listed as 3,594ha)

Land Tenure Government

Physical Features The area comprises a plateau in the north, the deep Black River Gorges in the middle sector, and, towards the south, a gentle southerly slope below a steep scarp. The soil is variable; at Petrin and Plaine Champagne it is either ground water laterite with lateritic concretion, or low humic gleys. At Macchabée/Mare Longue, the soils are humic ferrogineous latosols, and at Bel Ombre, a brown forest soil predominates.

Vegetation At Petrin, the various series in vegetation succession leading to climax forest are evident. The marshy spots are characterised by *Lycopodium* spp., *Pandanus* spp., *Sphagnum* spp. and sedges such as *Cyperus*; the dry areas are characterised by *Philippia*/*Phyllica* heath. Some of the plants found in this dry area are *Blechnum attenuatum*, *Astelia hemichrysa* (rare), *Coffea* spp., and *Trochetia* spp.. In the Macchabée/Mare Longue area, there is upland evergreen climax forest dominated by Myrtaceae, Rubiaceae and Sapotaceae, of which about 20-25% are endemic. Most orchid species such as *Phaius* spp. and *Jumellea fragrans* are threatened. Tree species of concern due to their lack of regeneration and endemic status are *Sideroxylon grandiflorum*, *Ocotea cupularis*, *Tambourissa sieberi*, and *Canarium paniculatum*. In Petites Gorges, Florin, Desgranges, Les Mares, Mesliers and Black River Gorges, about 900ha are covered with evergreen forest, extensively invaded by exotics. The remainder is composed partly of low native scrub, marshy vegetation, and heath vegetation. These are mixed with the exotic, aggressive *Psidium cattleianum*, and *Rubus alcaefolius*. There are various rare endemic plants, including some *Pandanus* spp., and *Trochetia* spp.. At Ste. Marie and Cocotte, mossy forest has been badly degraded as a result of successive cyclones. It has many species of orchids, ferns and mosses. In Bel Ombre, mid-altitude forest composed mainly of *Labourdonnaisia glauca*, *Mimusops petiolaris* and various *Diospyros* spp. predominates. A single tree of *Olax psittacorum*, previously known only from old collections, was found in Black River Gorges in the 1960s, and *Gaertnera longifolia*, only collected once, was also recently found in the area (IUCN/WWF Project 3149). Also occurring in the Black River Gorges is a small stand of the beautiful *Hibiscus columnaris*. This species, endemic to Mauritius and Réunion, is only known from a few scattered individuals.

Fauna No information

Conservation Management Several very small areas have been cleared of gregarious exotic weeds in order to free native plants which were being smothered. It is proposed that parts of the area should be fenced as weeded reserves. *Hibiscus columnaris* is being propagated by the Forestry Department and grows easily from cuttings, although it is almost extinct from the wild. Under the sponsorship of ICBP, WWF and the New York Zoological Society (IUCN/WWF Project 1082), an intensive programme of captive breeding has been initiated for the Mauritius kestrel, parakeet and pink pigeon. A reduction in introduced species, such as exotic birds and macaques *Macaca* sp., may be necessary to ensure the safety of the kestrels, parakeets, pink pigeons and cuckoo-shrikes. Translocation of fodies to Réunion has been proposed by the British Ornithologists Union (BOU) (Procter and Salm, 1975). The Forestry Service has already started planting nectar-producing flowers along the roadsides to improve the habitat for white-eyes.

Zoning None, apart from the partitioning into numerous smaller reserves.

Disturbances or Deficiencies Parts of the reserve are leased for the shooting of deer, which have free access to the reserve and which are inhibiting regeneration. Several forest roads

bisect the area and tourism is increasing. The forest is badly invaded with exotics like *Psidium cattleianum*, *Rubus alcaefolius* and *Ligustrum robustum* var. *walkeri*. There are four main threats to the bird species in the reserve: (1) Reduction in the area of mature evergreen forest. (2) Nest predation by introduced macaques and rats. (3) Shooting by careless or uninformed hunters. (4) Possible competition for nest holes by the aggressive introduced rose-ringed parakeet *Psittacula krameri*, and common mynah *Acridotheres tristis* with the Mauritius parakeet. These two introduced species and the red whiskered bulbul *Pycnonotus jocosus* are invading the native forests.

Visitor Facilities No information

Scientific Research Research in the area dates from the 1930s. Future research could investigate the total ecological effects of exotic plant establishment.

Special Scientific Facilities Herbarium facilities are available.

Principal Reference Material

- ° Owadally, A.W. (1976). Annual Report for the Forestry Service for the year 1974. Port Louis, Mauritius: L. Carl Achille Government Printer.
- ° Owadally, A.W. (1973). Les forêts naturelles de l'Île Maurice, Info-Nature. *Bulletin de Liaison de la S.R.E.P.N.* Numéro special La Forêt. Pp 88-94.
- ° Owadally, A.W. (1969). International biological programme check sheets on the nature reserves of Mauritius. Prepared for the International Council for Scientific Unions of Nature Conservancy, London.
- ° Procter, J. and Salm, R. (1974). Conservation in Mauritius 1974. IUCN/WWF Report to the Government of Mauritius. Unpublished.
- ° Staub, F. (1976). *Birds of the Mascarenes and Saint Brandon*. Organisation normale des entreprises Ltee, Labama House, Mauritius.
- ° Staub, F. (1973). *Oiseaux de l'Île Maurice et de Rodrigues*. The Mauritius printing Company, Mauritius.
- ° Vaughan, R.E. and Wiehe, P.O. (1937-1947). Studies of the vegetation of Mauritius. *Journal of Ecology* Vol. 24(1), 25(2), 28(2), 34(1).

Staff Ten forest officers

Budget Approximately US\$500 (1982)

Local Park or Reserve Administration Conservator of Forests, Ministry of Agriculture and Natural Resources and the environment, Forestry Service, Curepipe.

Date 1985

ROUND ISLAND

Management Category IV (Management Nature Reserve)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection Total

Date Established 1957

Geographical Location About 24km north-east of Cap Malheureux, the northernmost point of Mauritius. 19°51'S, 57°47'E.

Altitude Sea level to 280m

Area 159ha

Land Tenure Government

Physical Features The reserve is part of a tilted volcanic cone which rises from a coastal shelf at about 50m depth. Most of the island is composed of volcanic tuff, weathered into an extremely rugged landscape with numerous cliffs, and curious horizontally ridged pillars and deep gullies up to 15m deep. Blocks of basalt and deposits of coral detritus occur at various levels.

Vegetation Early descriptions of the vegetation relate that both screw pine *Pandanus vandermeerschii* and fan palm *Latania loddigesii* were common in ravines, with two other palms, the bottle palm *Hyophorbe lagenicaulis* and hurricane palm *Dictyosperma album*, also in abundance. This vegetation was similar to that of north-west Mauritius, in the coastal regions. The vegetation has been greatly reduced by rabbits and goats, which were introduced by 1830 and 1865 respectively. Few natural specimens survive of the endemic bottle palm and hurricane palm though the species are now found naturally only on Round Island, and only in cultivation on the mainland. Scattered fan palm and the screw pine form small clumps, and in a few places there is moderately dense ground cover of grasses, herbs, and widespread ruderal species. A single specimen of *Gagnabina pierocarpa* is the only survivor from former hardwood forest. North and Bullock (1986) reported that of 63 vascular plant species recorded for Round Island, only 51 were observed during 1975 and 1982 expeditions, of which 12 were species endemic to the Mascarenes and at least 16 exotic.

Fauna The island still provides a breeding place for fairly large populations of four species of seabirds. About 120 pairs of the Round Island petrel *Pterodroma arminjoniana* (elsewhere known to breed only on Trinidad/Martin Vaz islands off the south-east coast of Brazil, and only discovered on Round Island in 1948) breed there annually, and the population of red tailed tropic bird *Phaethon rubricauda* and the white-tailed tropic bird *P. lepturus* was estimated in August 1982 to be up to 300, with 100 breeding pairs. The total population of wedge-tailed shearwater *Puffinus pacificus* was between 3,500 and 4,000 pairs (Feare 1984). The island is also visited by migrant turnstone *Arenaria interpres*, and several species of tern feed close in to its shores. Reptile species constitute the most notable element of the fauna with five threatened species - the Serpent Island gecko *Cyrtodactylus serpensinsula* (T), the Round Island day-gecko *Phelsuma guentheri* (T) (population declining), the Round Island or Telfair's skink *Leiolopisma telfairii* (T), the Round Island boa *Bolyeria multocarinata* (T) and the keel-scaled boa *Casarea dussumieri* (T) (of which the last four are only now found on Round Island). In addition, the ornate day-gecko *Phelsuma ornata* and two more skinks, *Scelotes bojerii* and *Alepharus boutonii*, are present in larger numbers. The keel-scaled boa *Casarea dussumieri* and Round Island boa *Bolyeria multocarinata* are the most extraordinary of the reptiles to inhabit the island. They are the sole surviving members of the sub-family Bolyerinae, a group of primitive boas of particular scientific interest.

Conservation Management Goats have been eliminated from the island, and it is suggested that priority should now be given to eliminating rabbits. The unauthorised landing and slaughter of birds will only be controlled with the establishment of a warden. Although the vegetation of the island is degraded, North and Bullock (1986) suggest that some areas retain the potential for rapid recovery when herbivore populations are reduced. Palm savanna is also an important habitat for continued survival of the herptofauna (Bullock, 1986).

Zoning None

Disturbances or Deficiencies Round island is badly eroded because of over-grazing and browsing by goats and rabbits and the vegetation, particularly the palm savanna, is now seriously degraded. There is continued soil erosion and lack of regeneration, and between 80-90% of the island is now bare rock. The number of mature bottle palm trees has declined from 15 to eight and the number of hurricane palms from five to one. Some regeneration of the former was detected, with eight young trees. It is believed that goats are now extinct on

the island, but extermination of rabbits is still a priority. Both the Round Island day-gecko and the ornate day-gecko have declined in numbers and the former may only be represented by 200 individuals. The keel-scaled boa population has remained stable since 1975. The Round Island boa could not be found in 1982 and may be extinct. Shearwaters compete with rabbits for burrowing space in the remaining areas of soil, leaving them bare and unstable. Many shearwaters, unable to find burrowing space, lay their eggs on bare rock. There, they bake in the sun when the heat drives the adults to fly out to sea. Procter and Salm (1975) found 100 eggs abandoned in this way. Due to physical conditions, wardening of the island is difficult and poaching continues - mainly of petrel and red-tailed tropic-bird adults and chicks. The Trinidad petrel may be seriously threatened due to DDT poisoning. The reefs around Round Island are not well developed and show signs of damage which could be attributed to the deposition of silt, eroded from the island, and reef dependent fish are few.

Visitor Facilities Due to the difficulty of effecting a landing except for the period September to mid-December, visitors to the island have been very limited in number; no water or shelter is available on the island, and the heat may be considerable. Landing or evacuation by helicopter has been effected occasionally but is expensive and disturbs the birds.

Scientific Research The northern islets of Gunner's Quoin and Round Island were visited by a group of scientists in July and August 1982. One aim was to assess the suitability of Gunner's Quoin for the introduction of Round Island reptiles, which have been captive bred by the Jersey Wildlife Preservation Trust.

Special Scientific Facilities None

Principal Reference Material

- ° Bullock, D. (1977). Round Island - a tale of destruction. *Oryx* 14: 51-58.
- ° Bullock, D.J. (1986). The ecology and conservation of reptiles on Round Island and Gunner's Quoin, Mauritius. *Biological Conservation* 37: 135-156.
- ° Bullock, D. and North, S. (1976). Edinburgh University Expedition to Round Island, Mauritius, 1975. Final Report. Edinburgh (unpublished).
- ° Bullock, D. and North, S. (1984). Round Island in 1982. *Oryx* 18: 36-41.
- ° Bullock, D., North, S. and Grieg, S. (1983). Round Island Expedition 1982. Final Report. St. Andrews (unpublished).
- ° Cheke, A.S. (in press). A review of the ecological history of the Mascarene Islands with particular reference to extinctions and introductions of land vertebrates. In: Diamond, A.W. (Ed.) *Studies of the Mascarene avifauna*, Cambridge University Press.
- ° Feare C.J. (1984). Seabird status and conservation in the Tropical Indian Ocean. In: *Status and Conservation of the World's Seabirds*. ICBP, Cambridge. Pp 457-472.
- ° IUCN/WWF Project 1082. Conservation of Endangered Bird Species.
- ° Johnston, H.H. (1894). Report on the flora of Round Island, Mauritius. *Trans. Bot. Soc. Edinburgh* 20: 237-264.
- ° North, S.G. and Bullock, D.J. (1986). Changes in the vegetation and populations of introduced mammals of Round Island and Gunner's Quoin, Mauritius. *Biological Conservation* 37: 99-117.
- ° Procter, J. and Salm, R. (1974). Conservation in Mauritius 1974. IUCN/WWF Report to the Government of Mauritius. Unpublished.
- ° Vinson, J. (1964). Sur la disparition progressive de la flore et de la faune de l'Ile Ronde. *Proc. R. Soc. Arts & Sci. Mauritius* 2(3): 247-261.

Staff Visited by Forest Service officers when accompanying visiting scientists.

Budget Virtually nil

Local Park or Reserve Administration Enquiries to: Conservator of Forests, Forestry Service Headquarters, Curepipe.

Date 1985

BLACK RIVER FISHING RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection The Fisheries Act 1980 prohibits the use of large net or gill net fishing.

Date Established 2 February 1983 by Government Notice No. 18

Geographical Location Off the West coast of Mauritius around the estuary of the Black River. Boundaries are marked by high water mark, Petit Vacoas and Point Lascars. From Point Lascars, the boundary goes straight to Grand Pointe and from there in a straight line to the southern extremity of Point des Requins. 20°22'S, 57°20'E.

Altitude Sea level

Area 900ha

Land Tenure Government

Physical Features The reserve includes both Black River and Case Royale. The marine area comprises a lagoon environment, coral patches and reefs, and sandy areas. The terrestrial zone is covered by sandy beaches, rocky shores, and mangrove stands.

Vegetation There are various species of seaweed, notably *Ulva cucchemia*, *Enteromorpha*, and sea grass *Gracilaria* and *Chaetomorpha*. There are mangrove stands along the coast.

Fauna All commercially exploited species are well represented. It is a good nursery area for mullet *Mugil cephalus* and *M. sebeli*, crab and oysters.

Zoning None

Disturbances or Deficiencies There is hotel development along the coast, boating activities and illegal fishing. Silt deposit appears to be extensive.

Scientific Research Fish stock assessment (not restricted to reserve)

Special Scientific Facilities The Fisheries Research Centre is situated a few kilometers to the north.

Principal Reference Material

° Fisheries Act 1980.

° Fisheries Regulations in Government Notice No. 18 of 1983.

Staff Three fisheries assistants are based at an adjacent fisheries post. Enforcement is carried out as part of the general duties of the Fisheries Protection officers.

Budget No specific budget is allocated; recurrent expenditure and salaries are met from a budget allocated to both Fisheries Research and Protection Service i.e. Rs.8.3 million.

Local Park or Reserve Administration Protection Service, Fisheries Division

Date July 1983

FLACQ FISHING RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection The Fisheries Act 1980 prohibits large net or gill net fishing.

Date Established 2 February 1983 by Government Notice No. 18

Geographical Location Off the eastern coast of Mauritius. Boundaries are marked by high water mark and a line drawn from point La Brise at Port Lafayette to Pointe de Flacq. 20°9'S, 57°45'E.

Altitude Sea level

Area 600ha

Land Tenure Government

Physical Features The reserve comprises a lagoon, with a sandy and rocky bottom, and coral reefs. There are numerous mud flats and sand banks, some with rocky outcrops and the reserve also includes a barachois (fish pond).

Vegetation Vegetation comprises mangroves along much of the coast, and on islets, some marshy areas, and sea grass and algal beds on the shallow edges of the lagoon.

Fauna All commercially exploited species are well represented. The reserve provides large nursery areas for mullet *Mugil cephalus* and *M. sebeli*, siganids, letrínids, and goatfish (Mullidae). The crab *Scylla serrata* and many species of prawns also occur. Knowledge of smaller taxa is generally lacking.

Zoning None

Disturbances or Deficiencies Hotel development, boating activities, illegal fishing

Scientific Research Fish stock assessment (not restricted to the reserve)

Special Scientific Facilities None

Principal Reference Material

° Fisheries Act 1980.

° Fisheries Regulations in Government Notice No. 18 of 1983.

Staff Three fisheries assistants are based at an adjacent fisheries post. Enforcement is carried out as part of the general duties of the Fisheries Protection officers.

Budget No specific budget is allocated; recurrent expenditure and salaries are met from a budget allocated to both Fisheries Research and Protection Service i.e. Rs.8.3 million.

Local Park or Reserve Administration Protection Service; Fisheries Division

Date July 1983

GRAND PORT-MAHEBOURG FISHING RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection The Fisheries Act 1980 prohibits the use of large net or gill net fishing.

Date Established 2 February 1983 by Government Notice No. 18

Geographical Location South-east coast of Mauritius around the port of Mahebourg. Boudaries are marked by high water mark and a straight line drawn from Old Grand Port to the eastern point of Ile aux Aigrettes, then along the reefs to the islet of Le Broudou. 15°23'S, 57°42'E.

Altitude Sea level

Area 2,200ha

Land Tenure Government

Physical Features The reserve comprises a lagoon with a sandy and rocky bottom, coral patches and reefs, inter-tidal zone covered by sandy beaches, and rocky shores. In some areas, the inter-tidal zone is occupied by cliffed shores and eroded eolianite deposits.

Vegetation There are patches of mangroves and ferns in some areas and dense stands of mangroves on mud flats near the upper limits of the inter-tidal zone. Various species of seaweeds and algae occur, e.g. *Ulva*, *Cuchernia*, *Entomorpha*, and *Chaetomorpha*.

Fauna All commercially exploited species are well represented. The reserve provides large nursery areas for mullet *Mugil cephalus* and *M. sebeli*, rabbitfish (Siganidae), scavenger fish (Lethrinidae), and goatfish (Mullidae). The crab *Scylla serrata* and many species of prawns also occur. Knowledge of smaller taxa generally lacking.

Zoning None

Disturbances or Deficiencies During heavy rains and cyclones, there is siltation of lagoon. Illegal fishing is a problem.

Scientific Research Fish stock assessment (not restricted to the reserve)

Special Scientific Facilities Mahebourg Fish Farm (83ha) has a laboratory and aquaria facilities.

Principal Reference Material

- ° Fisheries Act 1980.
- ° Fisheries regulations in Government Notice No. 18 of 1983.

Staff Three fisheries assistants are based at an adjacent fisheries post. Enforcement is carried out as part of the general duties of the Fisheries Protection officers.

Budget No specific budget is allocated; recurrent expenditure and salaries are met from budget allocated to both Fisheries Research and Protection Service i.e. Rs.8.3 million.

Local Park or Reserve Administration Protection Service; Fisheries Division

Date July 1983

PORT LOUIS FISHING RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection The Fisheries Act 1980 prohibits large net or gill net fishing.

Date Established 2 February 1983 by Government Notice No. 18.

Geographical Location Off the north-west coast of Mauritius around Port Louis. Boundaries are marked by high water mark and a line drawn from the Martello Tower at Pointe aux Sables to a point due west on the reefs and from Point Tortue in a straight line to the most westerly point at Fort George. 20°09'S, 57°23'E.

Altitude Sea level

Area 500ha

Land Tenure Government

Physical Features The reserve encloses the harbour of Port Louis and includes an estuary at the entrance to the Grand River North West and River St. Louis. It comprises a lagoon with a muddy to sandy bottom and coral patches of mostly dead communities. A deep channel leads to the main harbour of the island from a wide pass in the reef of mostly dead communities.

Vegetation Seagrass communities are extensive on the southern part with some eutrophication, and seaweeds at the entry of sewage outfalls include *Ulva lactuca*, *Enchemia* sp., and *Enteromorpha* sp..

Fauna Lagoon fishes, particularly siganids and parrot fishes are present. All commercially exploited species are well represented. The reserve provides large nursery areas for mullet *Mugil cephalus* and *M. sebeli*, rabbitfish (Siganidae), scavenger fish (Lethrinidae), and goatfish (Mullidae). The crab *Scylla serrata* and many species of prawns also occur. Knowledge of smaller taxa generally lacking. However, in some areas many of the corals are dead.

Zoning None

Disturbances or Deficiencies Effluents (including industrial waste) from two sewage outfalls flow into the reserve. There is solid waste dumping around Northern Point and the presence of the harbour causes some disturbance. There is also illegal fishing.

Scientific Research Fish stock assessment (not restricted to the reserve)

Special Scientific Facilities The Fisheries Research Centre is situated 10km to the south.

Principal Reference Material

* Fisheries Act 1980. Fisheries regulations in Government Notice No. 18 of 1983

Staff Three fisheries assistants are based at an adjacent fisheries post. Enforcement is carried out as part of the general duties of the Fisheries Protection officers.

Budget There is no specific budget; recurrent expenditure and salaries are met from a budget allocated to both Fisheries Research and Protection Service i.e. Rs.8.3 million.

Local Park or Reserve Administration Protection Service; Fisheries Division

Date July 1983

RIVIERE DU RAMPART-POUDRE D'OR FISHING RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection The Fisheries Act 1980 prohibits large net or gill net fishing.

Date Established 2 February 1983 by Government Notice No. 18

Geographical Location On the north-east coast of Mauritius. Boundaries are marked by high water mark and a line from Pointe Grand Courant to the nearest shore of Ile d'Ambre and along the shore of that island to Pointe Dejeuner, then to the southern side of Passe St Geran, and along the reef to Point Roches Noires. 20°05'S, 57°42'E.

Altitude Sea level

Area 3,500ha

Land Tenure Government

Physical Features The reserve comprises a lagoon with sandy and rocky bottoms, and coral reefs. Rocky shores predominate on the inter-tidal zone, which also has small stretches of sandy beaches. The reserve also includes two barachois (fish ponds).

Vegetation Mangroves are found interspersed in rocky shores; in some areas they form dense stands. There are numerous rocky islets covered in mangroves.

Fauna The area is particularly rich in mullets (Mugilidae), rabbitfish (Siganidae), goatfish (Mullidae) and scavenger fish (Lethrinidae). Rich oyster beds are present, and all the commercially exploited species are fairly well represented. There is also part of the reef fringing communities. Knowledge of smaller taxa is generally lacking.

Zoning None

Disturbances or Deficiencies Illegal fishing and fish and oyster farms

Scientific Research Fish stock assessment (not restricted to reserve)

Special Scientific Facilities None.

Principal Reference Material

° Fisheries Act 1980.

° Fisheries regulations in Government Notice No. 18 of 1983.

Staff Three fisheries assistants are based at an adjacent fisheries post. Enforcement is carried out as part of the general duties of the Fisheries Protection officers.

Budget No specific budget is allocated; recurrent expenditures and salaries are met from the budget allocated to both Fisheries Research and Protection Service, i.e. Rs.8.3 million.

Local Park or Reserve Administration Protection Service; Fisheries Division

Date 1985

TROU D'EAU DOUCE FISHING RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection The Fisheries Act 1980 prohibits large net or gill net fishing.

Date Established 2 February 1983 by Government Notice No. 18

Geographical Location Off the east coast of Mauritius. The boundaries are marked by high water mark and a line drawn from Le Morne to the extreme western point of Ile aux Rats, along the inner shore of Isles aux Cerfs to Pointe Petit Vacoas, and to the extreme point of Ilot Lievre and Point Saint Lain (Pointe Cassis). 20°16'S, 57°47'E.

Altitude Sea level

Area 700ha

Land Tenure Government

Physical Features The shallow water, including the estuaries at the Grand River South East, is brackish.

Vegetation There are extensive mangrove areas in the inter-tidal zones and around the many small islets of the Isles aux Cerfs region. The area is rich in seagrass communities.

Fauna The fauna comprises varied coral communities. The brackish water provides habitats for oyster communities, which settle on the mangrove roots. The area provides a nursery ground for many species and is particularly rich in mullet species.

Zoning None

Disturbances or Deficiencies There are large amounts of silt deposited in the reserve during heavy rain. Pollutants from a sugar mill are carried via the Deep River Beau Champ into a part of the reserve. There is also illegal fishing.

Scientific Research No information

Special Scientific Facilities None

Principal Reference Material

° Fisheries Act 1980. Fisheries Regulations in Government Notice No. 18 of 1983.

Staff Three fisheries assistants are posted in an adjacent fisheries post. Enforcement is carried out as part of the general duties of the Fisheries Protection officers.

Budget There is no specific budget; recurrent expenditure and salaries are met from a budget allocated to both Fisheries Research and Protection Service, i.e. Rs.8.3 million.

Local Park or Reserve Administration Protection Service; Fisheries Division

Date July 1983

BAIE DE L'ARSENAL MARINE PARK

Management Category Proposed

Biogeographical Province 3.25.13 (Mascarene Islands)

Legal Protection No information

Date Established Not yet gazetted

Geographical Location 20°06'S, 57°30'E

Altitude No information

Area 100ha

Land Tenure Government

Physical Features Baie de l'Arsenal is unique in Mauritius for its remarkable diversity of habitats and species, and their unusual intactness within such a confined area. It consists of a peripheral fringing reef, lying 30-60m offshore, which is cut at frequent intervals by surge channels and narrow passages scoured out by strong rip currents. Sheltered fringing reefs border these channels. The peripheral reefs are exposed to oceanic swell, but there is no surf over the sheltered reefs and the current is weak. Consequently the sheltered reefs are easily accessible and extremely vulnerable. There are also lagoonal patch reefs between the peripheral fringing reefs and the shore, with a depth of 1-4m. The brackish lagoon has a substrate of coral fragments, blocks of dead corals, patches of sand and sand consolidated by beds of sea grass or patches of living corals. The bay has much of geological interest including its different rock formations (basalt, beach rock, raised beach and raised reef), its three types of beaches (coral and shell coarse sand, grey sand flats, and gravel) and the dunes at Pointe aux Piments which form a more or less continuous series of arcs parallel to the shore. There is a well-preserved earthen fort at the southern point of the bay. Towards the lagoon to the east are 13 rocky outcrops, large slabs of compacted back-reef coral exposed 2m above sea level and deeply undercut at their seaward faces. These rocks are studded with small colonies of boulder corals (*Porites*, *Astraeopora*).

Vegetation The vegetation can be divided into two basic types: (1) Plant-based algal beds behind the surf zone with abundant species of *Sargassum*, *Turbinaria*, and sea grasses with beds of *Syringodium isoetifolium* and *Halodule uninervis*. (2) Sand-based (sand flats, bay floor sediments, sandy beaches) and rock-based (shore-line basalt boulders, intertidal beach rock-reef rock) plant species (including seaweeds).

Fauna The sheltered reefs are characterised by a dense cover of fragile colonies which are remarkably intact, large and varied, comprising tiers of stagshorn, tabular *Acropora* and foliaceous *Montipora*. Extensive patches of stagshorn are established in the deeper lagoon waters. In shallower areas the *Acropora* patches are generally small, frequently dead or replaced by fields of hardy *Pavona* coral. The lagoonal patch reefs are especially vulnerable because their principle constructors - the brittle stagshorn and tabular *Acropora* are so fragile. Boulder reef with *Porites* features in areas with erratic salinity, turbidity, and temperature. With such a wide range of habitats, this area supports a good variety of other animal species including many wrass and parrotfish (notably *Halichoeres kawarin*, *Thalliurus chlorurus*, *Leptoscarus vaiensis*, and *Xanophon marmaritus*). The sea grass beds provide habitat for the molluscs *Pinna kraussi*, *Cassia cornuta*, and *Dolabella* spp., the crab *Calappa hepatica*, various annelids and the juveniles of some important economic fish including *Lethrinus harak* and *Siganus* spp.. *Donax faba* is relatively abundant inshore from the *Halodule uninervis* beds. Sand flats are important habitats for the sea cucumber *Synapta*, other holothurians, numerous molluscs and the commercially important goatfish (Mullidae) and mullets (Mugilidae). The sandy beaches were previously used by nesting turtles, and the hawksbill turtle *Eretmochelys imbricata* (E) has been seen around the mouth of the bay. The beaches

support a population of ghost crabs *Ocypoda* sp.. There is a remarkable echinoid-dominated community on the base of a raised reef rock, which includes *Echinometra mathaei*, *Heterocentrotus mammillatus*, *H. trigonarius*, *Echinostrephus molaris*, *Tripneustes gratilla*, *Stompnueustes variolaris*, *Diadema setosum*, and *Echinothrix diadema*.

Zoning No information

Disturbances or Deficiencies The Mauritian coral reefs are comparatively poorly developed and hence are easily destroyed. The area may be threatened by a plague of sea urchins (probably resulting indirectly from over-fishing), which is destroying sea grass beds and the reef on the east coast, and is causing the silting up of once productive lagoons. There are also reports of dense concentrations of the crown-of-thorns starfish *Acanthaster planci*, which may indicate a plague of these reef-destroying animals. There is a need to relocate three fishermen who are currently based in this bay.

Visitor Facilities The proposed construction of a hotel at Balaclava does not pose a threat to the marine park and will enhance its recreational value.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

* Procter, J. and Salm, R. (1974). Conservation in Mauritius 1974. IUCN/WWF Report to the Government of Mauritius. Unpublished.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date January 1983





Mozambique

MOZAMBIQUE

Area 784,961 sq.km

Population 13,140,000 (1983)

Parks and Reserves Legislation All parks and reserves are established under Decree No. 40040 of 20 January 1955. Hunting was banned in 1974, but hunting by village co-operatives under a quota system has been authorised since 1979. Protected conservation areas in Mozambique fall into six categories: Parques nacionais (national parks), Reservas especiais (game reserves), Reservas parciais (partial reserves), Regimen de vigilancia (faunal reserves), Coutadas, and Reservas florestais (forest reserves). Within parques nacionais natural resources are managed for ecological, cultural, aesthetic and socio-economic objectives, all national parks having some settlement, agriculture or cattle. In the early 1970s, there was interest in the creation of multi-purpose wildlife resource-use areas, especially where there was fragile substrate and vegetation cover, and tsetse fly *Glossina moritans*. This led to the establishment of the Reservas especiais category. Within these Reservas especiais the objectives are similar to national parks but exclude the socio-economic objectives. Within the Regimen de vigilancia, one or more species are protected while others may be exploited. Coutadas are hunting and photographic safari areas usually run on a private concession basis. Forest reserves are areas intended to protect representative examples of vegetation-types. A 'multiple use area' is a recently defined category. These areas are managed with the aim of utilising wildlife on a sustainable basis. One reserve, the Ilhas da Inhaca e dos Portugueses, is managed by the University Eduardo Mondlane for both conservation and education purposes.

Parks and Reserves Administration The Ministry of Agriculture is responsible for administration of reserves and recent reorganization has led to the creation of an office, the 'Unidade de Direcção da Fauna Bravia', to deal with wildlife matters including parks and reserves. In addition, the State Secretariat for Physical Planning is charged with ensuring coordination and interrelationship of the different organisms (sic) involved in the use of natural resources in order to guarantee the preservation/restoration of ecological balance. Forest Reserves come under the control and protection of the Forestry Department (Unidade de Direcção Florestas). A parastatal organization known as Emofauna E.E. was established in 1981 under the Department of Wildlife and Forestry which at that time was responsible for administration of parks and reserves. The main objective of Emofauna E.E. is to make full economic use of natural resources to ensure their future conservation. Several areas have been set aside as wildlife utilisation and production areas, and these come under the control of Emofauna E.E.

Address

- ° Unidade de Direcção da Fauna Bravia, CP 1072, Maputo.
- ° Unidade de Direcção Florestas, CP 3652, Maputo.
- ° Emofauna E.E., CP 2706, Maputo.

Additional Information The wildlife and forestry departments have persevered for many years under extreme shortages of equipment and manpower. In 1980, Mozambique had no comprehensive wildlife policy and with the exception of Gorongosa and Maputo National Parks and Marromeu Game Reserve, no wildlife area or park had any permanent field staff. The northern region was of particular concern as it was not well known due to its inaccessibility, remoteness and a history of security difficulties. There was, and still is, an urgent need for protection of representational sites in this area (Rodgers, 1980).

The guerilla war is considered to be by far the most serious problem facing nature conservation in Mozambique. Virtually every conservation area has been fairly severely affected, with the work of local administration being particularly badly disrupted, or even abandoned. Drought has had an affect on the region (in some cases exacerbated by upstream damming of rivers), which, in combination with the guerilla warfare has led to increased hunting both inside and outside protected areas. Also, the gradual drying in combination with wildfire is gradually

changing the character of the vegetation in some parts of the country. In an effort to alleviate problems within nature conservation, a National Meeting of Wildlife held in December 1981 approved a draft re-evaluation of some existing areas of conservation concern. However, lack of skilled staff and adequate equipment, and human settlements within the reserves, are still major problems (Marques, 1984). Although Tello (1983) does report a change in attitude in provincial governments and rural people (particularly of the Zambezi delta) towards conservation, with the establishment of Emofauna and the success of the Zambezi Wildlife Utilisation Area, he also stresses the pressure of human populations, cattle and farming developments, industries and poaching which threaten the integrity of the national parks and game reserves. However, such advances are being compromised by the continuing political difficulties.

A review has recently been carried out which assesses the current status of wildlife and protected areas in the country, and a series of recommendations aimed at improving the situation (Tello, 1986). This should be published by UNEP during 1987.

References

- ° Huntley, B.J. and Ellis, S. (1983). Conservation status of terrestrial ecosystems in southern Africa. Working document prepared by CSIR, Pretoria.
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- ° Kaplan, I. (1977). *Area Handbook for Mozambique*. US Government Printing Office, Washington D.C. 240 pp.
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- ° Tello, J.L. (1983). Mozambique's cropping scheme in the Zambezi Delta Area. Report presented to 59th SSC Meeting, Harare, Zimbabwe, 16 April 1983.
- ° Tello, J. (1986). Survey of protected areas and wildlife species in Mozambique with recommendations for strengthening their conservation. Report to WWF, Gland, Switzerland.
- ° Tinley, K.L., Rosinha, A.J., Tello, José L.P., and Dutton, T.P. (1974). Wildlife and Wild places in Mozambique. *Oryx* XIII(4): 344-349.
- ° Smithers, R.H.N. and Tello, J.L.P.L. (1976). Check list and Atlas of the mammals of Mozambique. *Museum Memoir* No 8. Trustees of National Museum and Monuments of Rhodesia, Salisbury.
- ° WWF Project 3701. Mozambique, Review of Conservation Situation.

Protected Areas

	(hectares)
<i>National Parks</i>	
Banhine	700,000
Bazaruto	15,000
Gorongosa	375,000
Zinave	500,000
Subtotal	1,590,000
<i>Marine National Parks</i>	
Paradise Island	
<i>Faunal Reserves</i>	
Ilhas da Inhaca e dos Portugeses	
<i>Game Reserves</i>	
Niassa	1,500,000

Reserves

Gile	210,000
Maputo	90,000
Marromeu	1,000,000
Pomene	10,000
Subtotal	1,310,000

Wildlife Utilization Areas

Zambezi	1,000,000
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Proposed areas

Primeira and Segunda Islands National Park	
Quirimba Islands National Park	
Rovuma National Park	1,500,000
San Sebastian Peninsula National Park	
Nacala-Mossuril Marine National Park	
Subtotal	1,500,000

PARQUE NACIONAL DO BANHINE

Management Category Under Review

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established 1972

Geographical Location In the Gaza Province, north-east of the Limpopo River. Approximately 23°00'S, 32°30'E.

Altitude No information

Area 700,000ha

Land Tenure No information

Physical Features Mainly open plains, with some slightly elevated areas. The park lies in Mozambique's most arid zone with under 400mm annual rainfall.

Vegetation Mainly open grassland plains with slightly elevated areas where baobab *Adansonia digitata*, mopani *Colophospermum mopane*, *Sclerocarya caffra*, and *Terminalia* species occur.

Fauna Mammals include: sable antelope *Hippotragus niger*, brown hyena *Hyaena brunnea* (T), caracal *Felis caracal*, black-backed jackal *Canis mesomelas* and side-striped jackal *Canis adustus*, and genet *Genetta mossambica*. Banhine, Zinave and the surrounding hunting areas contain Mozambique's largest populations of elephant *Loxodonta africana* (T) and cheetah *Acinonyx jubatus*, (T) and the only populations of giraffe *Giraffa camelopardalis*, roan antelope *Hippotragus equinus*, and ostrich *Struthio camelus*. Sizable populations of reedbuck *Redunca redunca*, impala *Aepyceros melampus*, and wildebeest *Connochaetes taurinus* also occur. Topi *Damaliscus lunatus* and waterbuck *Kobus ellipsiprymnus* were once common in the area, but no longer seen by the time the park was established. Arid zone birds include

kori bustard *Choriotis kori* and buffalo weaver *Bubalornis albirostris*. However, there are reports of excessive and uncontrolled hunting in the area, and it is unclear what the current situation is.

Conservation Management In 1980, the Government planned to create a mobile ranger team to undertake field surveys and anti-poaching, conservation extension and educational activities, but there were still problems in the initiation of these activities in 1984 and there are as yet still no wildlife staff within the area.

Zoning There is a buffer zone or fauna protection zone 5km wide, in which it is intended all wildlife should be protected.

Disturbances or Deficiencies There is a permanent settlement within the park, an extensive cattle population, and poaching. At the time of establishment of the park numbers of animals were reduced for most large species, largely due to hunting, but probably also as a result of the general drying of the region five to ten years earlier. Poaching by well organised gangs was a serious problem during the first few years of existence. Subsequently the area has been seriously affected both as a result of the war in Zimbabwe and by internal disturbances in Mozambique. No staff have been based in the area since 1975. Drought problems are also increasing within the area.

Visitor Facilities None

Scientific Research No information

Special Scientific Facilities None

Principal Reference Material

* IUCN/WWF Project 1988. Mozambique. Field Force Vehicles.

Staff Not staffed by wildlife staff since 1975. Three workers based outside the park in Xai-Xai.

Budget No information

Local Park or Reserve Administration No information

Date 1986

PARQUE NACIONAL DO BAZARUTO

Management Category Under Review

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established May 1971 by Legislative Diploma 46/71

Geographical Location On the islands of Bangué, Santo Antonio and Santa Isabel (the last two also being known as Benguerua and Magarugue), 10km off the coast near Vilanculos. Contiguous to the unprotected Bazaruto Island. Approximately 22°00'S, 35°30'E.

Altitude 0-50m

Area 15,000ha

Land Tenure No information

Physical Features The area includes three islands between Bazaruto Island and the Santo Sebastian Peninsula, and a 5km marine zone around them with extensive coral reefs.

Vegetation Vegetation cover is sparse with *Ipomoea pes-caprae* spp. *brasiliensis*, and *Scaevola plumieri*.

Fauna There are reported to be extensive coral formations, dugong *Dugong dugon* (T) and five species of marine turtle (all of which are threatened). Terrestrial habitats support samango monkey *Cercopithecus albogularis* and red bush duiker *Cephalophus natalensis*. Crocodile *Crocodylus niloticus* occur in a lake on Benguerua Island. The unprotected Bazaruto Island to the north is important as a feeding area for dugong and a nesting area for marine turtles, and has been proposed as a reserve.

Zoning None. Bazaruto Island to the north of the park was proclaimed as being under a 'special vigilance regime', with total exclusion of hunting.

Disturbances or Deficiencies Turtle and dugong hunting continues, as does fishing. Only Bangué Island is uninhabited, though fishermen from the mainland are frequent visitors. There are over 200 sheep and goats on Benguerua Island.

Visitor Facilities No information

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

Staff No field staff have been appointed since the establishment of the park.

Budget No information

Local Park or Reserve Administration No information

Date 1986

PARQUE NACIONAL DA GORONGOSA

Management Category Under Review

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established 23 July 1960 as a National Park of 553,000ha by Diploma Legislativo No. 1993, and reduced to its present size in 1966. First protected as a game reserve of 100,000ha under regulations of 1921, and enlarged to 320,000ha in 1935.

Geographical Location North-west of Sofala on the Pungue River, central Moçambique. Approximately 19°00'S, 34°30'E.

Altitude Up to 600m

Area 375,000ha; contiguous to the partially protected Zambezi Wildlife Utilisation Area.

Land Tenure State

Physical Features The park is situated at the southern limit of the Great Rift Valley with sharply rising inselbergs, an extensive floodplain, and associated lakes. Marshy areas are inundated by the rains. The climate is of a tropical moist savanna type, with most rains falling between November and April. Mists are common in winter months.

Vegetation *Piliostigma*, *Sclerocarya*, *Trichilia*, *Kigelia*, and *Acacia* type savanna woodlands occupy fairly extensive areas, as do some patches of dry forest with species such as *Dalbergia*, *Azelia*, and *Pterocarpus* on the old sand river beds. Pure *Combretum* savanna also occurs, but is fairly limited in extent. There are several areas of *Colophospermum*, both in the park and just north of it in a controlled hunting area, which forms part of the ecological system. There are some areas adjoining the flood plain with a savanna of short *Hyphaene* palms. *Hyphaene*, *Borassus* and some *Phoenix* occur in riverine areas.

Fauna Ungulates are typical floodplain species, such as elephant *Loxodonta africana* (T), wildebeest *Connochaetes taurinus* (one of the main floodplain species), buffalo *Syncerus caffer*, zebra *Equus burchelli*, reedbuck *Redunca redunca*, and impala *Aepyceros melampus*. In the elevated woodland and savanna, there are good populations of eland *Taurotragus oryx*, sable antelope *Hippotragus niger*, suni *Neotragus moschatus*, Sharpe's grysbok *Raphiceros sharpei*, bushbuck, and duiker. Black rhino *Diceros bicornis* (T) are very rare indeed. Other mammals include klipspringer *Oreotragus oreotragus* (common on rocky outcrops), hartebeest *Alcelaphus lichtensteini*, hippopotamus *Hippopotamus amphibius*, lion *Panthera leo*, leopard *Panthera pardus* (T), and hyena *Hyaena brunnea*. There are good numbers of lion, leopard and hyena. Hippopotamuses are plentiful - it has been suggested that they are too plentiful. Land and waterbirds are prolific and include heron *Ardea* sp., pelican *Pelecanus* sp., wattled crane *Bugeranus carunculatus* (of special concern), and secretary bird *Sagittarius serpentarius*. However, there are reports of excessive and uncontrolled hunting in the area, and it is unclear what the current situation is.

Conservation Management There was a well-developed road network, guard post system, several anti-poaching units, and a wildlife training school in the area. However, it would appear that no staff are currently working in the area, and all development projects have had to be stopped until the security problems in the area are alleviated.

Zoning None

Disturbances or Deficiencies The integrity of the park is threatened by a severe lack of equipment and manpower, however more serious at present is the pressure along the boundaries from legal and illegal settlements, and security problems within the area which have resulted in the park being abandoned by staff. Field patrols are restricted to small areas where security can be guaranteed. Most park facilities have been destroyed. There are unconfirmed reports that a high percentage of the game has been shot. The park limits still exclude several important areas, including Gorongosa Mountain, the primary water source for the park and surrounding area.

Visitor Facilities There was accommodation at Chitengo lodge, and guided tours were available, but all tourist activities have ceased.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

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Staff In 1980/1981, staff consisted of a chief warden, three rangers and some 50 game guards. The park is now administered by one of the three rangers, and there are an additional 30 guards. Staff are no longer based in the park, however, and the administration is based in Beira.

Budget No information

Local Park or Reserve Administration No information

Date 1986

PARQUE NACIONAL DO ZINAVE

Management Category Under Review

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established 1972. First proclaimed as a private safari hunting area in 1962.

Geographical Location Southern Mozambique. The Save River defines the northern boundary of the park. Approximately 21°30'S, 33°30'E.

Altitude No information

Area 500,000ha; with hunting areas to the north and a game ranch to the east.

Land Tenure No information

Physical Features The area represents a transitional zone between moist tropical and arid tropical environments. The annual rainfall is 800mm or less.

Vegetation Major vegetation types are *Brachystegia* species and mopani *Colophospermum mopane*, *Acacia-Combretum* tree savanna, and sandy grasslands.

Fauna Zinave, together with Banhine and the surrounding hunting areas, contains Mozambique's largest populations of elephant *Loxodonta africana* (T) and cheetah *Acinonyx jubatus* (T) and the only populations of giraffe *Giraffa camelopardalis*, roan antelope *Hippotragus equinus*, topi *Damaliscus lunatus*, and ostrich *Struthio camelus*. The northern boundary (Save River) marks the northern distribution limit of the southern African race of giraffe *Giraffa camelopardalis* and spring hare *Pedetes capensis*. Sizeable populations

of reedbuck *Redunca redunca*, impala *Aepyceros melampus*, waterbuck *Kobus ellipsiprymnus*, nyala *Tragelaphus angasi*, and wildebeest *Connochaetes taurinus* also occur. However, there are reports of excessive and uncontrolled hunting in the area, and it is unclear what the current situation is.

Conservation Management In 1980, the Government planned to create a mobile ranger team to undertake field surveys and anti-poaching, conservation extension and educational activities, but there were still problems in the initiation of these activities in 1984. Some staff have now been assigned to the area, however.

Zoning There is a buffer zone to the east, west and south of the park, providing a 5km wide fauna protection zone (regimen de vigilancia) in which all wildlife is protected.

Disturbances or Deficiencies There is permanent settlement and extensive cattle population, and poaching by local people, guerillas and soldiers. The area has suffered from military activity since 1976, including an attack on Zinave camp in 1982. All camps in the park have been severely damaged. Drought has been a serious concern for several years.

Visitor Facilities None operative

Scientific Research No current research

Special Scientific Facilities None operative

Principal Reference Material

* IUCN/WWF Project No. 1988. Mozambique, Field Force Vehicles.

Staff The park has been staffed 1972-4 and 1980-2. In 1985 two rangers and eight game guards were assigned to the park, based at the main camp.

Budget No information

Local Park or Reserve Administration No information

Date 1986

NIASSA GAME RESERVE AND PROPOSED ROVUMA NATIONAL PARK

Management Category Under Review

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Partial

Date Established 1960 as a Game Reserve of 2,000,000ha, reduced to its present size in 1969. There are proposals to develop the area into a national park and possibly form an international park with Tanzania. Formerly known as Rovuma Partial Reserve.

Geographical Location In the extreme north of the country, with its northern boundary the Rovuma River in Tanzania. Approximately centred 12°00'S, 37°00'E.

Altitude No information

Area 1,500,000ha

Land Tenure No information

Physical Features No information

Vegetation The dominant vegetation is *Brachystegia* spp. and *Baikiaea* spp. intersected by numerous rivers and associated 'dambos' (open grass plains). East of Niassa is the only area of *Combretum-Terminalia* savanna in Mozambique.

Fauna Mammals include: elephant *Loxodonta africana* (T), lion *Panthera leo*, buffalo *Syncerus caffer*, zebra *Equus burchelli*, wildebeest *Connochaetes taurinus*, Lichtenstein's hartebeest *Alcelaphus lichtensteini* and *Alcephalus buselaphus*, impala *Aepyceros melampus*, eland *Taurotragus oryx*, greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, sable antelope *Hippotragus niger*, waterbuck *Kobus ellipsiprymnus kondensis*, oribi *Ourebia ourebi*, reedbuck *Redunca redunca*, klipspringer *Oreotragus oreotragus*, grysbok *Raphicerus melanotis*, red duiker *Cephalophus natalensis*, warthog *Phacochoerus aethiopicus*, and hippopotamus *Hippopotamus amphibius*. Black rhino *Diceros bicornis* (T) is recorded occasionally.

Conservation Management The Niassa Province Agricultural Development Plan specifically excludes the reserve and Lugenda River and there are no agricultural development plans for the area.

Zoning Niassa is seen as a core zone to the proposed national park with a multiple land use buffer zone to be implemented in the future.

Disturbances or Deficiencies There is inadequate knowledge of the area. It is politically difficult to move settlements, which were specifically created during the Frelimo war of liberation (1968-1975), from within the area.

Visitor Facilities No information

Scientific Research The reserve was surveyed in the mid 1970s and in 1981 by Emofauna E.E. to assess the potential for wildlife production.

Special Scientific Facilities None

Principal Reference Material

- ° IUCN/WWF Project No. 1568. Mozambique, Ecological Survey.
- ° Rodgers, W.A. (1980). WWF/IUCN Advisory mission to the government of the Popular Republic of Mozambique. Report to IUCN/WWF and the Government of Mozambique.
- ° Tello, J. and Dutton, P. (1979). Report of an aerial survey of the proposed Rovuma National Park. Government of Mozambique, Ministry of Agriculture. (In Portuguese)

Staff One senior ranger, 10 rangers, three game guards and eight workers.

Budget No information

Local Park or Reserve Administration Provincial Forest Officer, Niassa.

Date 1985

RESERVE DE GILE

Management Category Under Review

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established First proclaimed in 1940, with an area of 500,000ha. Reduced to its present size in 1960.

Geographical Location In Zambézia Province. Approximately 16°30'S, 38°30'E.

Altitude No information

Area 210,000ha; contiguous to the 'Area do Gile' (fauna protection area)

Land Tenure No information

Physical Features Plains with inselbergs and numerous rivers

Vegetation The dominant vegetation type is *Brachystegia* miombo woodland with associated 'dambos' (open grass plains). Some inselbergs have endemic cycads.

Fauna Mammals include: elephant *Loxodonta africana* (T), lion *Panthera leo*, wildebeest *Connochaetes taurinus johnstoni*, Lichtenstein's hartebeest *Alcelaphus lichtensteini* and hartebeest *A. buselaphus*, impala *Aepyceros melampus*, eland *Taurotragus oryx*, greater kudu *Tragelaphus strepsiceros*, bushbuck *T. scriptus*, sable antelope *Hippotragus niger*, buffalo *Syncerus caffer*, zebra *Equus burchelli*, waterbuck *Kobus ellipsiprymnus*, oribi *Ourebia ourebi*, reedbuck *Redunca redunca*, klipspringer *Oreotragus oreotragus*, grysbok *Raphicerus melanotis*, red duiker *Cephalophus natalensis*, warthog *Phacochoerus aethiopicus*, and hippopotamus *Hippopotamus amphibius*. The flying squirrel *Anomalurus derbianus*, which does not extend south of the Zambezi, is a common crepuscular animal of the woodland and riverine habitats.

Conservation Management The reserve is largely unexplored with only minimal physical development. It has potential for development as a national park and proposals have been made for its transformation. Construction of park headquarters and a road network are under way.

Zoning Forms the northern boundary buffer zone of the 'Area do Gile'.

Disturbances or Deficiencies Until recently there have been few disturbances apart from an increase in poaching in the mid 1970s. Lack of resources, particularly means of transport, has however been a problem. In December 1984 the reserve came under attack, and camps have been destroyed.

Visitor Facilities There is no infrastructure as yet, although the area was planned to be developed as a national park.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° IUCN/WWF Project 1988. Mozambique, Field Force Vehicles.

Staff Staff did comprise some 100 people, with five game rangers, 20 game guards and 75 workers, but the numbers of both game guards and workers has been reduced (to 10 and 6 respectively). Reserve staff have been based in Pebane, outside the reserve, since December 1984.

Budget No information

Local Park or Reserve Administration No information

Date 1986

RESERVA ESPECIAL DO MAPUTO

Management Category Under Review

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Partial

Date Established Created in 1932, but many boundary changes up to 23 July 1960 when it was officially gazetted under Decree Law 1994. Enlarged from 70,000ha in 1969. Proposal to extend the protected coastal zone to the South African border.

Geographical Location 70km south of Maputo; the only conservation area in the extreme south of the country. Borders the Indian Ocean to the east for about 45km and again to the north on the Bay of Maputo for 19km. The Maputo River is on the western boundary. Approximately 26°30'S, 33°00'E.

Altitude 2-104m

Area 90,000ha; contiguous to Area do Maputo and Limbombos Mountain Reedbuck Park fauna protection areas. (It is unclear as to whether these areas are still recognized. They are possibly still on statute and were proposed as a wildlife utilisation zone at one time.)

Land Tenure No information

Physical Features The terrain is undulating and is mainly of sand dunes origin with beaches, freshwater and saline lakes, salinas, and floodplains.

Vegetation Coastal dune forests, swamp forest, mangrove forest, sandy open grassland, and sand ridges with savanna

Fauna Mammals include: serval *Felis serval*, selous mongoose *Paracynictus selousi*, reedbuck *Redunca* sp., common duiker *Sylvicapra grimmia*, red duiker *Cephalophus natalensis*, bushbuck *Tragelaphus scriptus*, nyala *Tragelaphus angasi*, blue monkey *Cercopithecus mitis*, aardwolf *Proteles cristatus* (doubtfully present in 1981), and hippopotamus *Hippopotamus amphibius*. One of the world's southernmost large populations of elephant *Loxodonta africana* (T) occur here. There are white rhino *Ceratotherium simum* (T), but they are reported to be again nearing extinction in the area. Some 337 bird species have been recorded including the Stanley bustard *Eupoditis denhami stanleyi* (but doubtfully present in 1981) and Pel's fishing owl *Scotopelia peli*. Reptiles include the Nile crocodile *Crocodylus niloticus* (V), and leather-back turtle *Dermochelys coriacea* (E) and loggerhead turtle *Caretta caretta* (V) occur along the coast.

Conservation Management Three major types of field operation were being carried out within the reserve, intensive anti-poaching patrols, the attempted evacuation of people living in the reserve to nearby communal villages and the construction of game posts.

Zoning None

Disturbances or Deficiencies Many animal species are only represented by a few remnant endangered populations. This is a consequence of bush fires, poaching, competition from domestic stock, and general harassment from people living within the reserve. The situation within the reserve has been gradually deteriorating, largely due to the combined effects of inadequate staffing and the antagonism of the local people (various attempts to move people out of the area have so far failed). Other serious problems are drying up of the Futi River and its flood plains, and uncontrolled wildfire.

Visitor Facilities No information

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° IUCN/WWF Project 1988. Mozambique. Field Force Vehicles.

Staff Reported to number 32, including one senior ranger, 15 game rangers, eight game guards. However, since 1984 wildlife staff have not actually been stationed in the park, but in a village some miles away.

Budget No information

Local Park or Reserve Administration No information

Date 1986

ZAMBEZI WILDLIFE UTILISATION AREA, INCLUDING MARROMEU RESERVE

Management Category Under Review

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Partial

Date Established The wildlife utilisation area was established in 1981, comprising the Marromeu Reserve (proclaimed in 1961 with subsequent legislation in 1969), and four safari hunting blocks.

Geographical Location South bank of the Zambezi River on the delta and surrounding area. Approximately centred 19°00'S, 35°00'E.

Altitude Less than 500m

Area About 1,000,000ha; contiguous to Gorongosa National Park (377,000ha) to the west

Land Tenure No information

Physical Features The reserve is situated in the Zambezi River delta and comprises floodplains, mangrove swamps, rivers and areas of higher ground. There are rocky, sandy and muddy intertidal zones, and sea grass beds. Mean annual rainfall is 1,000mm, and mean annual temperature is 24°C–27°C.

Vegetation The area includes about 7,500ha of coastal habitat, the most important being the dune scrub and very dense tall mangrove forest along both the coast and lower estuary. Other vegetation types include broad-leaf and palm savannas, *Brachystegia* and scattered transitional forests, lowland evergreen forests, riverine and papyrus swamp forests.

Fauna The area is particularly famous for a large population (c. 50,000) of buffalo *Syncerus caffer*. Other mammals include: elephant *Loxodonta africana* (T), zebra *Equus burchelli*, reedbuck *Redunca redunca*, bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, oribi *Ourebia ourebi*, suni *Neotragus moschatus*, common duiker *Sylvicapra grimmia*, blue duiker *Cephalophus monticola* and red duiker *C. natalensis*, warthog *Phacochoerus aethiopicus* and bush pig *Potamochoerus porcus*. In the east corridor adjoining the rift valley, there are good populations of nyala *Tragelaphus angasi*, greater kudu *T. strepsiceros*, wildebeest *Connochaetes taurinus*, impala *Aepyceros melampus*, elephant *Loxodonta africana* (T), leopard *Panthera pardus* (T), sable antelope *Hippotragus niger*, waterbuck *Kobus ellipsiprymnus*, and Lichtenstein's hartebeest *Alcelaphus lichtensteini*. Black rhino *Diceros bicornis* (T) also occurs. The avifauna is rich in terms of numbers and species. Waterbirds are common and include greater flamingo *Phoenicopterus ruber*, wattled crane *Bugeranus carunculatus* (of special concern), East coast akelat *Erithacus gunningi* (R), and a large nesting colony of white pelican *Pelecanus onocrotalus*. The swamps and rivers are well populated by crocodile and fish species including *Clarias* spp., *Tilapia* spp., and tigerfish. The estuaries are rich in species of marine fish.

Conservation Management Between 1976 and 1980, the Ministry of Agriculture carried out a buffalo cropping operation, with the result that commercial and organized poaching decreased. New roads and camps were built and 400 jobs created (200 permanent; 200 dry season) in association with the project. All products and by-products of buffalo cropping are used. Hunting safaris were started again in 1981. Other activities included agriculture to feed the workers; fishing in the fresh waters, a small crocodile farm, and an artisanal to use horns, bones, hoofs and skins. Anti-poaching activities were conducted throughout the year using amphibious tractors and small boats during the wet season. Much poaching has been stopped and many poachers are now employed as hunters or game guards. Captive breeding of certain birds, reptiles, and frogs was planned. The whole unit was in fact economically self sufficient. Guerilla activity has, however, seriously disrupted management of the area.

Zoning No information

Disturbances or Deficiencies The area has a population of less than 4,000 people with under 100 permanently based in the lowland or coastal belt. There was severe poaching prior to 1960 and post 1974, when all hunting was banned. Between 1960 and 1974, government wardens carried out successful anti-poaching measures aided to some extent by professional hunters who organized safaris. There has been degradation of floodplains due to a change in flooding regime caused by the Kariba and Cabora Bassa dams and related changes of watertable, probably assisted by wildfire. Since 1982 there have been increasing problems within the unit, with attacks on administrative camps and increased poaching. The area is reported to by still with problems, and much of the unit is still uncontrolled.

Visitor Facilities Canoe, bird-watching, and walking safaris are planned.

Scientific Research There were large mammal aerial counts in 1968 and 1978–1979, and studies on sustainable yield of buffalo populations. A survey of crocodiles was carried out in 1981 by FAO. Research was continuing, mainly on conservation and utilisation of other species, especially forest ungulates. However, research is limited by the serious lack of experienced ecologists, and now by security difficulties.

Special Scientific Facilities No information

Principal Reference Material

* Tello, J.L. (1983). Mozambique's cropping scheme in the Zambezi Delta Area. Report presented to 59th SSC Meeting, Harare, Zimbabwe, 16 April 1983.

Staff Some 400 were employed, 180 of them for the whole year. The current situation is less clear, but it would appear that staff are returning to the area and that there is now a director and 90 workers (10 of them trained).

Budget No information

Local Park or Reserve Administration No information

Date 1986

RESERVA DE POMENE

Management Category Under Review

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established 16 October 1972 by Legislative Diploma 104/72

Geographical Location Approximately 23°00'S, 35°00'E.

Altitude 0-100m

Area 10,000ha

Land Tenure No information

Physical Features Includes coastal littoral and estuarine areas.

Vegetation Dune forest, acid grassland, mangrove swamps, and associated estuarine environment

Fauna Marine species include dugong *Dugong dugon* (T), dolphin, and five species of marine turtle (all of which are threatened). Terrestrial species include red duiker *Cephalophus natalensis*, samango monkey *Cercopithecus albogularis*, and the chacma baboon *Papio ursinus*. Reintroduction of several antelope species, and buffalo, was at one time considered but not followed up.

Conservation Management No information

Zoning None

Disturbances or Deficiencies There is some military activity in the area.

Visitor Facilities The reserve had a good camp, and was a relatively important tourist area (mainly because of the fishing). Tourist activities stopped in 1982.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

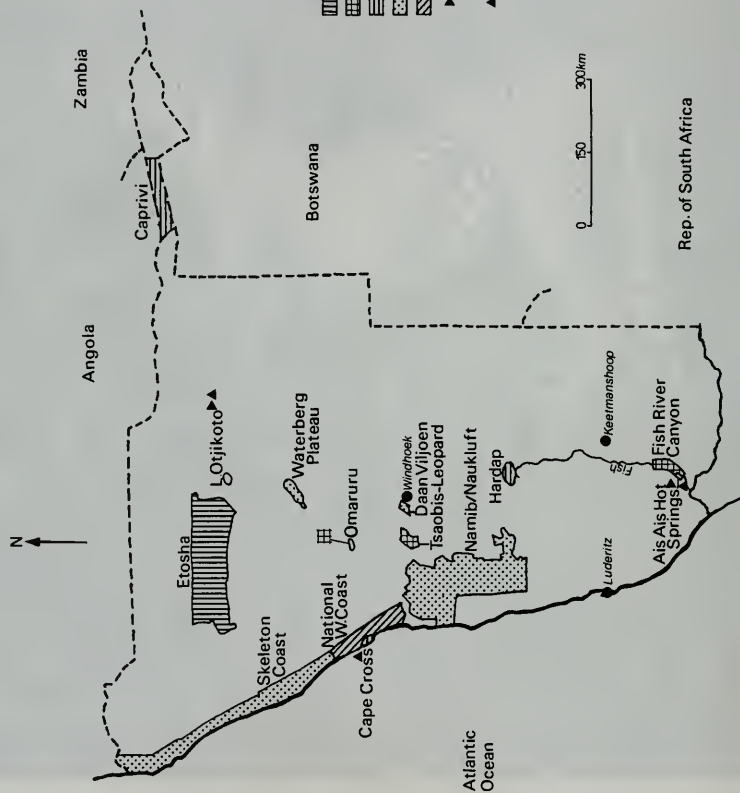
Staff Field staff have never been stationed in this reserve.

Budget No information

Local Park or Reserve Administration No information

Date 1986





Namibia

SOUTH WEST AFRICA/NAMIBIA

Area 824,293 sq.km

Population 1,039,800 (1982 estimate)

Parks and Reserves Legislation Parks and reserves are declared under the Nature Conservation Ordinance No. 4 of 1975. Definitions used within the country include National Park, Park, Game Reserve, Reserve, National Recreation Area, Nature Reserve and Recreation Resort. A new ordinance, setting up the Directorate of Nature Conservation and Recreation Resorts has yet to be promulgated, and for this reason Game Reserves have also yet to receive legal protection. The Directorate is, however, already set up in practice. The terminology used in defining areas is confusing, and is reportedly under review. In practice there would appear to be little difference in legal status between these areas.

Parks and Reserves Administration The state owned protected areas come under the jurisdiction of the Directorate of Nature Conservation and Recreation Resorts, Department of Agriculture and Nature Conservation. This office was established *de facto* in 1980, effectively bringing all conservation activity within the country under one directorate. The stated aims of this directorate are: care of the animal population and administration of licensed hunting; combating wildlife-carried animal epidemics; ensuring clean water supplies in protected areas; studying the environment and animals; running recreation facilities.

Address

• Directorate of Nature Conservation and Recreation Resorts, Department of Agriculture, Nature Conservation and Veterinary Services, Private Bag 13306, Windhoek 9000.

Additional Information Namibia has suffered drought since the 1979/80 rainfall season with Damaraland, Kaokoland, Owamboland and Etosha National Park most affected. Coupled with this there has been a loss of topsoil through hoof and wind erosion, particularly in Damaraland and Kaokoland. The eastern states of Kavango, Bushmanland and Caprivi are suffering lower water tables, and in East Caprivi, flood plains are dry and perennial swampland desiccated.

Red lechwe *Kobus letche*, sitatunga *Tragelaphus spekei* and puku *K. vardonii* are subject to poaching in eastern areas, especially in Caprivi, with low river levels enabling motor vehicles to negotiate dried out wetlands. In addition, most tribal people, pastoralists and nomadic, are causing serious competition for drinking water and grazing between livestock and wildlife in arid and semi-arid areas. There may be local extinctions of black rhino *Diceros bicornis* (T) in Damaraland and Kaokoland (maximum of 40-50 survive) and sitatunga and puku in eastern Caprivi. Warthog *Phacochoerus aethiopicus* are declining drastically throughout Namibia, with the southern population particularly at risk, and decreases of 40% have been reported for the elephant population of the Kaokoland due to poaching during 1981/82.

To alleviate drought effects, boreholes have been sunk both to provide water, and to spread out the animals more widely over available grazing. Animals have also been culled to reduce overgrazing.

References

- Huntley, B.J. and Ellis, S. (1983). Conservation status of terrestrial ecosystems in southern Africa. Working document prepared by CSIR, Pretoria.
- IUCN/WWF Project 1962. African Elephant Coordinating Office.
- Jackson, P. (1984). Wildlife and the Great African Drought. *IUCN Bulletin* 15(7-9): 73-74.
- Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.
- Relevant papers are also published in MADOQUA, the Journal of Nature Conservation and Desert Research in South West Africa, published quarterly by the Department of Agriculture, Nature Conservation and Veterinary Services.

Protected Areas

(hectares)

National Parks

Etosha 2,227,000

Nature Reserves

Fish River Canyon 46,100

Omaruru 1,000

Tsaobis-Leopard 35,000

Subtotal 82,100

Game Reserves

Caprivi 530,000

Reserves

Cape Cross Seal 650,000

Hardap 25,000

Subtotal 675,000

Natural Monuments

Ais Ais Hot Spring

Lake Otjikoto

Subtotal

Parks

Daan Viljoen 3,953

Namib/Naukluft 4,976,800

Skeleton Coast 1,639,000

Waterberg Plateau 40,500

Subtotal 6,660,253

Tourist Areas

National West Coast

ETOSHA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.15.07 (Namib)

Legal Protection Total

Date Established In 1958 as a National Park under section 37 of the Nature Conservation Ordinance 31 of 1967 (Art. 37, Para. 1, 2 and 3). The park area was reduced in 1967 to provide land for tribal homelands. Originally established as a game reserve in 1907.

Geographical Location About 400km north-west of Windhoek and 120km south of the Angolan border. 18°30'-19°28'S, 14°20'-17°10'E.

Altitude 1,000-1,500m (mean 1,200m)

Area 2,227,000ha. Etosha Game Reserve originally covered 9,952,600ha.

Land Tenure Government, under jurisdiction of the Division of Nature Conservation and Tourism

Physical Features The park comprises an area of inland drainage on the great African plateau with Atlantic drainage in the west and a system of interlaced channels (omurambas) with small water-holding pans draining towards the Etosha Pan in the east. The pan is about 480,000ha and up to 129km long and 72km wide. Owambo tribesmen named the pan 'Etosha' meaning 'the big white place' because of the pan's mirage. During most of the year, the pan appears barren and desolate, but during the wet season water drains from Ovambo and southern Angola. In exceptional years, the pan becomes a very shallow lake averaging a few centimetres in depth. Geologically, the area is composed of calcareous sand, gravel, and limestone with dolomite outcrops in the west. Soils are shallow and alkaline. The temperature range is from below freezing at night in winter to a summer maximum of 43°C. The patchy, convectional rainfall is about 300mm, falling mainly from January to March, and September to December. The three seasons of Etosha's year are four cold and dry months, four hot and dry months, and four hot and wet months.

Vegetation Arid savanna vegetation tending towards tree savanna occurs in the east and shrub and thorn-shrub in the west. Species include: acacias *Acacia tortilis*, *A. reficiens* and *A. nebrowii*, mopane *Colophospermum mopane*, and *Combretum*. All these species can vary in form from shrub to tree and occur throughout the park. Dominant grass species are *Anhephora*, *Enneapogon*, and *Aristida*.

Fauna Most of the larger mammals of the southern savanna plains of Africa occur in the park including: leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), numerous elephant *Loxodonta africana* (T), distinctive races of Burchell's zebra *Equus burchelli antiquorum* and mountain zebra *Equus zebra hartmannae* (T), black rhinoceros *Diceros bicornis* (T), giraffe *Giraffa camelopardalis*, kudu *Tragelaphus strepsiceros*, eland *Taurotragus oryx*, roan antelope *Hippotragus equinus*, gemsbok *Oryx gazella*, springbok *Antidorcas marsupialis*, hartebeest *Alcelaphus buselaphus*, wildebeest *Connochaetes taurinus*, steenbok *Raphicerus campestris*, topi *Damaliscus lunatus*, black-faced impala *Aepyceros melampus petersi* (T) (limited to this region with declining numbers), and some Damara dik-dik *Madoqua kirki*. The pan supports over 300 recorded bird species and the area is a wetland of international importance. Birds include: ostrich *Struthio camelus*, greater flamingo *Phoenicopterus ruber roseus* (largest known breeding area) and red-crested korhaan *Lophotis ruficrista*.

Conservation Management Veld fires were controlled until recent research showed that large herbivores were declining because vegetation was not being renewed. Policy is now to leave fires started by lightning to burn as far as the firebreaks. Thriving lion populations are competing with cheetah and the cheetah population has been declining. An experiment is now in progress (the first of its kind in the world) with 10 lionesses on contraceptive injections. This method of population control is considered preferable to shooting as no genetic material is destroyed.

Zoning About 80% of the park is closed to tourism. A predator-free zone is maintained at Otjovasandu in the west for threatened species such as black rhinoceros, black-faced impala, roan antelope, and tsesebe.

Disturbances or Deficiencies Boundary fences, primarily to keep domestic animals out of the park, have resulted in serious disturbance of migratory patterns. In particular, the path of wildebeest was blocked by the northern fence and the population has decreased in 25 years from 25,000 to 2,300. Many deep limepits were dug to provide gravel for tourist roads. These pits filled with water after the rains and many became infected with anthrax, a disease fatal to herbivores (mainly wildebeest and zebra), that drink the water. The sick and dead animals have contributed towards the increase in lion and other carnivores, whose environment was further improved by the construction of artificial watering points. The control of veld fires in the past altered the environment from savanna towards woodland and elephant, subsequently increased from under 100 in 1955 to 2,500 at present. The area has been particularly affected by drought since 1979-1980, with rainfall about 30-75% on average, leading to a reduction in vegetation, especially grass cover. Mountain zebra have moved east from Damaraland and

Kaokoland into Etosha, putting pressure on water points. Many have been killed by lions because their hooves, no longer subject to the wear of normal mountain habitat, grow abnormally, so reducing agility. Elephants in west Etosha doubled from 872 in 1982 to 1819 in 1983 because of immigration from drought areas. Kudu have been dramatically reduced by rabies in east Etosha. One thousand, two hundred and sixteen Hartman's and Burchell's zebra, springbok, gemsbok, and eland have been culled in west Etosha and sent to meat canning factories.

Visitor Facilities There are three restcamps with airstrips in the west, centre, and east of the park, each with full facilities. Eight hundred kilometres of gravel tourist roads link the camps to over 30 waterholes. A floodlit waterhole at Okaukuejo and rudimentary rest-stops in the park surrounded by game-proof fences.

Scientific Research The park has two permanent resident staff (ecologist and veterinarian) and eight visiting research scientists. The solution of managerial problems is often the main objective, but priorities are fixed by the director of the park in consultation with the research workers.

Special Scientific Facilities Facilities were enlarged and improved in 1972 at a cost of US\$375,000. There is a small natural history museum at Okaukuejo.

Principal Reference Material

- ° Barry, H.H. (1982). The Wildebeest Problem in Etosha: a synthesis. *Madoqua* 13 No. 2: 151-158.
- ° Jackson, P. (1984). Wildlife and the Great African Drought. *IUCN Bulletin* Vol 15 No. 7-9: 73-74.
- ° Readers Digest (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff Some 219 units were employed in 1972. A team of nature conservators is based at the park headquarters at Okaukuejo Camp.

Budget US\$1,014,000 annually

Local Park or Reserve Administration Director of Nature Conservation, Private Bag 13267, Windhoek 9000.

Date 1983

FISH RIVER CANYON

Management Category IV and III (Managed Nature Reserve and National Monument)

Biogeographical Province 3.15.07 (Karoo)

Legal Protection No information

Date Established 1962. Fish River Canyon itself is a national monument.

Geographical Location The lower reaches of the Fish River in southern Namibia, north of the confluence with the Orange River. Access is via the main Vioolsdrif-Keetmanshoof road. 27°30'S, 17°35'E.

Altitude No information

Area No information

Land Tenure Government, under jurisdiction of the Division of Nature Conservation and Tourism

Physical Features To the east lie the plains of Namaqualand and the Kokerboom Forest, and to the west is the Sperrgebiet diamond-mining area. The area contains Ai-Ais hot springs in the south, and a permanent pool heated by hot springs about 65km upstream. The canyon is up to 27km wide, but is much narrower for most of its length, meandering between steep cliffs that bisect the flat Namib plateau. The northern 65km comprises a deep channel in the bed of the original trough. The canyon floor is more than 500m below the plateau level in places. The lowest strata were laid down over 2,500 million years ago. The canyon floor is made up mainly of placid pools and huge boulders, but occasionally the river comes down in flood.

Vegetation Vegetation in the canyon is sparse, though some plants have gained a foothold on the rocky slopes. Reeds and rushes grow in the riverbed on slack stretches of the river. Camelthorn *Acacia erioloba* and Karoo thorn trees *Acacia karroo* grow on the river banks and aloes such as *Aloe gariepensis* cling to the canyon walls.

Fauna Mammals include: leopard *Panthera pardus* (T), Hartmann's mountain zebra *Equus zebra hartmannae* (T), klipspringer *Oreotragus oreotragus*, baboon, *Papio* sp., and rock hyrax *Procavia capensis*. Birds include: fish eagle *Haliaeetus vocifer*, hammerkop *Scopus umbretta*, grey heron *Ardea cinerea*, and Egyptian goose *Alopochen aegyptiacus*. The black spitting cobra *Hemachatus haemachatus* has been recorded.

Zoning The central national monument is surrounded by the nature reserve.

Disturbances or Deficiencies No information

Visitor Facilities There are extensive tourist accommodation facilities at Ai-Ais Hot Springs Resort including caravan and campsites. More campsites are situated near the canyon lookout, north of the springs. Other facilities include a scenic drive from the springs to the lookout point and extensive hiking trails. Hiking is strictly regulated.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Director of Nature Conservation, Private Bag 13267, Windhoek.

Date 1983

TSAOBIS-LEOPARD NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.15.07 (Namib)

Legal Protection Private

Date Established Established in 1969 by a Swiss conservationist (Dr August Juchli).

Geographical Location In the Chuos Mountains, 78km by road, south of Karibib in central Namibia. 22°35'S, 15°52'E.

Altitude No information

Area 35,000ha

Land Tenure Private

Physical Features No information

Vegetation No information

Fauna Twenty-five to 30 leopard *Panthera pardus* (T) (elusive and difficult to sight) occur in the park as part of a leopard breeding programme. Other animals encouraged in the reserve are giraffe *Giraffa camelopardalis*, kudu *Tragelaphus strepsiceros*, wildebeest *Connochaetes taurinus*, hartebeest *Alcelaphus buselaphus*, and springbok *Antidorcas marsupialis*.

Zoning No information

Disturbances or Deficiencies No information

Visitor Facilities The reserve is open throughout the year. Facilities include a restcamp with accommodation and swimming pool, organized horse treks and guided four-wheel drive tours.

Scientific Research There is a leopard breeding and study programme.

Special Scientific Facilities No information

Principal Reference Material None listed

Staff Park guides

Budget No information

Local Park or Reserve Administration Tsaobis-Leopard Nature Reserve, PO Box 143, Karibib 9000.

Date 1983

CAPRIVI GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.16.07 (Kalahari)

Legal Protection No information

Date Established 1963

Geographical Location Western end of the Caprivi Strip, which extends between Angola, Zambia and Botswana. Access is along the east-west gravel road from Mukwe to the Zambian border. 17°10'-18°15'S, 21°32'-23°20'E.

Altitude No information

Area About 530,000ha

Land Tenure Government, under jurisdiction of the Division of Nature Conservation and Tourism

Physical Features The reserve comprises dry flat savanna bushland on poor soil. It is dissected by the Okavango River, which flows from Angola to Botswana, and tributaries of the Kwando River, which flows into Angola. The reserve includes the scenic Popa Falls.

Vegetation Open savanna occurs throughout most of the reserve, with scattered groves of Rhodesian teak *Baikiaea plurijuga*, *Acacia* and wild fig *Ficus* sp.. Individual trees may be parasitised by the strangler fig *Ficus* sp.

Fauna Mammals include: lechwe *Kobus leche*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca arundinum*, hippopotamus *Hippopotamus amphibius*, topi *Damaliscus lunatus*, sable antelope *Hippotragus niger*, and roan antelope *Hippotragus equinus*. Birds include lappet-faced vulture *Torgos tracheliotus* and carmine bee-eater *Merops nubicus*.

Population The area has been allocated as a homeland for indigenous Bushman hunter-gatherers.

Zoning None

Disturbances or Deficiencies There has been political unrest from the late 1960s to mid 1970s, and the area is still classified as a military 'operational zone'.

Visitor Facilities The area is technically open to tourists, but visitors require a permit from the South African Defence Force and are not permitted to leave the road. There is no accommodation and camping is severely restricted.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Director of Nature Conservation, Private Bag 13306, Windhoek 9000.

Date 1983

HARDAP NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.16.07 (Kalahari)

Legal Protection Sport fishing is allowed

Date Established Opened as a recreation resort in 1964. The nature reserve surrounding the dam was established in 1968 by the merging of several farms.

Geographical Location Centred on the artificial Hardap Dam, 21km south of Windhoek. 24°45'S, 17°50'E.

Altitude No information

Area 25,000ha

Land Tenure Government, under jurisdiction of the Division of Nature Conservation and Tourism

Physical Features The area of Hardap Dam was flooded in 1963. The surrounding landscape is rugged, with cone-shaped kopjes (rocky outcrops) and dongas (deep eroded gulleys) created by heavy flooding in the past. The climate is dry.

Vegetation Open thorn scrub with camelthorn *Acacia erioloba* and hardy succulents such as wildgrape *Cyphostemma juttae*.

Fauna There are good populations of red hartebeest *Alcelaphus buselaphus caama*, eland *Taurotragus oryx*, kudu *Tragelaphus strepsiceros*, gemsbok *Oryx gazella*, springbok *Antidorcas marsupialis* and mountain zebra *Equus zebra* (T). Other mammals include: cheetah *Acinonyx jubatus* (T) and black-backed jackal *Canis mesomelas*. Over 100 bird species have been recorded including: black-headed heron *Ardea melanocephala*, ostrich *Struthio camelus* and large numbers of the marine white-necked cormorant *Phalacrocorax carbo* (nesting on the branches of the semi-submerged camelthorn). Reptiles include the Cape wolf snake *Lycophidion capense capense*. The dam contains numerous fish species including: tilapia *Tilapia* sp., mud mullet *Labeo umbratus*, Orange River mudfish *Labeo capensis*, barbel *Clarias gariepinus*, yellow-fish *Barbus marequensis* and *Barbus holubi*, carp *Cyprinus carpio*, black bass *Micropterus salmoides* and a popular sport fish, bream introduced from northern Namibia.

Zoning The reserve contains a recreation area on the north side of the dam.

Disturbances or Deficiencies There is extensive sport fishing on the dam. Fishermen have been known to illegally destroy cormorant eggs on the incorrect assumption that cormorants deplete fish stocks. The introduced fish present a dilemma and it is yet to be decided whether the ecosystem will be restored to its original state.

Visitor Facilities The recreation resort provides extensive accommodation with facilities. Eighty-two kilometres of dirt road in the reserve provide access for game viewing. There is sport fishing on the dam by permit. The resort is the main tourist attraction and there are few visitors to the game areas.

Scientific Research Studies of the white-necked cormorant breeding colonies and their effect on fish stocks have taken place. Research has been undertaken to assess the market for bream and other introduced fish.

Special Scientific Facilities The Freshwater Fish Research Institute is based in the recreation area.

Principal Reference Material None listed

Staff One conservator and two assistants

Budget Income from small-scale selling of bream to local restaurants is used for management purposes.

Local Park or Reserve Administration Director of Nature Conservation, Private Bag 13267, Windhoek.

Date 1983

DAAN VILJOEN GAME PARK

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.15.07 (Namib)

Legal Protection Fishing is allowed by permit

Date Established 1967, under Section 38 of the Nature Conservation Ordinance No. 31

Geographical Location Located in the Khomas Hochland, 21km west of Windhoek. 22°29'-31'S, 16°59'-17°01'E.

Altitude 1,800-2,000m (mean 1,900m)

Area 3,953ha

Land Tenure Government, under jurisdiction of the Division of Nature Conservation and Tourism

Physical Features The park comprises the eastern flank of the Khomas Hochland (Highlands), an area of rolling hills and deep ravines deeply dissected by the perennial Aueigas River that runs along the eastern boundary and is dammed and landscaped at the rest camp. The Aueigas and tributaries form part of the upper reaches of the Swakop River. These drainage lines are well marked, forming a series of parallel ravines with northerly alignment, each with lesser side ravines running east and west. Geologically, the area is composed of weathered mica schists of the Damara system of Precambrian age. The maximum summer temperature is 39°C; winter temperatures are near freezing with marked diurnal fluctuation. There is about 375mm of convectional rainfall in summer.

Vegetation The park is the only nature reserve in the Khomas Hochland classified as one of the 15 major vegetation zones in Namibia. There are patches of thorn scrub, but the area is predominantly montane open savanna on the hills with scattered trees of *Acacia hereroensis*, averaging four metres in height. Species favouring the ridges are *Ozoroa crassinervia* and *Combretum apiculatum*. Elsewhere, most tree growth is restricted to drainage channels and is dominated by *Acacia* species. The perennial grass species are mainly *Anthepphara*, *Enneapogon*, and *Stipagrostis*. Rare and endemic species include *Lithops* sp. and the green-flowered aloe *Aloe verdiflora*.

Fauna The game species are those common in the Khomas Hochland, some having been reintroduced. Mammals include: chacma baboon *Papio ursinus*, rock hyrax *Procavia capensis*, mountain zebra *Equus zebra hartmannae* (T), kudu *Tragelaphus strepsiceros*, eland *Taurotragus oryx*, gemsbok *Oryx gazella*, hartebeest *Alcelaphus buselaphus*, wildebeest *Connochaetes taurinus*, klipspringer *Oreotragus oreotragus*, steenbok *Raphicerus campestris*, and springbok *Antidorcas marsupialis*. Over 200 bird species have been reported, including breeding populations of: black eagle *Aquila verreauxii* and African hawk-eagle *Hieraaetus spilogaster*, ostrich *Struthio camelus*, crimson-breasted shrike *Laniarius atrococcineus* and uncommon endemic species such as Monteiro's hornbill *Tockus monteiri*, Damara rock-jumper *Sphenoeacus pycnopygius*, short-toed rock thrush *Monticola brevipes*, and chat shrike *Lanioturdus torquatus*. Introduced fish species include tilapia *Sarotherodon* sp., black bass *Micropterus salmoides* and barbel *Barbus* sp..

Zoning There is a fenced rest camp and 3,400ha wilderness area closed to vehicles.

Disturbances or Deficiencies Human impact in the park includes the rest camp, 15km of road, 60km of firebreak, and three dams. There is fishing by permit in Aueigas Dam for tilapia, black bass, and barbel.

Visitor Facilities The restcamp facilities include 58-bed accommodation, restaurant, caravan and campsite, shop and swimming pool. Tourist roads are confined to 600ha of the park, but tourists are not restricted to vehicles and are free to wander throughout the park.

Scientific Research The park is considered to be well suited to research on animal behaviour and for physiological studies.

Special Scientific Facilities No information

Principal Reference Material None listed

Staff Thirty-one units

Budget US\$25,500 annually

Local Park or Reserve Administration Director of Nature Conservation, Private Bag 13267, Windhoek 9000.

Date 1983

NAMIB-NAUKLUFT PARK

Management Category II (National Park)

Biogeographical Province 3.15.07 (Namib)

Legal Protection Traditional use of the area is allowed.

Date Established 1967 as Namib Desert National Park, under Nature Conservation Ordinance No. 31 (Art. 38 1964). Amalgamated with Naukluft Mountain Zebra Reserve in 1979 by a 30km wide corridor. Namib Desert National Park was first established as a game reserve in 1904. Size increased from 2,401,000ha to present size in 1984, though official proclamation will take place in 1986.

Geographical Location Stretching from the central coastal area of Namibia inland some 170km to the Naukluft Mountains. 24°12'-24°17'S, 16°05'-16°10'E.

Altitude Sea level to 2,000m

Area 4,976,800ha

Land Tenure Government, under jurisdiction of the Division of Nature Conservation and Tourism

Physical Features The Namib is the only true desert in southern Africa. The park contains the gravel plains of intensely weathered schists, marbles, quartzites, and granites, with some gypsum crusts, calcrete and desert pavement. Soils are shallow with evaporitic horizons and a buried fossil red-brown layer. River canyons are intermittent and sand-filled, sun-surface flow continuing in some sections and forming waterholes where impeded by impervious barriers. Extensive sand dunes run parallel to the coastline for up to 120km inland. The park also contains Sandvis (formerly Sandwich Harbour) which is an internationally important wetland formed by water seeping through the surface of the Kuiseb river bed. The annexed Naukluf Mountains lie astride the western escarpment. They overlook the Namib Desert plains, 1,000m below, and form part of a large triangular plateau which is higher than the main plateau and separated from it by almost unbroken cliffs, 500m high. They are geologically part of the Nama system and composed of successive horizons of quartzite, limestone, dolomite, and shale which have been folded by pressure and gravitation to produce a south-east inclination. Soils are shallow except on less pronounced slopes. Mean daily temperature in the desert is 16-18°C with almost no frost; mean annual rainfall is 23mm, but fog precipitation, which occurs on an annual average of 60 days, accounts for a further 31mm. The mountains have hot summers with mean maximum temperature of 35°C and summer storm precipitation 200mm; and cool winters with occasional frosts.

Vegetation Algae and lichens dominate on inselbergs and pegmatite dykes making use of moisture in dew and succulent plants. Lichens include *Parmelia hottentotta*, *P. namaensis* and *Caloplaca elegantissima*. Succulent genera include *Hoodia*, *Lithops*, *Sarcocaulon*, *Euphorbia* and *Aloe* spp. and the less common *Aloe namibensis*, and *Mesembryanthemum* spp.. Sandy wastes support halophytes such as *Zygophyllum stapfii*, *Z. simplex*, and *Aizoon dinteri*. The riverbeds near the coast are colonized by *Tamarix*, *Lycium* and *Salsola* and inland by a denser growth of *Acacia giraffae* and *Acacia albida* with some Orange River ebony *Euclea pseudobenus*, and *Salvadora persica*. *Acanthosicyos horridus*, which occurs in the Kuiseb Valley, is a valuable source of water in the desert. The most unusual single species is the unique gymnosperm *Welwitschia bainesii*, first discovered in 1863 beside the Swakop river course and still the only known species of its family. There is a complex and varied vegetation on the mountains due to the wide variation in aspect and edaphic conditions. The plateau surface peneplain is a mosaic of smaller communities dominated by low scattered scrub interspersed with bare ground or clumps of perennial grass. The southern slopes of the mountain massif are covered mainly by grass and short shrub species including *Commiphora*, *Euphorbia*, *Boscia albitrunca*, *Maerua schinzii*, *Aloe dichotoma*, and *Moringa ovalifolia*. Riparian vegetation contains a large variety of taller trees including *Ficus* and *Acacia* spp.. Uncommon species include *Aloe sladeniana*, *Lithops*, *Huernia*, *Hoodia*, *Stapelia*, *Aloe karasbergensis*, *Cyphostemma* spp., and the endemic resurrection plant *Myrothamnus flabellifolius*.

Fauna Desert mammals include: three species of elephant shrew, the desert golden mole *Eremitalpa granti*, three species of gerbil, black-backed jackal *Canis mesomelas*, bat-eared fox *Otocorys megalotis*, hyena *Crocuta crocuta*, and springbok *Antidorcas marsupialis*. Birds include: ostrich *Struthio camelus*, high breeding concentrations of lappet-faced vulture *Torgos tracheliotus* and red-necked falcon *Falco chicquera* (at Tsondabvlei Lake on the Tsondab River), martial eagle *Polemaetus bellicosus*, large colonies of the endemic Bradfield's swift *Apus bradfieldi*, and the endemic Gray's lark *Ammomanes grayi*. On the gravel plains, there are local races of Karoo lark *Certhilauda albescens*, the dry country chats *Cercomela tractrac* and *Cercomela schlegelii*, and the localised Herero chat *Namibornis herero* (first described in 1931, but the nest undiscovered until 1969). Resident birds at

Sandvis include herons, egrets, gulls, terns, some 20,000 Cape cormorant *Phalacrocorax capensis*, and several unusual species of palaearctic shore-birds in winter. Sandvis is the breeding ground for large numbers of fish and the birds are attracted by the large numbers of young fish trapped in the shallow waters by the outgoing tide. Reptiles include *Palmatogecko rangei*, *Aporosaura anchietae*, and the sidewinder *Bitis peringueyi*. The invertebrate fauna is of great interest and includes the beetles *Onymacris unguicularis* and *Lepidochora* spp., which have evolved methods of condensing fog as a source of water. Mountain mammals include: baboon *Papio ursinus*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), mountain zebra *Equus zebra hartmannae* (T), gemsbok *Oryx gazella*, rock hyrax *Procavia capensis*, kudu *Tragelaphus strepsiceros*, and klipspringer *Oreotragus oreotragus*. Mountain birds include black eagle *Aquila verreauxii* preying mainly on the rock hyrax.

Population The Topnaar Hottentots have lived in the river valley for generations. They farm goats and cattle and are a permanent population in the park. Part of their rich heritage is evident in many place-names, such as Gobabeb meaning 'the place of the fig tree'.

Conservation Management Illegal nomadic farming in the Kuiseb floodplain is being removed. There are 265km of game-proof fences along the inland boundary and three boreholes operated by wind-driven pumps.

Zoning The Tsondabvlei area is only open to scientific researchers. Sandvis is a fenced bird sanctuary with visitor access prohibited.

Disturbances or Deficiencies There are three small gypsum mining concessions in 40,000ha of the park, dating back before existing legislation. Prospecting in the area between the Swakop and Kuiseb rivers causes visible damage.

Visitor Facilities There is no limit on access except to the Naukluft section, which is only open to one group of 3-40 campers at a time. Accommodation in the park is only available at official overnight campsites including Homeb, Ganab and Sesriem. Other facilities include the one day hiking trail in the Naukluft section where further trails are planned, but water shortage in the mountains is posing a problem. Permits are required to enter the coastal area of the park. There are over 500km of tourist roads.

Scientific Research Studies by resident scientists and conservators mainly concern physiological and behavioural adaptations to extreme desert conditions and the ecology of the mountain zebra and klipspringer. There have been studies of desert ants, particularly *Camponotus detritus*. Researchers from other countries include geologists studying the dunes, entomologists studying the rich insect life of the three ecosystems, and archaeologists.

Special Scientific Facilities At Gobabeb, there is the Namib Research Institute which was established in 1963 with offices, accommodation facilities and laboratories; the Desert Ecological Research Unit, established in 1966; and a permanently monitored weather station.

Principal Reference Material None listed

Staff Total of 28 staff units with 13 units attached to Naukluft Mountain Zebra Reserve, and 15 units in the desert area

Budget US\$16,000 annually

Local Park or Reserve Administration Director of Nature Conservation, Private Bag 13267, Windhoek 9000.

Date 1983

SKELETON COAST PARK

Management Category II (National Park)

Biogeographical Province 3.15.07 (Namib)

Legal Protection Protected under the Nature Conservation Ordinance No. 31 of 1967. Sport fishing is permitted on some sections of the coast.

Date Established 1971 as a park. An addition, in 1971 it doubled its area. Established as a game reserve in 1966. First protected in 1916.

Geographical Location A stretch of the northern coast of Namibia from Ugab north to the Kunene River on the Angola border. 19°25'-21°15'S, 12°50'-13°55'E.

Altitude Sea level to 500m (mean 200m)

Area 1,639,000ha

Land Tenure Government, under jurisdiction of the Division of Nature Conservation and Tourism

Physical Features A relatively regular shoreline of sandy beaches and isolated rocky stretches is backed in the north by high dunes which stretch from the shore to 40km inland. This is the only area south of the Sahara with true barchan dunes. Large areas of white sands with sparse vegetation occur near the shore with gravel plains further inland. Several rivers, from the mountains of Damaraland and Kaokoland to the east, flow through the park to the coast, where their mouths are usually blocked by dunes. This results in the formation of freshwater pools, some of which are perennial. The park is in the fog belt with little temperature range and low rainfall. Precipitation from fog contributes a high proportion of the water balance. Offshore cold and warmer water masses overlap to create marine conditions which are only paralleled off the west coasts of South America and Australia.

Vegetation The vegetation comprises mainly *Zygophyllum stapfii* with some *Z. simplex*, *Aizoon dinteri*, and stands of *Salsola* sp.. Endemic plants include: *Barleria solitaria*, *Indigofera cunensis*, *Merremia multisecta*, *Petalidium giessii*, and *Stipagrostis ramulosa*.

Fauna Species present along the shore include: black-backed jackal *Canis mesomelas*, brown hyena *Hyaena brunnea* (T), cheetah *Acinonyx jubatus* (T), lion *Panthera leo*, and occasional seal species. The dry riverbeds provide passage routes from inland for elephant *Loxodonta africana* (T), giraffe *Giraffa camelopardalis*, black rhinoceros *Diceros bicornis* (T), springbok *Antidorcas marsupialis* and gemsbok *Oryx gazella*. There is a Damara tern *Sterna balaenarum* (R) colony in the reserve. The rivermouth freshwater pools are used by migrating shorebirds. Particularly noteworthy is the overlap of cold temperate marine fauna and warm tropical marine fauna due to the conjunction of cold and warm currents offshore.

Zoning Visitors to Terrace Bay are restricted to a zone 30km long by 5km wide stretching 15km above and below Terrace Bay.

Disturbances or Deficiencies A portion of the area has been allocated as a mining concession. Other human impacts are the gravel roads and visitor facilities. Sport fishing is permitted at Terrace Bay and Torra Bay.

Visitor Facilities The park is open to tourists all year. Park entrances are at Ugab and Springbokwasser. Facilities include accommodation, shop and airstrip at Terrace Bay and caravan and campsite at Torra Bay.

Scientific Research Dunes and dune communities have been studied, but inaccessibility has, until now, hindered study. The park is periodically visited by scientists from Gobabeb.

Detailed study of the intertidal zone has started. The overlap of cold and warm currents provides ideal conditions for zoogeographical research.

Special Scientific Facilities None

Principal Reference Material

- ° Bird checklist for Kaokoland and Skeleton Coast. *Madoqua* 11 (3).
- ° Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff Eight units

Budget US\$8,000 annually

Local Park or Reserve Administration Director of Nature Conservation, Private Bag 13267, Windhoek 9000.

Date 1983

WATERBERG PLATEAU PARK

Management Category II (National Park)

Biogeographical Province 3.16.07 (Kalahari)

Legal Protection Total

Date Established 1972. Originally established as an Eland Game Reserve.

Geographical Location In central Namibia, 30km east of Otjiwarongo. 20°25'S, 17°13'E.

Altitude No information

Area 40,500ha

Land Tenure Government, under jurisdiction of the Division of Nature Conservation and Tourism

Physical Features The region comprises a typical Karoo formation similar to the Orange Free State's Golden Gate National Park. A hard sandstone plateau rises 100m above the surrounding plain with near vertical cliffs on the east and west, which form natural boundaries. In the north of the park, the plateau gradually widens and dips to join the plain.

Vegetation The plateau features typical savanna vegetation with groves of *Lonchocarpus capassa* and herbaceous plants such as *Hibiscus calyphyllus*. Vegetation is more wooded below the plateau.

Fauna Plateau mammals include: leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), caracal *Felis caracal*, spotted hyena *Crocuta crocuta*, eland *Taurotragus oryx*, wildebeest *Connochaetes taurinus* and reintroduced giraffe *Giraffa camelopardalis*, white rhinoceros *Ceratotherium simum* (now breeding successfully), buffalo *Syncerus caffer*, roan antelope *Hippotragus equinus*, sable antelope *Hippotragus niger*, hartebeest *Alcelaphus buselaphus*, topi *Damaliscus lunatus*, impala *Aepyceros melampus*, and duiker *Cephalophus* spp.

Below the plateau, mammals include: kudu *Tragelaphus strepsiceros*, steenbok *Raphicerus campestris*, klipspringer *Oreotragus oreotragus*, dik-dik *Madoqua* sp., warthog *Phacochoerus aethiopicus*, and rock hyrax *Procavia capensis*. The rich avifauna includes Bradfield's hornbill *Tockus bradfieldi*, paradise flycatcher *Terpsiphone viridis* and Hartlaub's francolin *Francolinus hartlaubi*. The sandstone cliffs accommodate the only breeding population of Cape vulture *Gyps coprotheres* (R) in Namibia.

Zoning The park contains a quarantine camp (12ha) and acclimatisation camp (1,000ha) for re-introduced animals.

Disturbances or Deficiencies There has been some severe bush encroachment due to disturbance of the natural fire pattern, but this is now being reversed through controlled burning.

Visitor Facilities Most of the plateau is closed to visitors. A caravan and campsite was established in 1980 below the plateau and three small hiking trails have been opened in the south of the park.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Director of Nature Conservation, Private Bag 13267, Windhoek.

Date 1983



Niger



- Key
- National Park
 - Faunal Reserve
 - Nature Reserve
 - Proposed National Nature Reserve

NIGER

Area 1,267,000 sq.km

Population 6,270,000 (1984)

Parks and Reserves Legislation Before a reserve is officially designated and legally gazetted, the scientific aspects of a proposal must be approved by the administration's technical services and be studied by national and regional governments, and by the traditional authorities in the region of the reserve. Comments and criticisms made at these levels are evaluated and amendments or modifications made as and where necessary. After approval by the Council of Ministers, a decree is prepared for signature by Head of State.

Parks and Reserves Administration Vested in the Direction des eaux et forêts, which is within the Ministère de l'hydraulique et de l'environnement. At national level, the central directorate is helped by four subsections, of which two are concerned with faunal matters: the Service aménagement de la faune and the Service protection de la nature et du contentieux. These are represented at regional levels by various departmental and district services and by Forest Department sections. The Service aménagement de la faune is responsible for conservation, management and administration of existing reserves, the creation and management of new reserves, and research. The Section protection de la nature et du contentieux is responsible for guarding against infractions of hunting and forestry legislation as well as the deliverance of various permits and authorisations.

Address

° Direction des eaux et forêts, BP 578, Niamey.

Additional Information Wildlife experts from all over Niger met in March 1986 for the country's first seminar on wildlife management, to plan safeguards for the area's rapidly vanishing wildlife. The seminar was organised by the Forest and Wildlife Service, with the support of WWF, World Bank and USAID. The meeting's report outlined Niger's general policy towards wildlife, proposed a strategy for wildlife management, and made a number of specific recommendations concerning the threats to 'W' National Park, and the establishment of the Air and Ténéré national reserve. The strategy proposed by the seminar involved inventorisation of the remaining refuges for wildlife within the country, increasing public awareness and involvement, strengthening of staff and material resources, development and implementation of a wildlife management master plan, a legislative review, and improvement of national and international tourism.

Despite the fact that all hunting in Niger has been banned, hunting is widely practised in the absence of law enforcement. Traditional hunting, devoid of modifying factors such as modern weapons, vehicles and changing land-use patterns, probably does not have a significant effect on wildlife numbers. Commercial and armed forces hunting is of more concern, and considering its widespread nature, is almost impossible and very expensive to control.

References

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- ° IUCN/WWF Project 1624. Niger-Addax/Oryx.
- ° Newby, J. (1984). The role of protected areas in saving the Sahel. In: McNeely, J.A. and Miller, K.R. (Eds) *National Parks, Conservation and Development: the role of protected areas in sustaining society*. Smithsonian Institution Press, Washington D.C.
- ° Newby, J. (1986). Niger plans for wildlife protection. WWF Monthly Report for July. WWF Project 1624.

Protected Areas	(hectares)
<i>National Parks</i>	
W du Niger	220,000
<i>Nature Reserves</i>	
Dosso Partial Reserve	306,500
Tamou	76,000
<i>Faunal Reserves</i>	
Gadabedji	76,000
<i>Proposed areas</i>	
Air and Tenere National Nature Reserve	7,736,000

PARC NATIONAL DE 'W'

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 1954 as a National Park; originally classified as a faunal reserve and state forest on 25 June 1953 by Decree No. 4676.

Geographical Location 150km south-south-east of Niamey, on the right bank of the River Niger and extending to the point where the borders of Niger, Burkina Faso and Benin intersect, Niamey Département. 11°55'-12°35'N, 2°05'-2°50'E.

Altitude 180 to 338m (Yeriyombou), with an average height of 250m

Area 220,000 ha; contiguous to 'W' in both Burkina Faso (190,000ha) and Benin (502,050ha), and the réserve de faune de Tamou (75,600ha) to the north.

Land Tenure Government

Physical Features The park takes its name from the double bend of the Niger between the points where two tributaries from the west, the Tapoa and the Mékrou, flow into it. The valleys of both tributaries are deeply incised and, together with the Barou rapids, are the principal scenic attractions. Geologically, the park consists of a lateritic peneplain at a ruling level of about 250m, with rock outcrops of quartz, schists and gneisses. The oldest rocks are of Precambrian age, and the park is cut from south-west to north-east by the Atakora quartzite chain. Climatically, the area is typically Sahelo-Sudanian; the temperature ranges from a maximum of 36.1°C to a minimum of 21.6°C and the rainfall, although averaging between 600 and 700mm, is very unreliable.

Vegetation The predominant vegetation type is Sudanese wooded savanna, and the park lies in the transition zone between Sudan and Guinea savannas. Secondary forest, which occupies a low altitude zone and approximately 70% of the park, is composed of a mixture of grassland

and rather stunted savanna woodland with such species as *Celtis integrifolia*, *Boscia senegalensis*, *Balanites aegyptiaca*, *Parkia biglobosa*, *Diospyros mespiliformis*, *Bauhinia reticulata*, *Adansonia digitata*, *Tamarindus indica*, *Terminalia avicennioides*, *Prosopis africana*, *Pterocarpus erinaceus*, *Piliostigma reticulatum*, shrubland species such as *Combretum* spp., *Guiera senegalensis*, *Acacia* spp. and *Lannea* spp., and grasses such as *Andropogon gayanus*. Many of these species are also present in the gallery forests, which occupy much of the remaining 30% of the area, and which also have *Anogeissus leiocarpus*, *Borassus aethiopum*, *Mitragyna inermis*, *Vitex chrysoclada*, and good stands of *Cola laurifolia* and *Kigelia aethiopum*. Although it is forbidden to harvest trees within the park, *B. aethiopum* is used throughout Niger for construction purposes.

Fauna This area contains the only remaining populations of the country's Sudanese savanna fauna such as elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, and kob *Kobus kob*. Other larger mammals include: a number of carnivores such as spotted hyena *Crocuta crocuta*, common jackal *Canis aureus*, serval *Felis serval*, caracal *Felis caracal*, lion *Panthera leo*, and cheetah *Acinonyx jubatus* (T), Anubis baboon *Papio anubis*, patas monkey *Erythrocebus patas*, and ungulates such as warthog *Phacochoerus aethiopicus*, hippopotamus *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, red-flanked duiker *Cephalophus rufilatus*, common duiker *Sylvicapra grimmia*, Defassa waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca redunca*, roan antelope *Hippotragus equinus*, hartebeest *Alcelaphus buselaphus*, topi *Damaliscus lunatus*, oribi *Ourebia ourebi*, and red-fronted gazelle *Gazella rufifrons*. The avifauna is varied and abundant, and migratory aquatic birds are common in the period between February and May. Guinea-fowl (Numididae), bustards (Otididae), hornbills (Bucerotidae) and francolins *Francolinus* sp. are found throughout the park, and raptors such as vultures (Accipitridae), fish eagle *Haliaeetus vocifer*, martial eagle *Polemaetus bellicosus*, and Gobar goshawk *Melierax gabar* are also common. The waterbirds most frequently encountered include goose and duck (Anatidae), waders (or shorebirds), ibis (Threskiornithidae), stork (Ciconiidae), heron and egret (Ardeidae). Nile crocodile *Crocodylus niloticus* (V) occurs in the river.

Conservation Management In 1977, 12 waterholes were constructed to attract wildlife and 20 were redug in 1984. Annual burning of grass in the months following the rains has been successful in reducing rank grass, but in the long-term this depletes the desired perennial grasses, which are outcompeted by shrubs. Late dry season fires would enhance perennial grasses which are the basic food of many indigenous large herbivores. There has been development of fire management and park management plans, all carried out by US Peace Corps volunteers assigned to the park.

Zoning None

Disturbances or Deficiencies Poaching, illegal grazing and annual migrations of Fulani cattle, uncontrolled bush fires, fishing, and cultivation within the park still occur. There are proposals for phosphate mining, damming of rivers, and railroad construction within the park.

Visitor Facilities The park road system totals about 470km providing good access for game and bird viewing. Around 1700 visitor permits were sold in 1982. Hotel facilities are being developed in Tapoa village.

Scientific Research Projects include ecology of the African elephant, and vegetation ecology.

Special Scientific Facilities None, apart from a small museum with a nearly complete herbarium and reference library near park headquarters.

Principal Reference Material

- Grettenberger, J.F. (1984). 'W' National Park in Niger. A case for urgent assistance, *Oryx* 18(4): 230-236.
- Koster, S. (1977). *The ecology of Parc National du 'W' du Niger*, M.Sc. Thesis, Michigan State University.

- ° Newby, J. *et al.* (1981). Plan d'aménagement du Parc National du 'W' du Niger. Forêts et Faune, Niamey.
- ° Poché, R. (1973). Niger's threatened park 'W'. *Oryx* 12(2): 216-222 (and other articles by Poché in the *Journal of Applied Ecology*, *Mammalia* and *Journal of Mammalogy*, and a report submitted to IUCN in 1974).

Staff Administered jointly with Tamou, which is staffed by one park conservator, two mid-level foresters and 10 guards at Tapoa. two guards are also stationed at Tamou but in practise, little control is exerted in the reserve.

Budget US\$10,000 shared with the 'Réserve de faune de Tamou'

Local Park or Reserve Administration Le Conservator du Parc National du 'W', S/C Direction des Eaux et Forêts, BP 578, Niamey.

Date April 1985

RESERVE DE FAUNE DE TAMOU

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Total, but many areas of settlement and cultivation persist within the reserve boundaries.

Date Established 8 August 1962, under Decree No. 62-118/MER

Geographical Location About 101km from Niamey, to the immediate north of the Parc National de 'W' and west of the River Niger. 12°30'-12°55'N, 2°10'-2°30'E.

Altitude 206-277m, averaging about 240m

Area 75,600ha; contiguous to the 'W' National Parks which, in total, covers nearly a million hectares in Niger, Burkina Faso and Benin.

Land Tenure Government

Physical Features Like the nearby Parc National de 'W', the reserve is geologically part of a lateritic peneplain which has been deeply incised by rivers. The soils are shallow and infertile laterites on the upland areas, with deeper sandy loams along drainage channels. The Niger River forms part of the eastern border and the Dyamangou River, which is seasonal, flows through a small portion of the reserve on the northern side. Climatically, it is of a Sahelo-Sudanien type with a temperature range of 21°C-36°C and rainfall averaging 600-700mm falling largely between May and September, but very variable.

Vegetation The area is mainly covered by savanna woodland largely created by the practise of shifting cultivation. Three associations can be recognised: 1) *Combretum* shrub savanna, found on dry, shallow soils and dominated by *Combretum nigricans*, *C. micranthum*, *Guiera senegalensis* and *Acacia ataxacantha*, with a grass cover of annual species such as *Loudetia togoensis*, *Ctenium elegans*, and *Andropogon fastigatus*; 2) *Combretum* wooded savanna on deeper soils, dominated by *Combretum nigricans*, *C. glutinosum*, *C. collinum* and *Terminalia avicennioides*, with a grass cover of annuals such as *Hyparrhenia involucrata*, *Diheteropogon hagerupii*, and the perennial *Andropogon gayanus*; 3) and riparian forest along the drainage

channels, dominated by *Vitex chrysocarpa*, *Mitragyna inermis*, *Tamarindus indica*, *Anogeissus leiocarpus*, and *Diospyros mespiliformis*. *Andropogon gayanus* is used for housing and is thus of economic importance. No endemic species.

Fauna This reserve contains some cheetah *Acinonyx jubatus* (T), which are becoming rare. Other dominant species include: African elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, bushbuck *Tragelaphus scriptus*, roan antelope *Hippotragus equinus*, kob *Kobus kob*, reedbuck *Redunca redunca*, hartebeest *Alcelaphus buselaphus*, topi *Damaliscus lunatus*, red fronted gazelle *Gazella rufifrons*, common duiker *Sylvicapra grimmia*, oribi *Ourebia ourebi*, buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, Anubis baboon *Papio anubis*, patas monkey *Erythrocebus patas*, vervet monkey *Cercopithecus aethiops*, side-striped jackal *Canis adustus*, and lion *Panthera leo*. This reserve only covers part of the regular seasonal movements of several of the park species. Among birds recorded are white pelican *Pelecanus onocrotalus*, egrets *Egretta* spp., saddle-bill stork *Ephippiorhynchus senegalensis*, marabou stork *Leptoptilos crumeniferus*, and secretary bird *Sagittarius serpentarius*.

Zoning None

Disturbances or Deficiencies There are still many homesteads and areas of cultivation inside the reserve, with illegal expansion of agriculture, over-grazing, burning, intensive poaching and destruction of woody vegetation. Prospecting for phosphates has also been authorised and was in active progress in 1975.

Visitor Facilities There is a hotel at the nearby parc national de 'W', which borders this reserve, with accommodation for 100 people. Visits to the reserve are limited. At present, there is low touristic potential as the large animal populations are limited to the area bordering 'W'.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Administered jointly with 'W', which is staffed by a park conservator, two mid-level foresters and 10 guards at Tapoa. Two guards are also stationed at Tamou but in practise, little control is exerted in the reserve.

Budget Combined with that of the parc national de 'W'; total US\$10,000

Local Park or Reserve Administration Le Conservateur du Parc National du 'W', S/C Direction des Forêts et de la Faune, BP 578, Niamey.

Date April 1985

RESERVE DE FAUNE DE GADABEDJI

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection No information

Date Established 25 April 1955, by Law No. 3120/S.E. Also a 'forêt classée'

Geographical Location 76km north of Dakoro in Maradi Département. 14°59'-15°21'N, 7°01'-7°19' E.

Altitude 405-478m

Area 76,000ha

Land Tenure Government, with limited public rights

Physical Features The area comprises fixed dunes with intermediate plains between dunes and a drainage system of wadis, run-off channels, pans and temporarily flooded pools. There is no permanent surface water. Wadis include Tafassaoua, Tougoutou and Aza. Major temporary pools are Mecca Rakouma, Altema and Tchigira. Soils are mostly soft to compact sands, with a mud admixture in the depression, and temporarily inundated pools and pans. Mean annual rainfall is 327mm (118-507mm), with the rainy season occurring between May and September, August being the wettest month.

Vegetation North Sahelian wooded steppe and grassland predominates. Grassland species are mostly annuals including *Aristida mutabilis*, *Cenchrus biflorus*, *Brachiaria* spp., with perennials including *Panicum turgidum* and *Chrozophora*. Wooded steppe species include *Balanites aegyptiaca*, *Acacia tortilis*, *A. senegal*, and *Sclerocarya birrea*. Wooded depressions and run-off channels comprise species such as *Bauhinia reticulata*, *Guiera senegalensis*, *Combretum glutinosum*, and *Acacia nilotica*. Grasses and annual forbes are economically important to the region's nomadic population.

Fauna A number of threatened species have been recorded including cheetah *Acinonyx jubatus* (T) (very rare within the reserve, probably not resident), Dorcas gazelle *Gazella dorcas*, and red-fronted gazelle *Gazella rufifrons*. Scimitar-horned oryx *Oryx dammah* (T) and dama gazelle *Gazella dama* (T) are already extinct in this area and giraffe *Giraffa camelopardalis* has disappeared since 1970. Predators include jackal *Canis aureus*, striped hyena *Hyaena hyaena* (very rare within the park, probably not resident), and sand fox *Vulpes pallida*. Patas monkey *Erythrocebus patas* is also present. Smaller more common species include honey badger *Mellivora capensis*, zorilla *Ichonyx striatus*, and aardvark *Orycteropus afer*. Bustards, especially Saville's pygmy bustard *Lophotis ruficrista* and white-bellied bustard *E. senegalensis*, are not uncommon. The ostrich *Struthio camelus* totally disappeared from the reserve about 1972-1973, but is now returning in small numbers.

Zoning None

Disturbances or Deficiencies There is poaching and intensive livestock rearing. Both activities are not only specifically forbidden within the reserve in accordance with its decree, but the former is also banned nationally. Some cutting of large trees for livestock browsing and also local consumption of wood products is evident. Lack of funds and manpower make permanent or effective control of the reserve impossible.

Visitor Facilities There are no visitors or facilities and the reserve is currently closed to the public. It has a very small potential for tourism until wildlife is reconstituted.

Scientific Research A programme of ecological monitoring was initiated in 1981 (IUCN/WWF Project 1624).

Special Scientific Facilities None

Principal Reference Material

- ° Avant-Projet de Classement - drawn up 30 September 1954.
- ° IUCN/WWF Project 1624. Niger, Addax and Oryx.
- ° Rapport de Mission Eaux et Forêts - August, 1979.

Staff None specifically employed within the reserve, but some surveillance and repression.

Budget None

Local Park or Reserve Administration Station des Eaux et Forêts at Dakoro

Date April 1985

RESERVE NATURELLE NATIONALE DE L'AIR ET DU TENERE

Management Category Proposed as a IV (Managed Nature Reserve) with core of I (Strict Nature Reserve)

Biogeographical Province 2.18.07 (Sahara)

Legal Protection None yet

Date Established Legislation is being prepared

Geographical Location In the Air Mountains. The town of Iferouane lies on the on western boundary. Approximately centred at 18°40'N, 8°30'E.

Altitude 1,998m maximum

Area 7,736,000ha (6.1% of Niger)

Land Tenure To be Government with some public rights retained

Physical Features The area can be described as a Sahelian oasis within a Saharan environment. It is predominantly desert (65%) with mountains (20%) and basins (15%) and great habitat diversity. Geographically, the desert corresponds to the western part of the ergs of Fachi-Bilma and of Ténéré. These are fixed and moving sand dunes, and 'regs', extensive flat areas of sand, gravel or stones often devoid of vegetation, surround the ergs. The mountainous regions include nine massifs and 13 large rocky areas. Three important water basins, Zagado, Tafidet and Zilalet, comprise wadis and seasonally dried up water courses. There are also several other large wadis and temporary which are important to the ecology of the area. The desert climate with a tropical influence is characterised by hot and cold seasons and one rainy season from July to September. Rainfall is highly unpredictable and may only be a few millimetres, but because of intensive run-off, it is equivalent to a much higher precipitation. The mountain ranges affect the amount and abundance of rain locally. Temperatures range from -1°C to 50°C at Iferouane.

Vegetation The vegetation is predominantly Sahelian with several areas typical of the Sahara and some relict Sudanese enclaves. The Sahel element is found around the wetter areas, such as wadis and temporary pans. The principal species are *Balanites aegyptiaca*, *Salvadora persica*, *Ziziphus spina-christi*, and *Acacia laeta*. *A. albida* was once widespread according to the nomads of the area, but its distribution has been reduced largely through degradation by man. The grasses *Panicum laetum*, *Eragrostis pilosa*, *Cenchrus biflorus*, *Dactyloctenium aegyptium* and *Pennisetum violaceum* occur. In the drier Sahel-Saharan transition zone, species include *Panicum turgidum*, *Lasiurus hirsutus*, *Aerva javanica*, and the trees *Maerua crassifolia*, and *Leptadenia pyrotechnica*. The Saharan element has trees typical of a sand habitat, such as *Acacia tortilis*. On the stony, clay soils, this is replaced by *A. ehrenbergiana*. Elsewhere on the sand the vegetation is very scattered with *Fagonia bruguieri*, *Zygophyllum simplex*, *Cornulaca monacantha*, and the herbs *Stipagrostis vulnerans* and *S. plumosa*. A particularly

important plant for the fauna is *Schouwia thebaica* which has green and fleshy leaves at the end of the cold season. On the sands of Ténéré, the annual plants comprise an ephemeral pasture. The relict Sudanese element is found in sheltered, wetter areas such as beds of wadis and ravines of mountains above 1,000m. Species include *Grewia tenax*, *G. villosa* and *Cordia sinensis*. Species of North African origin are the wild olive *Olea laperrinei* (above 1,500 on scree slopes of the Tamgak and Gréboun massifs), *Rhus tripartita* (on the Sahara massifs), and *Salvia aegyptiaca* (in the beds of wadis).

Fauna This region is the last stronghold of Sahelo-Saharan wildlife in Niger. Of particular concern are the addax *Addax nasomaculatus* (T) and oryx *Oryx dammah* (T). Addax rarely visit the reserve now; other areas where it may occur are Chad, Mali and Mauritania. The Barbary sheep *Ammotragus lervia* (T) occurs on the mountains. Other threatened species include the slender-horned gazelle *Gazella leptoceros* (T), dama gazelle *Gazella dama*, dorcas gazelle *Gazella dorcas* and cheetah *Acinonyx jubatus*. Other predators are the caracal *Felis caracal*, striped hyena *Hyaena hyaena*, golden jackal *Canis aureus* (probably the commonest of the scavengers), and small foxes such as Ruppell's sand fox *Vulpes ruppelli*, and fennec *Fennecus zerda*. The sand cat *Felis margarita* also occurs. Ostrich *Struthio camelus* are well represented although severely threatened by poaching in all other areas of the Sahel.

Population The people within the region are virtually all Tuaregs, (of Berber origin) and there are approximately 2,500 within the reserve. They are semi-nomadic pastoralists raising camels and goats. The caravans between the Air Mountains and the oases to the east, across the Ténéré Desert, used to be very important but this caravan trade is now disappearing through competition with motorised transport. The Tuaregs recognise certain trees for their fruit-bearing potential - for example *Acacia albida* and *A. tortilis* - and they are specially protected. There is a respect for certain animals, such as the ostrich which are not hunted. Unfortunately, the influx of people from different areas are breaking the traditions. Several generations ago a highly revered religious leader of one of the Sherifan tribes pronounced that no-one should cut trees, harm gazelles or kill ostriches. As a result a wadi area has been protected by this edict. There is an abundance of palaeolithic and neolithic remains as well as recent historical and cultural remains.

Conservation Management With technical and financial assistance from IUCN/WWF Project 1624, the Government of Niger is planning the establishment of this area to help conserve endangered large mammals of the Sahelo-Saharan region, particularly the addax, scimitar-horned oryx, barbary sheep and species of gazelle. The Government aims to maintain traditional forms of land use, and plans are to include the local population in the management of the area and also in planning policies. The project's long term objective is to rehabilitate the arid land fauna and flora to provide adequate living conditions to the local people and nomads. The field trips associated with the development of the reserve and subsequent analysis of data, have provided technicians from Niger with valuable training in ecological survey, practical conservation and game management.

Zoning Zoning needs to be flexible to allow for scope in management as factors such as resource abundance and local imperatives change. A 1,280,500ha Strict Nature Reserve core zone is planned.

Disturbances or Deficiencies Hunting is traditional and has no major impact on the area. The biggest problem is the conservation of the vegetation in the face of pressure from nomads. The combination of drought in the late 1960s, 1970s and early 1980s and over-utilization of *Acacia* trees by browsing livestock of the nomads, has degraded the area. Exploitation tends to be intensive, mainly by camels, goats and sheep. Traditional hunters take a few Barbary sheep every year but their impact on the population is probably negligible. Cheetah are hunted because they are accused of stock damage. Strychnine is used to kill jackals and hyenas, and other animals are therefore killed as well. The Wildlife Department in Niger has recently issued a strong statement on the use of strychnine, reiterating that its use is illegal without authorisation from the wildlife authority and other authorities concerned with natural resources.

Visitor Facilities Good potential for tourism but this could pose a major threat to wildlife from harassment and hunting.

Scientific Research The area is the focus for IUCN/WWF Project 1624. Between 1980 and 1982, WWF and the Government of Niger initiated a regular programme of ecological monitoring and wild life census. During 1982, fieldwork produced vital information on gazelle and Barbary sheep populations and the first sightings of the extremely rare slender-horned gazelle.

Special Scientific Facilities Small laboratory

Principal Reference Material

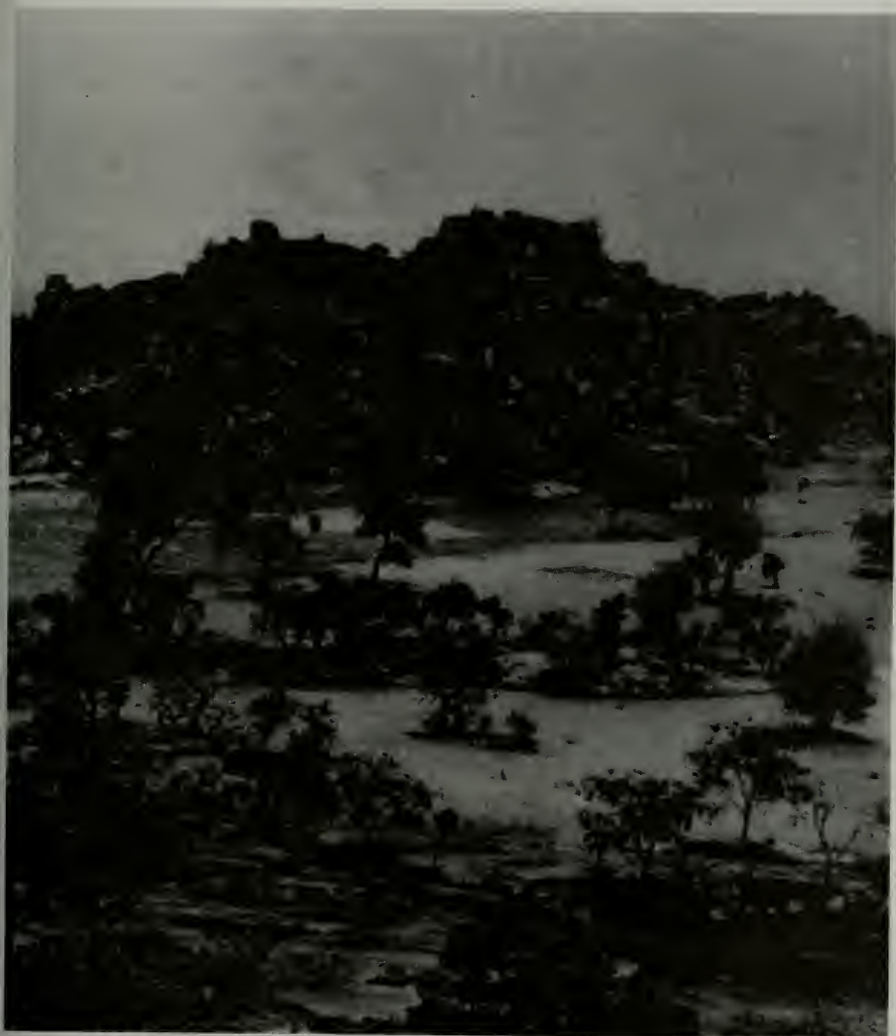
- ° IUCN/WWF Project 1624. Niger, Addax and Oryx.
- ° Newby, J. (1984). A Desert Reserve for Niger. *WWF Monthly Report* October 1984. Pp. 263-267.
- ° Newby, J. (1982). Avant-Projet de Classement d'une Aire Protégée dans L'Air et Le Ténéré (Republique du Niger). IUCN, Gland, Switzerland.

Staff Director, five foresters, three drivers, one guide, one mechanics, and two Peace Corps biologists

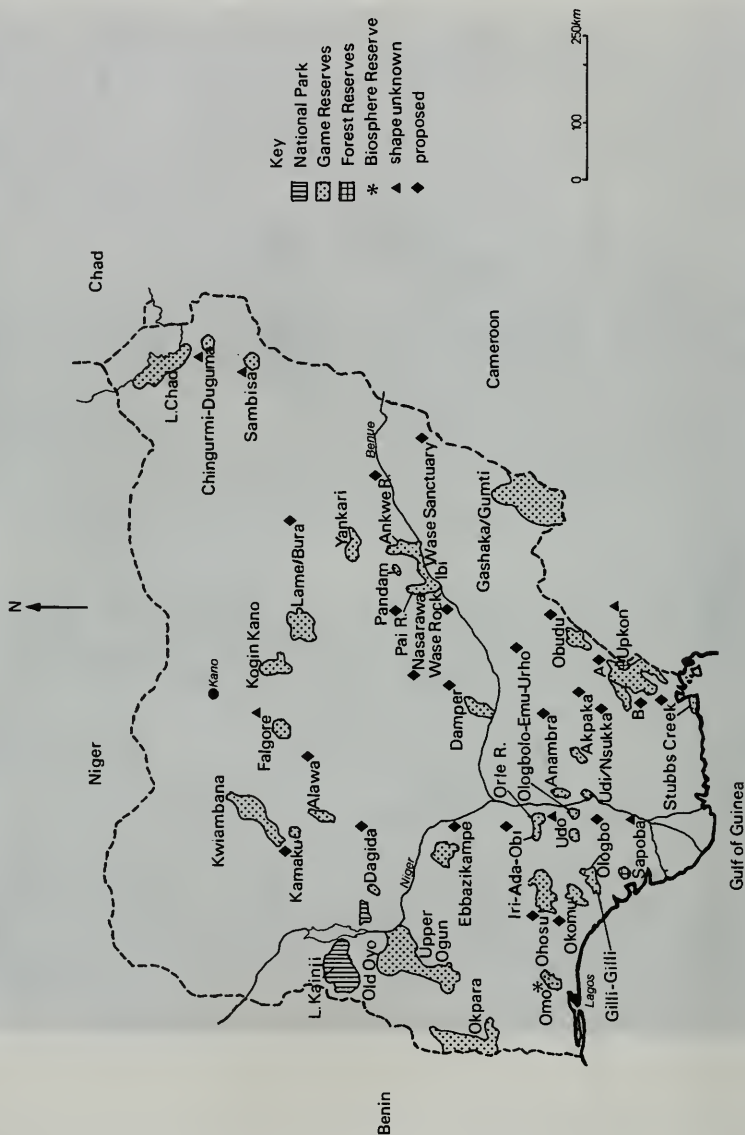
Budget US\$368,000 from 1982-1985 under WWF Project 1642

Local Park or Reserve Administration IUCN/WWF Field Headquarters at Iferouane

Date April 1985



Nigeria



NIGERIA

Area 923,769 sq.km

Population 82,390,000 estimated in 1983. There is considerable uncertainty over the total population size due to political and logistic difficulties involved in the organization of a census. One estimate based on electoral registration in 1978 is 95,000,000.

Parks and Reserves Legislation The idea of protecting wildlife began with the creation of Nigeria, soon after the amalgamation of northern and southern parts of country in 1914. Regional game laws were enacted, initially by Eastern Nigeria in 1916 and later by the Western and Northern regions in 1928 and 1963, respectively. The conservation and protection of wildlife is still governed by these three game laws and their several modifications which emerged with the creation of states in 1967 and 1976. Each law has territorial coverage: the 1916 law is used in the eastern states (Anambra, Cross River Imo and Rivers States), the 1928 law in the western states (Bendel, Lagos, Ogun, Ondo and Oyo States), and the 1963 law in the northern states (Bauchi, Benue, Borno, Gongola, Kaduna, Kano, Kwara, Niger Plateau and Sokoto States). Due to the abundance of wildlife at the time of their enactment, the emphasis of the three game laws was on the preservation of wildlife for the benefit of future generations without any reference to utilization for particular purposes. Thus, hunting for sport purposes became conveniently included in the rather amorphous national wildlife policy. With the creation of Yankari Game Reserve in 1956 and Borgu Game Reserve in 1962, recreation and tourism were accommodated within the national policy. Later, in 1967, the national policy was further enlarged to include conservation for meat production, based on claims that shortage of animal protein was the main cause of indiscriminate hunting in protected areas (Tuna Wildlife Consultants Company, 1983). An attempt was made in 1973 to unify the legislation into a more comprehensive national wildlife conservation law. Titled 'National Fauna Conservation Law', the draft spent a long time undergoing legal processing and is now being replaced by the Endangered Species (Control of International Traffic and Trade) Decree. This may be enacted in 1985, as it awaits only the consent of the Supreme Military Council. The creation of the Kainji Lake National Park in 1976 marked the first major attempt at managing wildlife for recreation purposes in Nigeria. There are two other types of protected area, strict natural reserves and game reserves. Hunting is not permitted in game reserves, which are described as areas to be set aside for the conservation, management and propagation of wild animal life and the protection and management of its habitat. Strict natural reserves, which are set aside for the protection of natural vegetation, have no legal status to distinguish them from forest or game reserves. The laws under which individual forest reserves are established usually designate restrictions on hunting and fishing with rights given only to residents of particular villages and their descendants. Forest reserves cover over 10% of the country.

Parks and Reserves Administration Traditionally, wildlife administration has been the responsibility of the Department of Forestry in the Ministry of Agriculture at federal and state government levels. The Federal Department of Forestry is in charge of wildlife development and extension including the creation of national parks. National parks are created with the agreement of the National Wildlife Conservation Committee (NWCC), which was formed in 1967 and is still an appendage of the National Forestry Development Committee. Kainji Lake National Park is a parastatal of the Federal Department of Forestry in the Federal Ministry of Agriculture. The NWCC represents the coordinating body for all matters pertaining to policies on wildlife management at the national level. The functions of NWCC are: to formulate policies for wildlife matters in Nigeria; to maintain standards and coordinate development programmes for reserves and parks; to develop an effective wildlife conservation law; to publicise wildlife activities and mobilise public opinion in favour of wildlife management; to serve as a clearing house for the creation of game reserves (by considering proposals from the state departments of forestry); and to create national parks where appropriate, based on recommendations from the Federal Department of Forestry. Also at federal level, the Forestry Research Institute of Nigeria is responsible for wildlife research and training even though the Kainji Lake Research Institute, with its effective component of wildlife staff, its facilities, and its past achievements, is gradually taking on more of this role. At state level, the forestry

departments in the Ministries of Agriculture are responsible for the management of game reserves, and also for the transfer of forest reserves into game reserves after formal approval by the NWCC. Reserve management often emphasises participation of the local community in conservation programmes, providing employment within the reserves for local people if possible. The establishment of an autonomous 'Board of Trustees of National Parks' that would oversee the planning and administration of all parks in the country has been recommended (Tuna Wildlife Consultants Company, 1983).

Address

- ° Federal Department of Forestry, Federal Ministry of Agriculture, P.M.B. 12613, 6 Jieh Village, Obalende, Lagos

Additional Information Under the London Convention of 1933, Nigeria made a pledge to conserve her nature and natural resources. By mid 1950, Nigeria's premier game reserve, Yankari, had come into existence, since when other game reserves have been set up and many more are still being proposed. In the absence of a unified national wildlife policy, some of these have gone into oblivion (Afolayan, 1980; Ebin, 1983). Nevertheless, rapid changes have occurred in Nigerian wildlife conservation in the last decade (Afolayan and Ajayi, 1983). Apart from a considerable increase in the number of protected areas, the Wildlife Research Division of the Federal Forestry Research Institute of Nigeria (FRIN) was created to handle research and training and has established a school at New Bussa which provides training in wildlife management. The Department of Wildlife and Fisheries Management has been created at the University of Ibadan. It offers undergraduate and postgraduate training in the two disciplines. Wildlife ecology and management is also taught in the Department of Forest Resources Management at the University of Ibadan, and several officers have been trained overseas. Important research programmes have been completed and some states are introducing new legislation in an attempt to control hunting. Although there have been advances in nature conservation for Nigeria in the savanna biome, little has been done in the last 20 years for the wildlife in the southern rainforest zone where the majority of the animal species occur. Many 'protected' areas are being degraded by excessive logging, farming, grazing and road-building (Anadu and Oates, 1982; Afolayan and Ajayi, 1983). The pressure of hunting is very high and only a few reserves contain a reasonable species diversity. Species of particular concern include elephant, leopard and chimpanzee.

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Protected Areas

	(hectares)
<i>National Parks</i>	
Kainji Lake	534,082
<i>Strict Nature Reserves</i>	
Omo	460
<i>Game Reserves</i>	
Akpaka	
Alawa	29,620
Ankwe River	
Dagida	29,422
Falgore (Kogin Kano)	92,000
Game Reserve A	
Game Reserve B	
Gilli-Gilli	36,200
Hadejia (Baturiya) Wetlands	29,700
Ibi	
Iri-Ada-Obi	
Kambari	41,400
Kashimbila	189,600
Kwale	1,340
Kwiambana	261,400
Lame/Burra	205,967
Ohosu	47,100
Ologbo	19,440
Orle River	5,440
Pai River	
Sambisa	68,600
Udi/Nsukka	5,600
Upper Ogun/Old Oyo	110,000
Yankari	224,000
Subtotal	1,396,829
<i>Game Sanctuaries</i>	
Wase	115,300
<i>Reserves</i>	
Margadu-Kabak Wetland	10,000
Nguru/Adiani Wetland	7,500
Subtotal	17,500
<i>Sanctuaries</i>	
Bedde	35,400
Wase Rock Bird	924
Subtotal	36,324
<i>Wildlife Parks</i>	
Jos	800
Pandam	22,400
Subtotal	23,200

IUCN Directory of Afrotropical Protected Areas

Forest Reserves

Milliken Hill	
Oban	64
Opara GR	110,000
Sapoba	49,200
Upkon	
Subtotal	159,264

Game Complexes

Udo	5,400
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Biosphere Reserves

Omo Strict Natural Reserve	460
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Proposed areas

Anambra Game Reserve	
Chingurmi/Duguma Game Reserve	35,400
Damper Sanctuary Game Reserve	
Ebba/Kampe Game Reserve	11,730
Gashaka/Gumti Game Reserve	636,300
Kamuku Game Reserve	120,000
Meko Game Reserve	96,610
Nasarawa/Bakono Game Reserve	190,000
Num River Game Reserve	9,720
Obudu (Boshi/Okongwo) Game Reserve	72,000
Okeleuse Game Reserve	11,440
Okomu Game Reserve	123,800
Opanda Game Reserve	10,520
Stubbs Greek Game Reserve	
Lake Chad Game Reserve	36,800
Ikwe Wildlife Park	5,000
Ifon Game Reserve	28,230
Subtotal	1,387,550

KAINJI LAKE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Protection of flora and fauna through Kainji Lake National Park Act No. 46 of 1979.

Date Established Established as Kainji Lake National Park in 1975, with the amalgamation of Borgu and Zugurma Game Reserves. The western sector of Borgu Game Reserve was established as a 'Native Authority Forest Reserve' under Section 22 of the Forest Law in 1961 (Legal Notice No. 97) and 1966 (Legal Notice No. 39). Zugurma Reserve was demarcated in 1964 and officially gazetted in 1971. The decree of 1979 empowers the park to acquire another 374,272ha of land in Wawa, Kaiama, Babaua, Yashikira and Bussa districts of the Borgu sector and 137,080ha in the Zugurma sector.

Geographical Location The park is situated 506km north of Lagos. The Zugurma sector is situated in the Mariga local government area of Niger State, 55km south-east of Borgu. It is bordered by the Kontagora River to the north-west and the Manyara River to the north. The

Borgu sector is situated in the Borgu and Baruten local government areas of Kwara State. It is bordered on the east by Kainji Lake and is less than 10km from the border with the Republic of Benin on the west. 9°40'-10°30'N, 3°30'-5°50'E.

Altitude 100-339m

Area 534,082ha, comprising two sections, Zugurma (138,500ha) and Borgu (397,002ha) and part of Lake Kainji.

Land Tenure State

Physical Features The park includes a central area of the impounded Lake Kainji on the Niger River, the eastern lakeshore forming the boundary. Kainji Dam was constructed in 1968 and the lake filled by 1972. The two sectors of the park are drained by separate systems. The western and southern areas of the Borgu sector are drained by the Oli River, the largest river in the park, while the east is drained into the Kainji Lake by four small rivers, the Doro, Timo, Menai, and Sadoro. There are permanent waterholes throughout the dry season although no watercourses flow (there are at least six waterholes along the Oli River which support hippopotamus populations). The Zugurma sector is poorly drained and the Manyara River has no tributaries within the sector. Other rivers, such as the Yampere and Lanser, are seasonal and flow from north to south. The central portion has no water supply, except for a few wet season pools. The topography of the Borgu sector is gently undulating with a broken relief of quartzite ridges, rising from underlying gneissose or metasedimentary terrain. The Zugurma sector consists of a low plateau with gradually sloping sides forming an east to west watershed. The region is largely underlain by metamorphic rocks of the Basement Complex (granites, phyllites, schists and quartzites) of Pre-Cambrian to early Palaeozoic age. The most important recent geological feature of the Borgu sector is ironstone (plinthite) pans, which are exposed or close to the surface. Soils are ferruginous tropical soils and crystalline acid rocks. Soil depth is generally shallow, ranging from zero to about 140m in depth. The upland soils are sandy loams to sandy-clay loams and often have a high gravel content. The clay fraction is kaolinite, although monmorillonite also occurs. Soil pH is slightly acid to neutral. The Zugurma sector is covered by sandstone derived loam. The soil is moderately deep and fertile but overgrazing has rendered most areas infertile and there is erosion in most parts. There is a savanna climate with rainy season from May to November, and dry season from December to April. Temperature ranges from 15°C during the height of the harmattan (Dec-Jan) to 37°C. Mean annual relative humidity is 53%. The mean annual rainfall of the Borgu sector is 1100mm, and of the Zugurma sector, 1167mm.

Vegetation The vegetation is transitional between the Sudan and Northern Guinea savanna zones. Principal vegetation types in the Borgu sector are: (1) *Burkea africana* - *Detarium microcarpum* wooded savanna. This is by far the most common vegetation type and can be divided into five units: *Burkea africana* - *Terminalia avicennioides* savanna woodland; *Detarium microcarpum* savanna woodland; *Azelia* savanna woodland; *Acacia* variant (links the *Burkea africana* - *Terminalia avicennioides* with *Acacia* savanna); and *Maytenus* - *Gardenia* shrub (never very extensive). (2) *Isobrerlinia tomentosa* woodland. This is typical of slopes below the quartzite ridges on well drained soils with high clay content. (3) *Diospyros mespiliformis* dry forest. This occurs on upland slopes with an understorey of *Polysphaeria orbicula*. Both species form practically pure canopies. The grass *Optismenus hirtellus* occurs in this unit. (4) *Terminalia macroptera* tree savanna. This occurs in moist savannas near the forest zones on clay soils. Widely scattered *Terminalia macroptera* grows in a grassland with abundant *Hyparrhenia rufa* and *Hyparrhenia smithiana*. (5) *Isobrerlinia doka* savanna woodland. This occurs on upland areas and is typical of ironstone regions. (6) *Monotes kerstingii* woodland. This is typical of deep soil with ironstone gravel. The vegetation in the Zugurma sector is typically that of Guinea savanna woodland, but it has been badly over-grazed except for the riparian forests along the Manyara River and other water holes. Common tree species are *Azelia africana*, *Daniella oliveri*, *Pterocapus erinaceus*, *Terminalia glaucescens*, *Parkia clappertoniana*, *Butyrospermum paradoxum*, *Detarium microcarpum*, *Isobrerlinia doka*, *Uapaca togoensis*, and *Khaya senegalensis*. The dominant grass species are *Andropogon* and *Hyparrhenia*. There are four distinct vegetation types: *Pterocapus* - *Detarium* woodland, *Terminalia* - *Monotes/Isobrerlinia* woodland, *Azelia* - *Daniella* woodland

and *Acacia* savanna woodland. An annotated list of plants in the park is given in Tuna Wildlife Consultants Company (1983).

Fauna The fauna is typical of Sudan - Guinea savanna woodland. Sixty-five mammal species, 350 bird species, and 30 amphibia and reptile species have been recorded. In the Borgu sector, mammals include lion *Panthera leo*, leopard *Panthera pardus* (T), caracal *Felis caracal*, elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, hartebeest *Alcelaphus buselaphus*, kob *Kobus kob*, roan antelope *Hippotragus equinus*, red-flanked duiker *Cephalophus rufilatus* (appears to be decreasing), common duiker *Sylvicapra grimmia*, reedbuck *Redunca redunca*, waterbuck *Kobus ellipsiprymnus*, bushbuck *Tragelaphus scriptus*, warthog *Phacochoerus aethiopicus*, oribi *Ourebia ourebi*, giant pangolin *Manis gigantea*, hippopotamus *Hippopotamus amphibius*, wildcat *Felis silvestris*, hunting dog *Lycaon pictus* (T), honey badger *Mellivora capensis*, clawless otter *Aonyx capensis*, olive baboon *Papio anubis*, green monkey *Cercopithecus aethiops*, patas monkey *Erythrocebus patas*, Senegal bushbaby *Galago senegalensis*, armadillo *Orycteropus afer*, and manatee *Trichechus senegalensis* (T). Cheetah *Acinonyx jubatus* (V) has recently been recorded. Reptiles include: Nile crocodile *Crocodylus niloticus* (V), slender snouted crocodile *Crocodylus cataphractus* (I), rock python *Python sebae* and royal python *Python regius*, spitting cobra *Naja nigricollis* and black cobra *Naja melanoleuca*, puff adder *Bitis arietans*, gaboon viper *Bitis gabonica*, monitor lizard *Varanus niloticus* and *Varanus exanthematicus*, and terrapin *Pelomedusa subrufa* and *Pelusios adansonii*. Wildlife numbers are much lower in the Zugurma sector due to poor drainage, deteriorating vegetation, heavy poaching and extensive cattle grazing. The Kainji Lake has a diverse fish fauna. There are 82 known species belonging to 18 families. The most important families in order are Mochodridae, Mormyridae, Characidae, Citharimideae, Cyprinidae, Cichlidae, Polypteridae, Clariidae, and Schilbeidae. Some species are particularly adapted to swamps and not taken frequently elsewhere. These include *Gymnarchus niloticus*, *Clupisudus niloticus*, *Hepsetus odoe*, *Heterobranchus bidorsalis*, *Clarias lazera*, and *Poaphice-phalus obscuris*. There are also many fish in the Ole River. Checklists of mammals, birds, reptiles and fish from the Borgu sector are given in Tuna Wildlife Consultants Company (1983).

Population The principle tribes in the Borgu area are the Bussawa and the Borgawa, though there exist other important groups, notably the Kamberi, Fulani and Hausa to the north, the Nupe to the east and the Yoruba to the south. The Nupes (hunters) are the major tribe in the Zugurma area. Other important groups are the Kambaris (also hunters) and the Hausas (migrant farmers). The Fulanis, though nomadic, are very common within the park. Population density in the Borgu area is less than five people per square kilometer. The creation of the Kainji Dam and the consequent development of resettlement towns has led to a considerable increase in human population within this area. The Zugurma sector has a much higher population and the interaction of the inhabitants and the park is actually more intense than in the Borgu sector.

Conservation Management There is a management plan for the area (Tuna Wildlife Consultants Company 1983). Recommendations include the development of park infrastructure for effective management and provision of tourist access; the development of a controlled burning programme (including total protection of the *Terminalia macroptera* vegetation for the dry season grazing by kobs); the construction of water holes; the development of an effective anti-poaching campaign (including the recruitment and involvement of the local people); the construction of staff housing, patrol posts, hides and guest accommodation; and the development of recreational facilities (boating, swimming, fishing etc.). The management plan also recommends the development and management on a sustainable basis of fish and cultural resources. There are several agencies based in the Kainji Lake Basin area, the National Electricity Power Authority (NEPA), Niger River Basin Development Authority (NRBDA), Kainji Lake Research Institute (KLRI) and indirectly the Borgu Local Government Council (through local farmers and pastoralists). The Kainji Lake Research Institute is currently monitoring the cattle population and its environmental consequences.

Zoning Eight management units are proposed for the park, six in the Borgu sector and two in the Zugurma sector. Unit 1 would be a strict nature reserve for scientific purposes. Unit 2

would be for teaching and research purposes, Units 3 to 5 would be for game viewing, and Unit 6 would contain the tourist lodge and lakeshore recreational activities. Units 7 and 8 in the Zugurma section would be reserved for game viewing (Tuna Wildlife Consultants Company 1983).

Disturbances or Deficiencies Illegal grazing, with tree lopping during the dry season to feed stock, is the major problem facing conservation in the Zugurma section. Fulani cattle are the major offenders and there at least seven permanent cattle routes within the Zugurma section, which suffer from trampling and erosion. There is uncontrolled dry season burning to provide better cattle pasture. Wild animals are sometimes killed to protect cattle. Fruits of wild plants (*Parkia clappertoniana*, *Butyrospermum paradoxum* and *Cola acuminata*) are harvested, and baobab *Adansonia digitata* is debarked to make rope. Thatching grass and raffia poles are cut for house construction, and villages are encroaching on the park boundaries. Grazing is less prevalent in the Borgu sector, but the increasing pressure upon the Fulani to settle and regionalise their cattle industry will inevitably lead to an increased sedentary cattle population around Lake Kainji. Heavy poaching still continues in the Zugurma sector despite frequent arrests and fines imposed by park patrols. The Borgu sector also has hunting problems, but on a lower key. Historically, the people of Borgu are traditional hunters and have an insignificant effect on wildlife. Sophisticated leisure hunting is a major threat to the park. There is a lot of farming in the Zugurma sector (mainly cereals and root crops), and there are some signs of recent cultivation in isolated areas on the south, west and north-east margins of the Borgu section. There are some temporary fishing villages on the lakeshore and the lake is reported to be overfished. There are currently 4,867 professional fishermen and 3,331 fishing boats on the lake (Tuna Wildlife Consultants Company, 1983). DDT is used to kill black fly *Simulium* sp. (a cause of river blindness) in the Oli River. This has adverse effects on fish and possibly some ungulates.

Visitor Facilities There were about 5,000 visitors in 1980. Accommodation is available at Oli River Lodge in the centre of the Borgu sector and at designated campsites. Major tourist attractions are the Old Mahale settlement and well, the Kali Hill Shrine and the Tunga Maikade settlement. Other landmarks include the Tukuna Dry Valley, the Zugurma settlement and Hippo Pools.

Scientific Research While the Borgu sector has been extensively studied, the Zugurma sector has received virtually no research attention. Monitoring research programmes on vegetation, fire and wildlife populations are recommended by the management plan.

Special Scientific Facilities The Kainji Lake Research Institute is situated at New Bussa.

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Staff Three senior officers, 50 game protection staff, 20 drivers, and 10 support staff

Budget US\$15,000 annual income from tourism (Afolayan, 1980)

Local Park or Reserve Administration Controller, Wawa, Near New Bussa

Date 1984

OMO STRICT NATURAL RESERVE

Management Category I and IX (Strict Nature Reserve and Biosphere Reserve)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Protection against all forms of exploitation is provided under the Forest Reserves Act.

Date Established Established as a strict natural reserve in 1949. Approved as a Biosphere Reserve in January 1977.

Geographical Location North of Oshokum, 4km from Etemi village in the Ijebu-west Division of Ogun State. The strict nature reserve lies within Omo Forest Reserve. 6°30'N, 4°15'E.

Altitude 100m

Area 460ha (strict natural reserve)

Land Tenure State

Physical Features The land is highest in the west and slopes gently towards the south and east, becoming fairly flat on the banks of the Omo River. The geological strata consist of crystalline rocks of undifferentiated basement complex. Soil is heavy clay formed from weathered granite, except where thick alluvium has been laid down by the river on its banks. There are many small streams, which fill with water during the rainy season, but are dry in the dry season. The mean annual rainfall is 2030mm.

Vegetation The reserve lies in the moist lowland evergreen forest zone. The forest is mainly open with common species including: *Diospyros* spp., *Strombosia pustulata*, *Scottellia coriacea*, *Octolobus angustatus*, *Corynanthes pachyceras*, *Canthium vulgare*, *Terminalia superba*, *Hunteria umbellata*, *Xylopia aethiopica*, *Ficus* spp., *Funtumia elastica*, *Drypetes* spp., *Cola* spp.,

and *Khaya ivorensis*. *Sterculia rhinopetala* is locally abundant. Most of the western area is broken forest. There are several *Uvaria* spp. tangles with isolated trees, usually *Terminalia superba* *Nauclea diderrichii*, *Strombosia pustulata*, *Canthium vulgare*, *Cordia millenii* and *Funtumia elastica*, rising above the general level. Areas of good, high forest include: *Nauclea diderrichii*, *Brachystegia nigerica*, *Scottellia coriacea*, *Khaya ivorensis*, *Canthium vulgare*, and *Strombosia pustulata*. Where light penetrates, clumps of seedlings occur. Common regenerating species are *Drypetes* spp., *Cola* spp., *Sterculia rhinopetala*, *Buchholzia coriacea*, *Octolobos* spp., *Brachystegia nigerica*, *Guibourtia ehie*, *Musanga* spp., and *Diospyros* spp.. *Anthonotha macrophylla*, *Grewia coriacea*, and *Spondianthus prussii* are common in the marshy areas.

Fauna Common mammals include elephant *Loxodonta africana* (T), duikers *Cephalophus* spp, antelopes and warthog *Phacochoerus aethiopicus*. The red-bellied monkey *Cercopithecus erythrogaster* is also present.

Population No information

Conservation Management The core area is still largely undisturbed. Very little is known about the past history of the area, but an old hauling road from Etemi to Etemi Odo indicates former exploitation.

Zoning Central core (strict natural reserve) surrounded by buffer zone (forest reserve).

Disturbances or Deficiencies There is a settlement of about 10 people 30km from the reserve. Traces of carbide powder used by hunters can usually be found within the buffer zones and along the reserve boundaries. The new main road from Shagamu to Benin (A121) passes through the forest reserve. *Gmelina* spp. plantations are replacing rain forest in the forest reserve which threatens the effectiveness of the strict natural reserve.

Scientific Research The Forestry Research Institute of Nigeria have carried out a biological inventory in the area and visiting scientists from overseas have studied the ecology. MAB Projects 1 and 2 include productivity and regeneration studies.

Special Scientific Facilities No information

Principal Reference Material

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- ° Urban, E.K. and Brown, L.H. (1968). Wildlife in an Ethiopian valley. *Oryx* 1: 342-353.

Staff Five assigned to maintenance and two to research

Budget No information

Local Park or Reserve Administration The Director, Forestry Research Institute of Nigeria, PMB 5054, Ibadan.

Date 1981

FALGORE (KOGIN KANO) GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial

Date Established Gazetted as Falgore Game Reserve in 1969. Originally established as Kogin Kano Forest Reserve (261,000ha) in 1948.

Geographical Location Situated in Kano State and bounded in the north by the Tiga and Sumaila districts, in the west by Kaduna State, in the east by Bauchi State, and in the south by Tagwaye, Malamawasa, and Maikwandira villages. 11°-11°20'N, 8°33'-8°45'E.

Altitude No information

Area 92,000ha

Land Tenure State

Physical Features A small part of the northern sector has been flooded as a result of the Tiga Dam. The reserve is bisected into two barely equal halves by Kano River. It is well drained by streams such as the Maiwa, Kumbo, Maitunku, Murgu, Randa, and Maigungume, all of which drain into Kano River. Zarara, Maiwa, Falgore, Huzu and Katini are rock inselbergs.

Vegetation Open savanna woodland with trees 9-14m in height.

Fauna Large mammals include: lion *Panthera leo*, leopard *Panthera pardus* (T), serval *Felis serval*, spotted hyaena *Crocuta crocuta*, jackal *Canis* sp., patas monkey *Erythrocebus patas*, green monkey *Cercopithecus aethiops*, baboon *Papio anubis*, bushbaby *Galago* sp., red-flanked duiker *Cephalophus rufilatus*, red-fronted gazelle *Gazella rufifrons*, roan antelope *Hippotragus equinus*, bushbuck *Tragelaphus scriptus*, hartebeest *Alcelaphus buselaphus*, buffalo *Syncerus caffer*, oribi *Ourebia ourebi*, and warthog *Phacochoerus aethiopicus*.

Conservation Management Protects much of the catchment area of Tiga Dam, which provides the water supply for Kano and a major irrigation project mid-way between the city and the dam.

Zoning None

Disturbances or Deficiencies There is some poaching and illegal grazing by nomadic Fulani herdsmen and, uncontrolled fire, but the reserve is well protected. The vegetation was considered still to be in very good condition in March 1985, despite the current drought conditions.

Visitor Facilities Tours operate from Kano, particularly at weekends. Visitor accommodation is provided near the reserve. The reserve is easily accessible from the Kano-Jos road. A network of internal access roads is under development.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Dugan, P. (1985). Mission to Nigeria. IUCN, Gland. Unpublished report. 11 pp.
- ° Ebin, C.O. (1983). An appraisal of the biotic and material resources of some Game Reserves and Wildlife Management in Nigeria. Nigerian Conservation Foundation, Lagos.

Staff One Head and one assistant conservator. Some 60 game guards are based at a number of guard posts distributed around the periphery of the reserve.

Budget No information

Local Park or Reserve Administration No information

Date No information

HADEJIA (BATURIYA) WETLANDS GAME RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection No information

Date Established Proposed as a game reserve in 1976 and gazetted in 1985.

Geographical Location North-east sector of the Katagum River in Kano State

Altitude No information

Area 29,700ha

Land Tenure State

Physical Features The reserve comprises an area of floodplain of the Katagum River with waterholes and ponds. Two-thirds is terrestrial habitat and within the arid zone of Nigeria.

Vegetation The area contains one of the few remaining areas of Sahelian woodland in the Sahel.

Fauna The reserve is an important wintering ground for palaearctic migrants. Mammals reported in the area include aardvark *Orycteropus afer*, spotted hyena *Crocuta crocuta*, warthog *Phacochoerus aethiopicus*, common duiker *Sylvicapra grimmia*, Dorcas gazelle *Gazella dorcas*, and patas monkey *Erythrocebus patas*. Waterfowl on the ponds and banks of the Katagum River include knob-billed goose *Sarkidiornis melanotos*, spur-winged goose *Plectropterus gambensis*, great white pelican *Pelecanus onocrotalus*, and secretary bird *Sagittarius serpentarius*.

Conservation Management The reserve is used for multiple purposes, grazing and fishing being allowed on a controlled basis. This follows recommendations made for the provision of alternative sources of meat protein or seasonal fishing in the ponds (Ebin, 1983).

Zoning None. It has been recommended that the core of the reserve should be strictly protected, while allowing a limited amount of grazing and agriculture in buffer areas on the periphery (Dugan, 1985).

Disturbances or Deficiencies Principal threats are uncontrolled grazing by cattle, and associated lopping of branches by the Fulani herdsmen, and lack of inundation of the floodplain for two years (Dugan, 1985). The latter, caused by the drought, has been aggravated by offtake of water upstream. The net result is that the level of water in the Hadejia River has not been high enough to flood the Keffin Hausa, the tributary which runs through the reserve.

In addition, sediment now deposited by the Hadejia at its junction with the Keffin Hausa will have to be removed in order to restore the water supply to the reserve.

Visitor Facilities There is a rest house at Hadejia. Provision is being made for guided tours.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- ° Dugan, P. (1985). Mission to Nigeria. IUCN, Gland. Unpublished report. 11 pp.
- ° Ebin, O.C. (1983). An appraisal of the biotic and material resources of some Game Reserves and Wildlife Management in Nigeria. Nigerian Conservation Foundation, Lagos.

Staff The reserve is staffed, but there is no information on numbers.

Budget There is a budget for the reserve but there is no information on amount.

Local Park or Reserve Administration Department of Wildlife, Ministry of Agriculture and Natural Resources, Kano State, Kano.

Date No information

KWIAMBANA GAME RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection No information

Date Established 1971

Geographical Location South-east of Gusau in Sokoto State, north-west Nigeria. 10°50'-11°50'N, 6°00'-7°00'E.

Altitude 400-850m

Area 261,400ha; contiguous to Kamuku Game Reserve (112,766ha)

Land Tenure State

Physical Features The highest area in the reserve is north at Madaba Hills (850m). Other prominent hills are Mezomaye, Madanza, Birana and Bugana. The Mariga River forms the southern and most of the eastern boundary. During the dry season, the major rivers dry up and only pools remain. The entire reserve is underlain by metamorphic rocks of Pre-Cambrian to early Palaeozoic age. Climate is relatively dry with an average annual rainfall of 1,100mm. It is generally drier to the north and west, and wetter to the south and east.

Vegetation The reserve is in the Northern Guinea savanna zone near the border with the Sudan zone. There are five distinct vegetation types: *Isobерlinia tomentosa* woodland; *Isobерlinia doka* woodland; *Terminalia avicennoides* savanna woodland; *Gardenia* scrubland; and riverine vegetation. Dominant trees are *Isobерlinia* spp., which constitute over 80% of trees in the reserve. *I. tomentosa* forms closed woodlands in the wetter south. *I. doka*

open woodlands are predominant in the drier north, mainly on the slopes and tops of quartzite ridges. The bottom of the ridges is often seasonally flooded and dominant trees are *Terminalia* spp. and *Daniellia oliveri*.

Fauna Mammals include: elephant *Loxodonta africana* (T), hartebeest *Alcelaphus buselaphus*, roan antelope *Hippotragus equinus*, common duiker *Sylvicapra grimmia*, kob *Kobus kob*, waterbuck *Kobus ellipsiprymnus*, oribi *Ourebia ourebi*, buffalo *Syncerus caffer*, warthog *Phacochoerus aethiopicus*, olive baboon *Papio anubis*, patas monkey *Erythrocebus patas*, green monkey *Cercopithecus aethiops*, lion *Panthera leo*, leopard *Panthera pardus* (T), serval *Felis serval*, spotted hyena *Crocuta crocuta*, jackal *Canis adustus*, civet *Civettictis civetta*, spring hare *Lepus capensis*, and armadillo *Orycteropus afer*. Nile crocodile *Crocodylus niloticus* (V) is also present in the reserve.

Conservation Management The objectives of management are: to make the reserve more attractive to visitors, to protect the wildlife (and cultural monuments) and maintain a stable ecosystem for a high level of plant and animal production; and, depending on its potential, to utilise the reserve for game cropping, particularly for the benefit of the nearby rural population. Early burning along game-viewing tracks helps to concentrate animals in places where they can be seen but this treatment tends to degrade the quantity and quality of grasses unless it is conducted on a rotational basis. Away from game-viewing roads, the riverine vegetation and water-holes should be completely protected from fire. The *Isoberrinia* woodlands and *Terminalia* savanna woodlands, which constitute 95% of the vegetation in the reserve, should be protected from fires and burnt only once in three years before the early rains. A fire programme is essential for providing adequate food for herbivore populations, particularly as they recover from the impact of hunting. Perennial water is available in the major rivers but in the dry season only pools remain, the capacity of which need to be improved for the benefit of wild animal populations. A cropping programme cannot be recommended at present due to present hunting pressure (Ajayi *et al.*, 1981).

Zoning No information

Disturbances or Deficiencies Uncontrolled cattle grazing within the reserve is causing habitat degradation and cattle are competing with wildlife for food. There is considerable illegal hunting, especially during the dry season when many young are born. A policy of extensive grass burning is carried out to provide new grass for grazing animals, but at present this is degrading the quantity and quality of grasses (perennial species are being replaced by annuals). There are insufficient personnel and equipment for effective management.

Scientific Research A species count has been carried out along major game-viewing tracks.

Special Scientific Facilities None

Principal Reference Material

- ° Ajayi, S.S., Milligan, K.R.N., Ayeni J.S.O. and Afolayan, T.A. (1981). A Management Programme for Kwiambana Game Reserve, Sokoto State, Nigeria. *Biological Conservation* 20(1): 45-57.
- ° Ajayi, S.S., Afolayan, T.A. and Milligan, K.R.N. (1981). A survey of wildlife in Kwiambana Game Reserve, Nigeria. *Afr. J. Ecol.* 19: 295-298.
- ° Ebin, C.O. (1983). An appraisal of the biotic and material resources of some Game Reserves and Wildlife Management in Nigeria. Nigerian Conservation Foundation, Lagos.

Staff One game warden, one assistant, two game rangers, game scouts

Budget No information

Local Park or Reserve Administration No information

Date 1981

SAMBISA GAME RESERVE

Management Category No category assigned

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial

Date Established Gazetted in 1978. First opened to the public in 1982.

Geographical Location Near the town of Bama in Borns State. Approximately 11°00'-11°30'N, 13°30'-14°30'E.

Altitude No information

Area 68,600ha

Land Tenure State

Physical Features No information

Vegetation Lies in the Northern Guinea/Sudan Savanna vegetation zone of Nigeria.

Fauna Species present include: roan antelope *Hippotragus equinus*, topi *Damaliscus lunatus*, baboon *Papio anubis*, elephant *Loxodonta africana* (T), ostrich *Struthio camelus*, and guinea fowl *Numida meleagris*. There are some waterfowl.

Conservation Management The major management objective is the preservation of dry season elephant range.

Zoning None

Disturbances or Deficiencies There is grazing, poaching, illegal fishing, inadequate personnel, and a lack of equipment.

Visitor Facilities The visiting season lasts from October until June.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Ebin, O.C. (1983). An appraisal of the biotic and material resources of some Game Reserves and Wildlife Management in Nigeria. Nigerian Conservation Foundation, Lagos.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date No information

UPPER OGUN GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Farming, grazing, hunting and fishing prohibited

Date Established May 1973. First established as Upper Ogun River Forest Reserve.

Geographical Location In the north-west of Oyo State. Approximately 8°44'N, 3°44'E.

Altitude No information

Area 110,000ha; contiguous to Old Oyo Game Reserve (40,000ha) in the north

Land Tenure State

Physical Features There is permanent water throughout the reserve.

Vegetation The reserve lies just north of the forest-savanna border. Vegetation is mainly Guinea savanna woodland with dense woodland and forest outliers in the south.

Fauna Large mammals typical of the southern savanna of West Africa are present including: elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, buffalo *Syncerus caffer*, hartebeest *Alcelaphus buselaphus*, roan antelope *Hippotragus equinus*, waterbuck *Kobus ellipsiprymnus*, kob *Kobus kob*, bushbuck *Tragelaphus scriptus*, oribi *Ourebia ourebi*, common duiker *Sylvicapra grimmia*, red-flanked duiker *Cephalophus rufilatus*, Maxwell's duiker *Cephalophus maxwelli*, olive baboon *Papio anubis*, green monkey *Cercopithecus aethiops*, lion *Panthera leo*, leopard *Panthera pardus* (T), and spotted hyena *Crocuta crocuta*. Nile crocodile *Crocodylus niloticus* (V) occur in small numbers in the deeper pools of the Ogun River. Forest animals include red river hog *Potamochoerus porcus* and black and white colobus monkey *Colobus polykomos*.

Conservation Management Basic protection was already operational before the gazettement of the game reserve, and there may be a considerable increase in animal numbers with the control of hunting.

Zoning None

Disturbances or Deficiencies The larger fauna of the reserve have been depleted as a result of past hunting, although there are still good breeding populations of a number of species.

Visitor Facilities The reserve is just north of the large population centres of western Nigeria, namely Ibadan and Lagos, each with a population of one million. With this large and increasingly prosperous urban population only two hours drive away, the reserve could have good potential for tourism and environmental conservation.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Geerling, C. (1974). Upper Ogun and Opara Game Reserves gazetted in Western State, Nigeria. *Environmental Conservation* 1: 304.

Staff No information

Budget No information

Local Park or Reserve Administration No information

YANKARI GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection No information

Date Established Established as a forest reserve in 1956; fully gazetted as a game reserve in 1957. Opened to the public in 1962.

Geographical Location In Bauchi State, north-east Nigeria. Access is by road from Bauchi. 9°30'-10°00'N, 10°00'-11°00'E.

Altitude Approximately 350-450m

Area 224,000ha

Land Tenure State

Physical Features The rolling hilly terrain is underlain by Tertiary sediments of sandstone and shales. It is drained by the Gaji River, which runs north to south through the reserve and is fed by a system of warm springs emerging from the sandstone cliffs of the Gaji Valley. There is little superficial drainage due to the sandy soils and only the Gaji Valley has water during the dry season. There are deep, well-drained, red sandy loams on loose sediment. The climate is characteristic of lowland savanna, with a mean annual rainfall of 1,100mm and a dry season from November to May accentuated by the 'harmattan' (dry desert wind). The mean maximum temperature is 31°C, with March and April the hottest months at 36°C to 38°C. The mean minimum temperature is 19°C with January the coldest month at 11°C to 14°C.

Vegetation The major vegetation type is *Burkea africana*/*Combretum glutinosum* savanna woodland dominated by *Azelia africana* on high level sites and *Anogeissus leiocarpus* and *Combretum nigricans* on lower slopes. Savanna grasslands include: *Jardinea congoensis* with *Hyparrhenia* and *Andropogon* grass species. The river valley has a mosaic of vegetation types differentiated by hydrology: aquatic vegetation with species of *Nymphaea*, *Marsilea* and *Pistia stratiotes*; *Cyperus exaltatus* swamp; sedge meadows of *Cyperus difformis* and other Cyperaceae; evergreen swamp forest; and *Pteleopsis habeensis* woodland. A generalised vegetation map and a list of vascular plants is given in Geerling (1973).

Fauna Larger mammal species are typical of the West African savanna including green monkey *Cercopithecus aethiops*, bushbaby *Galago senegalensis*, olive baboon *Papio anubis*, elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, buffalo *Syncerus caffer*, and waterbuck *Kobus ellipsiprymnus*. Less common mammals include: hippopotamus *Hippopotamus amphibius*, roan antelope *Hippotragus equinus*, red-flanked duiker *Cephalophus rufilatus*, oribi *Ourebia ourebi*, reedbuck *Redunca redunca*, and patas monkey *Erythrocebus patas*. Carnivores include: lion *Panthera leo*, leopard *Panthera pardus* (T), caracal *Felis caracal*, serval *Felis serval*, spotted hyena *Crocuta crocuta*, and hunting dog *Lycaon pictus* (T). The crocodile *Crocodylus niloticus* (V) is also present. The bird fauna

has been extensively studied. Details, and further references can be found in Crick and Marshall (1981). Lists of mammals (with details of their status), birds, and reptiles are given in Sikes (1964).

Conservation Management The management policy since 1956 has included early burning during November to improve visibility along game-viewing tracks, to encourage growth of a new flush of grass for grazing animals, and to concentrate these animals along the game-viewing tracks. However, this has led to erosion and run-off where perennial grasses, which stabilise the soils, have been replaced by annual species. Late burning has been recommended as it would be more effective and would encourage the perennial grasses. The construction of waterholes in the savanna area would stop the current annual migration to the riverside during the dry season and reduce the degradation of vegetation in the riverside area.

Zoning No information

Disturbances or Deficiencies Severe poaching is reducing animal populations particularly through use of modern weapons. There is forest clearance for human settlement expansion. Interference with the burning plan by poachers is leading to habitat degradation with annual *Hyparrhenia* sp. outcompeting the perennial species such as *Andropogon gayanus*. There is a planned development scheme for the warm Wikki Spring, which involves the sinking of bore holes for the Natural Water Factory. This would cause serious erosion to wildlife habitats along the River Gaji, which is the only perennial river in the reserve. Funds and personnel are insufficient.

Visitor Facilities Open to the public from 1 November to 30 June. About 10,000 visitors come to the reserve each year. The major attraction being the warm springs at Wikki where there is a visitors camp. An extensive network of jeep tracks provides access in the reserve.

Scientific Research Surveys of the vegetation have been published by Keay (1961), Tuley (1970) and Geerling (1973). An ecological survey of the reserve was undertaken in 1970-1971 with a view to developing management policies in the face of increasing animal populations (FAO, 1975).

Special Scientific Facilities Kainji Lake Research Institute at New Bussa.

Principal Reference Material

- Afolayan, T.A. (1980). A synopsis of wildlife conservaton in Nigeria. *Environmental Conservation* 7(3): 207.
- Afolayan, T.A. and Ajayi S.S. (1980). The influence of seasonality of the distribution of large mammals in the Yankari Game Reserve. *African Journal of Ecology* 18: 87-96. (Includes a check list of plants and mammals in the reserve).
- Crick, H.Q.P. and Marshall, P.J. (1981). The Birds of Yankari Game Reserve, Nigeria. Their Abundance and Seasonal Occurrence. *Malimbus* 3: 103-113.
- FAO (1975). *The ecology and management of Yankari Game Reserve*. Technical Report FO: DP/NIR/72/002. FAO, Rome.
- Gadzama, N.M., Mustafa, S. and Parr, M.J. (1974). Notes on the history of human interference in the Yankari Game Reserve area. *Nigerian Field* 39: 77-85.
- Geerling, C. (1973). *The vegetation of Yankari Game Reserve: its utilisation and condition*. Department of Forestry, University of Ibadan.
- Geerling, C. (1983). Vegetation and herbivores in Yankari. *Nigerian Field* 47(4): 167-184.
- Happold, D.C.D. (1970). The Rodents of Yankari Game Reserve, Northern Nigeria. *Mammalia* 34: 491-495.
- Keay, R.W.J. (1961). Yankari Game Reserve, Bauchi Province, Northern Nigeria. Department of Forest Research. Technical Note No. 17.
- Sikes, S. (1964). A game survey of Yankari Game Reserve. *Nigerian Field* 29: 127-141.
- Tuley, P. (1970). Botanical notes on a visit to Yankari Game Reserve and other locations on the Keri Plateau, Nigeria. Miscellaneous Report No. 82. Directorate of Overseas Surveys, England.

Staff No information

Budget US\$30,000 annual income from tourism (Afolayan, 1980)

Local Park or Reserve Administration Game Preservation Unit of the Ministry of Animal and Forest Resources of Bauchi State.

Date 1983

PANDAM WILDLIFE PARK

Management Category No category assigned

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial

Date Established 1972

Geographical Location In Plateau State, 60km from Lafia near Pandam village. 8°31'-9°00'N, 7°50'-9°00'E.

Altitude No information

Area 22,400ha; contiguous to Ibi Game Reserve, Wase Sanctuary Game Reserve and Wasa Rock Bird Sanctuary, Pai Game Reserve, and the proposed Ankwe and Nasarawa game reserves.

Land Tenure State

Physical Features Includes Pan Lake (200m by 3km)

Vegetation Grassland interspersed with patches of high forest

Fauna The fauna is similar to that of the Yankari and Falgore game reserves. Other species are said to include: red river hog *Potamochoerus porcus*, topi *Damaliscus lunatus*, waterbuck *Kobus ellipsiprymnus*, and a variety of forest monkeys. The lake is said to contain manatee *Trichechus senegalensis* (T), hippopotamus *Hippopotamus amphibius* (possibly only one individual) and crocodile *Crocodylus niloticus* (V), and a variety of fish species.

Conservation Management The reserve is managed for game viewing, river-based recreation, and the protection of aquatic birds.

Zoning None

Disturbances or Deficiencies There is insufficient accommodation for staff and visitors. Poaching is a major problem, with ineffectual punishment of offenders.

Visitor Facilities There are jeep tracks, but these are impassable during the wet season.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Ebin, C.O. (1983). An appraisal of the biotic and material resources of some Game Reserves and Wildlife Management in Nigeria. Nigerian Conservation Foundation, Lagos.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date No information

CHINGURMI-DUGUMA GAME RESERVE

Management Category Proposed

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection No information

Date Established Ungazetted

Geographical Location Situated in Borno State, on the border with northern Cameroon. 11°30'-12°00'N, 13°30'-15°00'E.

Altitude No information

Area 35,400ha

Land Tenure State

Physical Features No information

Vegetation Northern Guinea Savanna/Sudan zone vegetation

Fauna Species include jackal *Canis aureus*, giraffe *Giraffa camelopardalis*, topi *Damaliscus lunatus*, red-fronted gazelle *Gazella rufifrons*, elephant *Loxodonta africana* (T), and guinea fowl *Numida meleagris*.

Conservation Management Access roads and infrastructure are still under development. The farmers cultivate guinea corn, which, under an agreement with the wildlife authorities, is left after harvest for the wildlife to feed on.

Zoning None

Disturbances or Deficiencies There is illegal burning, poaching with the aid of four-wheel drive jeeps and modern weapons, and excessive livestock grazing. Farming rights are granted to local citizens.

Visitor Facilities None

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Ebin, O.C. (1983). An appraisal of the biotic and material resources of some Game Reserves and Wildlife Management in Nigeria. Nigerian Conservation Foundation, Lagos.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date No information

GASHAKA/GUMTI GAME RESERVE

Management Category Proposed

Biogeographical Province 3.19.12 (Guinean Highlands)

Legal Protection Partial

Date Established Gashaka and Gumti, two contiguous forest reserves, are in the process of being combined and gazetted as a game reserve.

Geographical Location In Gongola State on the border with Cameroon near the town of Serti. Approximately 6°40'-8°20'N, 11°10'-12°10'E.

Altitude Up to 2,425m

Area 636,300ha (Gashaka: 435,200ha; Gumti 201,100ha)

Land Tenure State

Physical Features Most of the Gashaka sector is mountainous with steep hills rising 500-900m from their bases. Chappal Waddi (2,425m) in the southeast is the highest mountain in Nigeria. The Kam, Gashaka, Gamgam, Ngiti, and Yim flow northwestwards from the Godel Mountains in the south and drain into the Taraba River. The Gumti sector is flat with rolling hills rising 300-400m above the plains. Soils are derived from gneiss, migmatite and granite of Lower Palaeozoic to Pre-Cambrian age. Ferruginous tropical soils, ranging from reddish-brown to brown and varying in texture from clay to gravelly sandy clay loam, occur in lower areas. Non-differentiated mineral lithosols, humic ferrisols, and lithosols are present at high altitudes. The rainy season begins with showers in March and lasts until October in the Gashaka sector. Mean annual rainfall at Serti was 1800mm during a six year period in the 1960s, but it is now much less with the current drought conditions widespread in Africa. Much more rain falls on northern than on southern slopes of mountains. Mean maximum temperatures range from 21°C to 27°C at high altitudes. Temperatures may drop to freezing point on Chappal Waddi in December. In the lowlands, temperatures reach 43°C in March (Wanzie *et al.*, 1985; Green, 1986).

Vegetation The Gashaka sector falls within the Guinea savanna and derived savanna zones. Savanna woodland and tree savanna formations cover much of the lowland areas, grassland (fadaman) occurs along some rivers, and montane grassland with shrubs scattered at wide intervals is present on the Falinga and Sabere plateaux and on the higher mountains. Gallery forest, locally called kurmi, is well-developed along all rivers and streams. Common trees and shrubs of lowland savanna include: *Piliostigma thonningii*, *Annona senegalensis*, *Azelia africana*, *Terminalia laxiflora*, *Daniellia oliveri*, *Parkia africana*, *Crossopteryx febrifuga*, *Uapaca togoensis*, *Parinari curatellifolia*, *Prosopis africana*, *Protea elliotii*, *Hymenocardia acida*, *Pterocarpus erinaceus*, and various *Combretum* spp. Trees found in gallery forest

include: *Brachystegia eurycoma*, *Khaya grandifolia*, *Erythrophleum guineensis*, *Tetrapleura tetraptera*, *Elaeis guineensis*, *Anogeissus leiocarpus*, *Ricinus dendron* sp., *Pterygota macrocarpa*, *Cola cordifolia*, *C. togoensis*, *Cleistophelis patens*, *Pycnanthus angolense*, *Ceiba pentandra* and species of *Homalium*, *Detarium*, *Lannea* and *Anthocleista* (Wanzie *et al.*, 1985; Green, 1986).

Fauna Large mammals are much less abundant than they were 10 years ago, largely due to illegal hunting in the case of large antelopes. Common primates are olive baboon *Papio anubis*, greater white-nosed monkey *Cercopithecus nictitans*, mona monkey *Cercopithecus mona*, and guereza *Colobus guereza*. The chimpanzee *Pan troglodytes* (T) is uncommon. Large carnivores, notably lion *Panthera leo* and spotted hyaena *Crocuta crocuta*, are uncommon or rare. Elephant *Loxodonta africana* (T) no longer occurs in the Gashaka sector but there is a population in the northern part of the Gumti sector. Hippopotamus *Hippopotamus amphibius* is rare, probably due to the unsuitability of most streams, and giraffe *Giraffa camelopardalis* is no longer thought to be present. Buffalo *Syncerus caffer* used to be common but numbers have declined with the spread of rinderpest, introduced by domestic cattle in 1983. Of the larger antelope, bushbuck *Tragelaphus scriptus*, kob *Kobus kob*, waterbuck *Kobus ellipsiprymnus*, and hartebeest *Alcelaphus buselaphus* are common. Green (1986) provides an annotated list of mammals. The diversity of the avifauna is not as great as might be expected. Green (1986) lists 188 species of bird recorded in the game reserve.

Conservation Management The establishment of a game reserve to protect the Gotele Mountains and the mountains around Chappal Hendu was proposed in 1969. During the 1970s a tourist camp was set up at Gashaka Village, the Gashaka and Kam rivers were bridged, and a road was constructed from near Serti to Gashaka Village. Subsequently, the game reserve has been neglected: the tourist camp has not been properly maintained, the bridges have been washed away, and Gashaka is accessible from Serti only on foot. At the time of the establishment of Gashaka and Gumti forest reserves, the people were allowed to remain and so enclaves were created round their villages. Subsequently, other villages have become illegally established elsewhere. The people of Gashaka Village are allowed to fish in a short stretch of the Gamgam and Gashaka rivers (Green, 1986).

Zoning None

Disturbances or Deficiencies People in the authorised enclaves have extended their activities (raising cattle and subsistence agriculture) well beyond the limits of the enclaves. Most of the people living in the game reserve are recent immigrants, many from Cameroon. Poaching is rampant and widespread, the military camp at Serti being a particular problem as soldiers hunt with modern rifles in the game reserve.

Visitor Facilities Access to the Gumti sector is from Yola to Tongo, on the north edge of the game reserve. From here there is a track, motorable only in the dry season, to Gumti. Access to the Gashaka sector is from Yola southwest to Serti and Buddel, from where a motorable track leads to Gashaka Village but the Kam and Gashaka rivers are no longer bridged. There is a tourist camp at Gashaka Village but it needs to be renovated.

Scientific Research The area was surveyed by Snider *et al.* (1973) with a view to it being established as a game reserve. Recently Wanzie *et al.* (1985) undertook an ecological survey of the game reserve and Green (1986) reconnoitered the southern Gashaka sector.

Special Scientific Facilities None

Principal Reference Material

- ° Ebin, O.C. (1983) An appraisal of the biotic and material resources of some Game Reserves and Wildlife Management in Nigeria. Nigerian Conservation Foundation, Lagos.
- ° Green, A.A. (1986). Reconnaissance survey of southern sector of Gashaka-Gumti Game Reserve, Gongola State, Nigeria. Nigerian Conservation Foundation, Lagos. Unpublished report. 20 pp.
- ° Snider, B., Barnwell, R.J., Menefy, R.J. and Sosiak, A.J. (1973). Land use, large mammals, staff organisation and construction programmes of Gashaka Game Park Project. Unpublished report.

- ° Wanzie, C., Ola-Adams, B.A., Abelude, F.A., Adebisi, D.O. and Oyatogun, M.O.O. (1985).
A preliminary ecological survey of Gashaka-Gumti Game Reserve, Gongola State.
Unpublished report.

Staff There are 17 patrol posts under the Wildlife Management Officer at Serti, only five of which are within the game reserve. Of the 62 staff at Serti, 54 are guards, scouts, rangers and wildlife officers (1986). Details of staff assigned to the game reserve are not known.

Budget No information

Local Park or Reserve Administration No information

Date June 1986

KAMUKU GAME RESERVE

Management Category Proposed

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Partial

Date Established Ungazetted

Geographical Location In Kaduna State

Altitude No information

Area 120,000ha; contiguous to Kwiambana Game Reserve (261,400ha)

Land Tenure State

Physical Features No information

Vegetation No information

Fauna Mammals include: elephant *Loxodonta africana* (T), hartebeest *Alcelaphus buselaphus*, roan antelope *Hippotragus equinus*, common duiker *Sylvicapra grimmia*, kob *Kobus kob*, waterbuck *Kobus ellipsiprymnus*, oribi *Ourebia ourebi*, buffalo *Syncerus caffer*, warthog *Phacochoerus aethiopicus*, olive baboon *Papio anubis*, patas monkey *Erythrocebus patas*, green monkey *Cercopithecus aethiops*, lion *Panthera leo*, leopard *Panthera pardus* (T), serval *Felis serval*, spotted hyena *Crocuta crocuta*, jackal *Canis adustus*, civet *Civettictis civetta*, spring hare *Lepus capensis*, and aardvark *Orycteropus afer*. Nile crocodile *Crocodylus niloticus* (V) is also present.

Conservation Management Artificial waterholes have been constructed in the reserve for the wild fauna.

Zoning None

Disturbances or Deficiencies Uncontrolled cattle grazing within the reserve is causing habitat degradation and cattle are competing with wildlife for food. There is considerable illegal hunting, especially during the dry season when many young are born. A policy of extensive grass burning is carried out to provide new grass for grazing animals, but at present this is

degrading the quantity and quality of grasses (perennial species are being replaced by annuals). There are insufficient personnel and equipment for effective management.

Visitor Facilities No information

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Ebin, O.C. (1983). An appraisal of the biotic and material resources of some Game Reserves and Wildlife Management in Nigeria. Nigerian Conservation Foundation, Lagos.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date No information

OBUDU (BOSHI/OKONGWO) GAME RESERVE

Management Category Proposed

Biogeographical Province 3.19.12 (Guinean Highlands)

Legal Protection Protection under forest law

Date Established Three forest reserves gazetted in 1933 have been integrated to form the proposed game reserve, though the area has yet to be gazetted.

Geographical Location Lies in Cross River State, southeastern Nigeria, on the border with Cameroon. The only access road is through the Sankwala Mountains to Obudu Cattle Ranch. 6°40'N, 9°1'E.

Altitude 1,500-2,000m

Area 72,000ha

Land Tenure State

Physical Features The Obudu Plateau area is highland at a general elevation of 1,500m, but with odd peaks rising to almost 2,000m. The rolling hills are covered in grassland, interspersed with large tracts of high forests, which stretch across the border into west Cameroon. The underlying rocks are mainly gneisses and granites. Intense leaching, due to the long rainy season and high mean annual rainfall, has led to the formation of ferrallitic soils, which are relatively poor in available nutrients. Mean annual rainfall is very heavy - 4280mm (falling mainly in a nine-month rainy season) at the Obudu Cattle Ranch and possibly even heavier elsewhere. Temperatures are low: monthly means are 14-16°C (daily minima) and 18-25°C (daily maxima).

Vegetation The area was once under continuous forest cover, though human interference has led to the replacement of most of the forest by grassland. Today, the forest is mostly confined

to steep-sided valleys and escarpments. Between the forest and the grassland is a distinct transition zone. The floras of Obudu Plateau and the Oban lowland forest area to the south form ecological islands of great phytogeographical interest. The area was part of a forest refuge in the last major Pleistocene dry phase (20,000yrs BP) and the Obudu flora can be seen as an attenuated variant of the lowland endemic-rich Oban forest (Hall, 1981) enriched with species of Afrotropian affinity, such as *Dasylepis racemosa*, *Podocarpus latifolius* and *Ritchiea albersii*. Like the forest flora, the transition zone flora (forest/grassland) includes species which occur more widely in eastern than in western Africa, such as *Aframomum zambesiacum* and *Albizia gummifera*. Many species are at, or near, the limit of their geographical ranges. This is even more evident with the grassland flora, especially in the grasses *Hyparrhenia cymbaria* and *Melinis minutiflora* and the legumes *Amphicarpa africana* and *Eriosema montanum*.

Fauna Mammals include: chimpanzee *Pan troglodytes* (T), baboon *Papio anubis*, leopard *Panthera pardus* (T), African golden cat *Felis aurata*, rock hyrax *Procavia capensis*, tree hyrax *Dendrohyrax dorsalis*, a variety of high forest monkeys, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, and forest elephant *Loxodonta africana* (T). Gorilla *Gorilla gorilla* (T) was reported by Ebin (1983) but it is unclear from the report whether gorilla were sighted during the study, or if this is a perpetuation of earlier reports. Manatee *Trichechus senegalensis* (T) and crocodile *Crocodylus niloticus* (V) are also present. Bird species include grey-necked picathartes *Picathartes oreas* (R), green-breasted bush-shrike *Malaconotus gladiator* (R), white-throated mountain babbler *Lioptilus gilberti* (R), Bannerman's weaver *Ploceus bannermani* (V), black-winged oriole *Oriolus nigripennis* (common bird of lowland forests, occurring here as montane forest bird), Waller's red-winged starling *Onychognathus walleri*, Cameroon mountain rough-winged swallow *Psolidoprocne fuliginosa*, Petit's rough-winged swallow *P. petiti* and red-breasted wheatear *Oenanthe heuglini* (Elgood, 1965). A bird species list can be found in Elgood (1965) and Gartshore (1984).

Conservation Management Both the Obudu Plateau and the Oban forest merit high priority for conservation action in Nigeria. The Obudu Plateau is connected to the Oban forest flora via an ecotone of unbroken, little disturbed high forest at an altitude range of nearly 2000m (a situation rare in Africa). The great ecological interest of this ecotone, the rarity of comparable phenomena in Africa, and the floristic endemism involved, suggest that the whole ecotone - a distance of some 100km north-south - might best be conserved as a national park (Hall, 1981). There is a need to arrest and reverse the habitat degradation caused by locally excessive grazing (sometimes coupled with inappropriate burning practices) and an expanding resident human population. Currently, emphasis is on control of cattle movement through administrative and sward improvements, and the rehabilitation of some land already eroded. Hall (1981) suggests that farming be confined to areas of relatively level grassland and that a rotational system is adopted to maintain crop-growth capacity. Small plantations of *Eucalyptus* should be established to provide fuelwood and to control erosion and there should be measures to control burning.

Zoning No information

Disturbances or Deficiencies The Obudu Plateau is being increasingly utilised for ranching. The effects of cattle action are sward changes and erosion. Erosion is further aggravated by clearance of forest, mainly on steep and vulnerable slopes, for farming or over-intensive removal of trees for firewood. If the present trend of degradation continues, the economic value of the area as range will inevitably suffer and the potential of the Plateau as a tourist resort and beauty spot is likely to decline. Also, the indirect role of watershed protection for part of the boundary between the Cross River and the Benue River catchments would be rendered less effective. Poaching is perpetuated by the lack of necessary legislation, money, equipment, and active management.

Visitor Facilities Obudu Cattle Ranch provides lodging and catering services. Tourism is limited to the developed ranch area only.

Scientific Research Various ecological studies have been made including studies of the vegetation, avifauna and the migratory routes of gorillas.

Special Scientific Facilities None

Principal Reference Material

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- ° Gartshore, M. E. (1984). Birds of Obudu Plateau. Unpublished.
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Staff There are staff, but they are reported to be severely under-equipped.

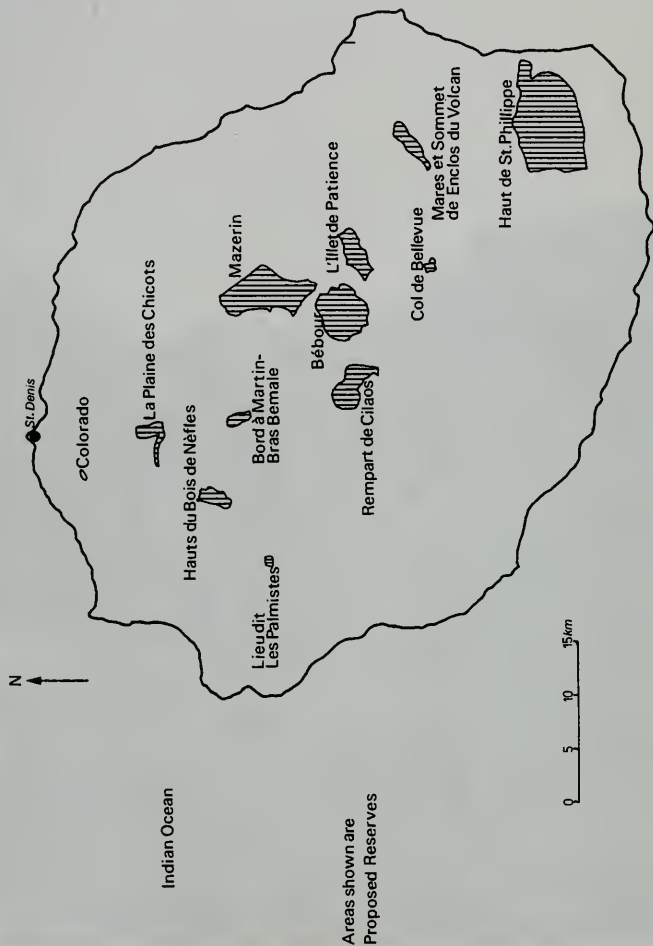
Budget No information

Local Park or Reserve Administration No information

Date April 1985



Reunion



FRANCE-REUNION

Area 2,510 sq.km

Population 545,300 (1984)

Parks and Reserves Legislation As a Department of France, this territory is largely covered by the same legislation as that country, namely Law No. 60-708 of 22 July 1960 which applies to the establishment of National Parks (although this law has not been applied in Reunion yet), and Law No. 76-629 of 10 July 1976 (Loi relative à la protection de la nature) which applies to all aspects of conservation, including reserves. Two réserves biologiques intégrales were established by Arrêté of 8 May 1963 (Piton Bleu of 4.25 hectares and Grand Matarum of 3.5 hectares). Also a réserve naturel was established by Decree 81-854 of 28 August 1981 at Mare Longue covering 68.39 hectares; an extension of an area first established by Arrêté of 29 January 1958. One other reserve already established on the island is the reserve of Notre-Dame de la Paix, which covers 168 hectares. Exploitation of any sort is prohibited in each of these reserves. The islands of Tromelin, Iles Glorieuses, Europa and Bassas Da India were declared as réserves naturelles by Arrêté 13/DG/101 of 18 November 1975, signed by the Prefect of Réunion. This piece of legislation replaced an earlier decision 101 DGRF of 28 August 1971, which apparently also protected Juan de Nova though not Bassas Da India (Harroy, 1972). A law of 2 May 1930 allows for the protection of natural monuments and sites of artistic, historic, scientific, legendary or aesthetic importance. Three sites are currently classified, les grottes des premiers français, le Voile de la Mariée, and la Ravine Saint-Gilles, with other sites under study. The forestry regime in Reunion is fixed by an ordonnance of 2 March 1949. Fishing reserves have been established within the lagoons, and offshore from the reefs which lie between Cap la Houssaye and the Etang-Salé. This latter area is managed on a three block rotation.

Parks and Reserves Administration Management of the nature reserves is the responsibility of the Office national de la forêt, within the Regional Department for Reunion, although no staff are employed within the reserves (which although open to public access are established in areas of low human activity). Fishing reserves are the responsibility of the Administration des affaires maritimes, while classified sites are administered by the Service départemental de l'architecture.

Address

- ° Office national de la forêt, Direction régionale pour la Réunion, Colline de la Providence, 97400 Saint-Denis.
- ° Administration des affaires maritimes, 11 rue de la Compagnie, 97400 Saint-Denis.
- ° Service départemental de l'architecture, 97 rue Juliette Doda, 97400 Saint-Denis.

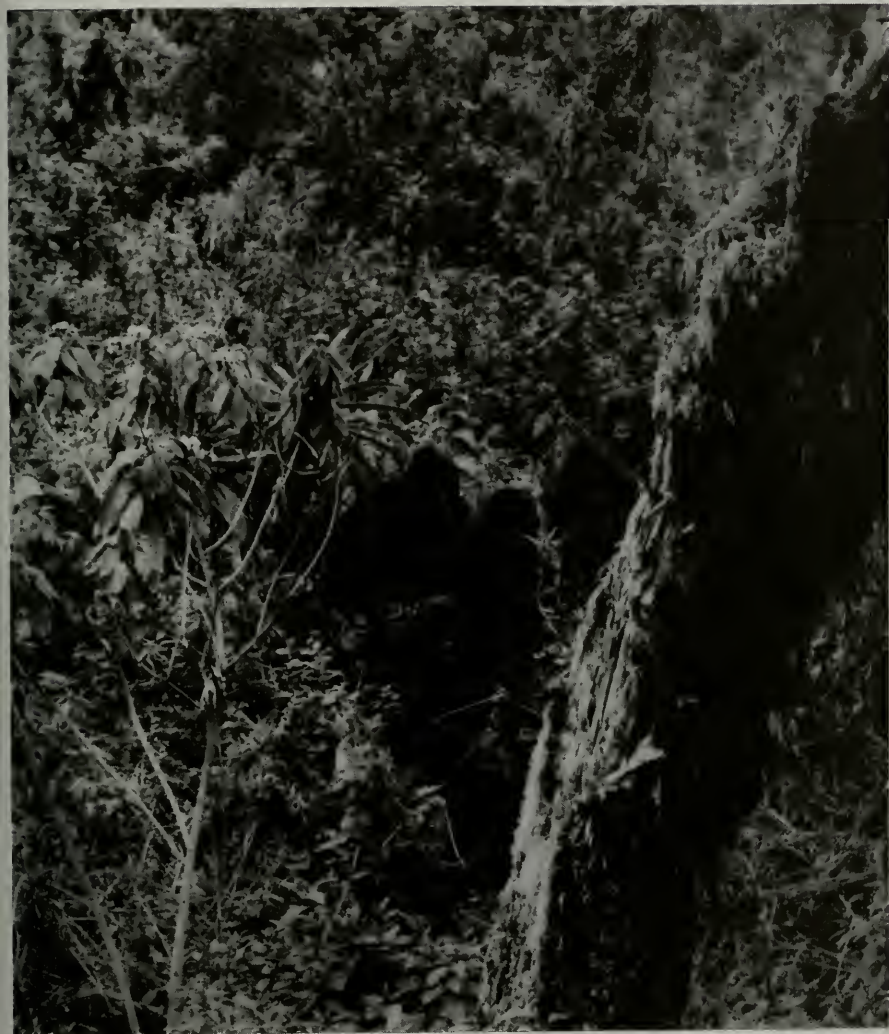
Additional Information Originally the island was entirely covered by forest, much of which has now been cleared for agriculture and by fire, grazing and competition from exotic species. Revegetation and weed control programmes have therefore also been recommended by ORSTOM. There are many endemic plants (see Cadet, 1977; Baumer 1981) and animals including two threatened birds, the Mascarene black petrel *Pterodroma aterrima* (E) which is probably the rarest of tropical Indian Ocean sea birds, and Réunion cuckoo-shrike *Coracina newtoni* (V) (see Cheke, 1976), both of which depend on forest.

A study of the national forests was undertaken by botanists of the University of St Denis and the Organisation de la recherche scientifique et technique d'outre-mer (ORSTOM). Areas of the least disturbed indigenous vegetation were proposed for establishment as biological reserves. Twelve areas in total were proposed for the status of strict nature reserve (Bossier, 1983). Six of these have been examined by ONF: Hauts de St Philippe (3,500ha), Matarum (500ha), Col de Bellevue (20ha), Les Mares et du Sommet de l'Enclos du Volcan (300ha), Hauts Bois de Nèfles (80ha) and Mazerin (2,000ha). Proposals for these have been sent to the Ministry of Environment who have already accepted the last two areas. The other areas proposed include: L'Ilet de Patience (450ha), La Plaine des Chicots (200ha), Bord à Martin-Bras

Bémale (150ha), Lieu dit les Palmistes (30ha) and Colorado (size unknown). ONF is investigating three of these, including Plaine des Chicots and the area around the St Denis river.

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 - ° Harroy, J.P. (1972). *Addendum-Corrigendum to the second edition of the United Nations List of National Parks and Equivalent Reserves*. Hayez: Brussels.
 - ° Jadin, B. and Billiet, F. (1979). Observations ornithologiques à la Réunion. *Gerfaut* 69: 339-352.
 - ° Milon, P. (1951). Notes sur l'avifaune actuelle de l'île de la Réunion. *Terre et Vie* 98: 129-178.
 - ° SREPEN (Undated). *Livre blanc de l'environnement; états régionaux de l'environnement*. Société Réunionnaise pour l'Etude et la Protection de l'Environnement, Saint Denis, Réunion.
 - ° UNEP (1984). *Marine and Coastal Conservation in the East African Region*. UNEP Regional Seas Reports and Studies, No. 39.
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Rwanda



RWANDA

Area 26,338 sq.km

Population 5,650,000 (1984); the most densely populated country in Africa (183/sq.km) with an annual population increase of over 3%.

Parks and Reserves Legislation The principal legislation is currently an Ordinance-Law of 18 June 1973, confirmed and modified by a Decree-Law of 18 December 1973. This legislation established the Office Rwandais du tourisme et des parcs nationaux (under the direct control of the President), detailed its control and responsibilities, and included chapters on protected areas, hunting, classification of sites, and penal sanctions for infringements. A national park is designated an area exclusively destined for the propagation, protection, conservation and management of the flora and fauna, at the same time as protecting geological formations of scientific or aesthetic value. Protection would appear to be total, with entry and research both under strict control. Domaines de chasse (Hunting Reserves) are defined as areas set aside for conservation, management and protection of wild animals and their habitat. Hunting within these areas is controlled, while all other exploitation is prohibited, and again entry is controlled. Réserves spéciales, also called Réserves partielles or Sanctuaires, can be created under this Decree-Law by Presidential Decree to protect characteristic communities of animals, or threatened plant or animal species and the habitat essential for their survival. In general, control of these areas would be as for national parks.

Parks and Reserves Administration The main objectives of the Office Rwandais du tourisme et des parcs nationaux, as defined in the establishing legislation, are to assure promotion of tourism in Rwanda; to assure protection of nature, and encourage research and tourism in protected areas; management and identification of important sites; and international responsibilities relating to nature and tourism. This replaced the Institut des parcs nationaux created by Decree of 26 November 1934. The Direction des parcs nationaux within the Office Rwandais du tourisme et des parcs nationaux, is responsible for day to day management of the protected areas. Prior to independence, Akagera National Park was the responsibility of the Institute of National Parks of the Belgian Congo (in Brussels). Volcanoes National Park was administered as part of Albert National Park at Rumungao in Kivu Province in the Belgian Congo.

Address

- ° Direction des parcs nationaux, Office Rwandais du tourisme et des parcs nationaux, BP 905, Kigali.
- ° Division de la gestion forestière, Ministère de l'agriculture, de l'élevage et des forêts, BP 621, Kigali.

Additional Information Over 500 scientific studies were undertaken in the parks between 1933 and 1970. Since 1970, work has been supported by technical co-operation from a number of countries including Belgium and Switzerland, as well as from various internationally active conservation organisations. The major conservation problems of the parks are competition for agricultural use and poaching (particularly of gorilla for trophies). Tourism is responsible for an appreciable proportion of the country's foreign earnings, and the national parks are the basis for this industry. Various agencies including both IUCN and WWF are assisting in the protection and development of, in particular, the Volcanoes National Park.

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Protected Areas

(hectares)

National Parks

Akagera	250,000
Volcanoes	12,000
Subtotal	262,000

Hunting Reserves

Mutara	30,000
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Forest Reserves

Nyungwe	90,000
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Biosphere Reserves

Parc national des Volcans	15,065
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PARC NATIONAL DE L'AKAGERA

Management Category II (National Park)

Biogeographical Province 3.20.12 (Central African Highlands)

Legal Protection No information

Date Established 1934

Geographical Location In the north-east region on the Tanzania and Uganda borders. 1°00'-2°05'S, 30°25'-30°50'E.

Altitude 1,250-1,825m (Mount Mutumba)

Area 250,000ha; bordered to the north-west by the Mutara Hunting Reserve (30,000ha)

Land Tenure Government

Physical Features There are rolling sandstone hills in the west cut in places by deep, narrow valleys and separated by a steep north-south escarpment from the extensive lakes and swamps of the Kagera valley. Climate varies with topography (west to east) from sub-humid to near arid with great annual variation.

Vegetation Five distinct floras meet in the region: Guineo-Congolian, Sudanian, Zambezian, Somali-Maasai and Afro-montane. The vegetation consists of floristically-impooverished variants of the first four. Savanna with short grasses (mostly *Themeda triandra*, *Hyparrhenia* sp., and *Cymbopogon afronardus*) predominates on the hilltops grading to savanna forest with dense maqui plains on the slopes with long savanna grasses, *Combretum* spp. and *Acacia senegal*. The more abrupt hills of the centre and southern area are more heavily treed and bushed. Down towards the lake borders to the east, the savanna becomes more heavily wooded, until gallery forest is reached along the lake edges. Gallery forest species include: *Albizia*, *Acacia polyacantha*, and some *Ficus*. Though *Acacia* and *Combretum*

predominate, more than 250 tree species can be found in the park. Floodplain and marsh vegetation occurs in the river depression, with marshes dominated by the sedge *Cyperus papyrus*, but also with *Cladium* and *Miscanthidium* occurring.

Fauna Species diversity is high due to the climatic and topographical variations and the mixing of east and central African elements. Over 50 mammal species including: zebra *Equus burchelli*, waterbuck *Kobus ellipsiprymnus*, roan antelope *Hippotragus equinus*, buffalo *Syncerus caffer*, reedbuck *Redunca arundinum*, topi *Damaliscus lunatus*, eland *Taurotragus oryx*, oribi *Ourebia ourebi*, sitatunga *Tragelaphus spekei*, common duiker *Sylvicapra grimmia*, hippopotamus *Hippopotamus amphibius*, impala *Aepyceros melampus* (most common antelope; densities near the lakes in excess of 500 animals per sq.km), leopard *Panthera pardus* (T), lion *Panthera leo*, wild dog *Lycaon pictus* (T), warthog *Phacochoerus aethiopicus*, and spotted hyena *Crocuta crocuta*. Large troops of baboon *Papio* sp., vervet monkey *Cercopithecus aethiopicus*, and Sykes' monkey *Cercopithecus mitis* abound, especially in the lake region. Black rhinoceros *Diceros bicornis* (T) were re-introduced in 1958 and elephant *Loxodonta africana* (T) in 1975. Akagera has an extremely rich avifauna due to the park's position at the junction of several biogeographical zones. The majority are of south and east African origin, but there are also many from Central Africa. The park also lies on the great Nile Valley migration route from Europe to Asia. Over 525 bird species have been recorded (a record for an area of 260,000ha) including 44 raptors such as fish eagle *Haliaeetus vocifer*. There are a few pairs of shoebill *Balaeniceps rex* (of special concern). About 180 reptile species have been recorded.

Zoning None

Disturbances or Deficiencies The park has no fence. Poaching is a problem and there are no technical and administrative staff. Some 1,500 families practising cultivation and animal husbandry occupy about 72,000ha. The Akagera basin is threatened by a hydrological development project.

Visitor Facilities There is accommodation at Ihema Lake Lodge located centrally and Gabiro Lodge on the western perimeter, two hours drive from Kigali.

Scientific Research Research has been carried out by the Belgian Technical Cooperation and the British Overseas Development Administration. Studies include large mammal ecology and monitoring, vegetation surveys, bird population studies, and fishery management.

Special Scientific Facilities Accommodation is available at Ihema Lake Fishery.

Principal Reference Material

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- ° Montfort, N. and Montfort, A. (1982). Akagera. Rwanda's biggest park. *Swara* 5(3): 31-33. Republished in *Parks*, 8(4): 6-8, 1984 and *Wallaceana* W 37, September 1984.
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- ° Vienne, G. and Vienne, G. (1980). Akagera. Des Lions du Nil aux gorilles des monts de la lune. Flammarion.

Staff Twenty guards

Budget No information

Local Park or Reserve Administration Office Rwandais de Tourisme et des Parcs Nationaux, BP 905, Kigali.

Date May 1985

PARC NATIONAL DES VOLCANS

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.20.12 (Central African Highlands)

Legal Protection Total

Date Established Part of the park was protected in 1925. Albert National Park, which included the entire volcanoes area, was established in 1929 and divided in 1960 with the independence of Zaire. Current protection is under a Decree of 24 April 1974. Accepted as a Biosphere Reserve in 1983.

Geographical Location 15km north-west of the town of Ruhengeri in the Virunga massif of north-west Rwanda, on the Uganda and Zaire borders. 1°21'-1°35'S, 29°22'-29°44'E.

Altitude 2,400-4,507m

Area 12,500-13,000ha; contiguous to Virunga National Park (809,000ha) in Zaire and Gorilla Game Reserve (8,800ha) in Uganda. The area of Volcanoes National Park could be 12,000-16,000ha, depending on whether the plan area or estimate of true surface area is used. The problem arises from inaccurate base maps with significant errors of scale. A figure of 77,000ha is often quoted, which probably refers to the surface area in the 1950s of the entire southern section of Albert National Park. The Biosphere Reserve covers an area of 15,065ha.

Land Tenure Government

Physical Features The park contains Pleistocene volcanic peaks belonging to the chain which forms part of the watershed between the Nile and Zaire river systems. The peaks include Karisimbi, one of the highest mountains in Africa. Terrain is difficult and broken with steep slopes. The forested slopes are recognised as important water catchment areas for the surrounding agricultural lands. Outflow decreased dramatically with the decrease in park area between 1958 and 1978 when forest was cut to be replaced by *Pyrethrum* plantations. There is a high annual rainfall of 1,975mm at 3,030m, with a marked decrease to the west. Mean annual temperature is 9.6°C.

Vegetation Vegetation varies considerably due to the large altitudinal range within the park. There is some lower montane forest (now mainly lost to agriculture). Between 2,400 and 2,500m, there is *Neoboutonia* forest. From 2,500 to 3,200m *Arundinaria alpina* (bamboo) forest occurs, covering about 30% of the park area. From 2,600 to 3,600m, mainly on the more humid slopes in the south and west, is *Hagenia-Hypericum* forest, which covers about 30% of the park. This is one of the largest forests in Africa with *Hagenia abyssinica*. The vegetation from 35-4,200m is characterised by *Lobelia wollastonii*, *L. lanurensis*, and *Senecio erici-rosenii* and covers about 25% of the park. From 4,300 to 4,500m grassland occurs. Secondary thicket, meadows, marshes, swamps and small lakes also occur, but their total area is relatively small.

Fauna The park is best known for mountain gorilla *Gorilla gorilla berengei* (T) with a population in 1980 of 250 in the area covered by the parc national des Volcans, and the

Virunga National Park in Zaïre, about 110 occurring in the former. This subspecies is endemic to Virunga Mountain and Bwindi Forest in Uganda. Other mammals include: elephant *Loxodonta africana* (T), black-fronted duiker *Cephalophus niger*, buffalo *Syncerus caffer*, spotted hyena *Crocuta crocuta* and bushbuck *Tragelaphus scriptus*. There are 178 recorded bird species that include Grauer's swamp warbler *Bradypterus graueri* (V) and at least 13 species endemic to the Virunga and Ruwenzori Mountains including: handsome francolin *Francolinus nobilis*, Ruwenzori turaco *Tauraco johnstoni*, Ruwenzori flycatcher *Batis diops*, strange weaver *Ploceus alienus*, dusky crimson-wing *Cryptospiza jacksoni* and Shelley's crimson-wing *C. shellei*, and 16 endemic subspecies.

Conservation Management A management plan is being developed and should be available soon. A public awareness programme on the park periphery aims to promote understanding of the park and stimulate local support. It includes creation of wildlife clubs in primary schools, park visits by local people, and film shows in the villages with Kinyarwanda commentaries. An IUCN/WWF mission in 1985 noted that there was perhaps insufficient interaction between the management of the park, and the scientific research done within it.

Zoning Zones have developed with general usage, but have no fixed boundaries. They are: research zone (between Karisimbi and Bisoke), tourism zone (Bisoke and between Bisoke and Sabinyo), and strict reserve zone. There is no buffer zone.

Disturbances or Deficiencies The main threat is the possibility of further excision of park areas by the Government for agricultural purposes, but this has now been halted. The park is already reduced to a size which may not be large enough to support viable populations of some species were it not for the neighbouring protected areas in Zaïre and Uganda. Lack of technical and administrative staff and absence of a buffer zone are problems, but their effect is exacerbated by population increase on the park periphery. Damage to agriculture in the periphery area, particularly by buffalo, seems to be increasing and could cause resentment from local people. Gorilla poaching affects both survival of the species in this area and tourism. Problems associated with tourism are: over-demand for gorilla viewing and degradation of upland habitats through trampling, but these can be controlled. Other problems include encroachment, illegal wood and bamboo cutting, and feral dogs. Grazing is now under control. The yellow duiker *Cephalophus sylvicultor* probably occupied areas that have been turned over to cultivation in the past 30 years and it has now disappeared from the park. Leopard *Panthera pardus* (T) was also present, but there have been no records since 1979. Recently a number of gorillas have died of an unknown illness.

Visitor Facilities The Mountain Gorilla Project, jointly financed by the African Wildlife Foundation (AWF), the Flora and Fauna Preservation Society (FFPS), Peoples Trust for Endangered Species (PTEF) and WWF has worked to improve tourism so as to achieve economic independence for the park. This has involved habituating four gorilla families to the presence of humans so that visitors can be guaranteed close-up views. Cooperation Belge has also contributed finance to set up a new park bureau/guest house and visitor reception complex, now approaching completion.

Scientific Research There are general surveys on the ecology and status of bird populations, and intensive research on the mountain gorilla and its habitat has been carried out for the past 15 years, including a census in 1980 funded by WWF and New York Zoological Society.

Special Scientific Facilities No information

Principal Reference Material

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Staff Some 45-55 staff: two administrative, 28 guards, specialist gorilla guides/trackers or hiking guides, and watchmen. Three Mountain Gorilla Project staff, and one full-time and two part-time MGP guide/trackers.

Budget Environmental education in the park is financed jointly by WWF, FFPS and PTES.

Local Park or Reserve Administration Office Rwandais du Tourisme et des Parcs Nationaux, PO Box 905, Kigali.

Date May 1985

SAO TOME AND PRINCIPE

Area 964 sq.km

Population 102,000 (UN estimate 1984)

Parks and Reserves Legislation The islands became an independent democratic republic on July 12 1975 with a new Constitution approved on 12 December 1975. Independence all agricultural land was nationalized. There is apparently no general legislation dealing with the establishment of protected areas, and there are also no overall species protection laws. However, some species were afforded protection in law in 1955 (eg. Maroon Pigeon *Columba thomensis*).

Parks and Reserves Administration At present there are no protected areas designated.

Address

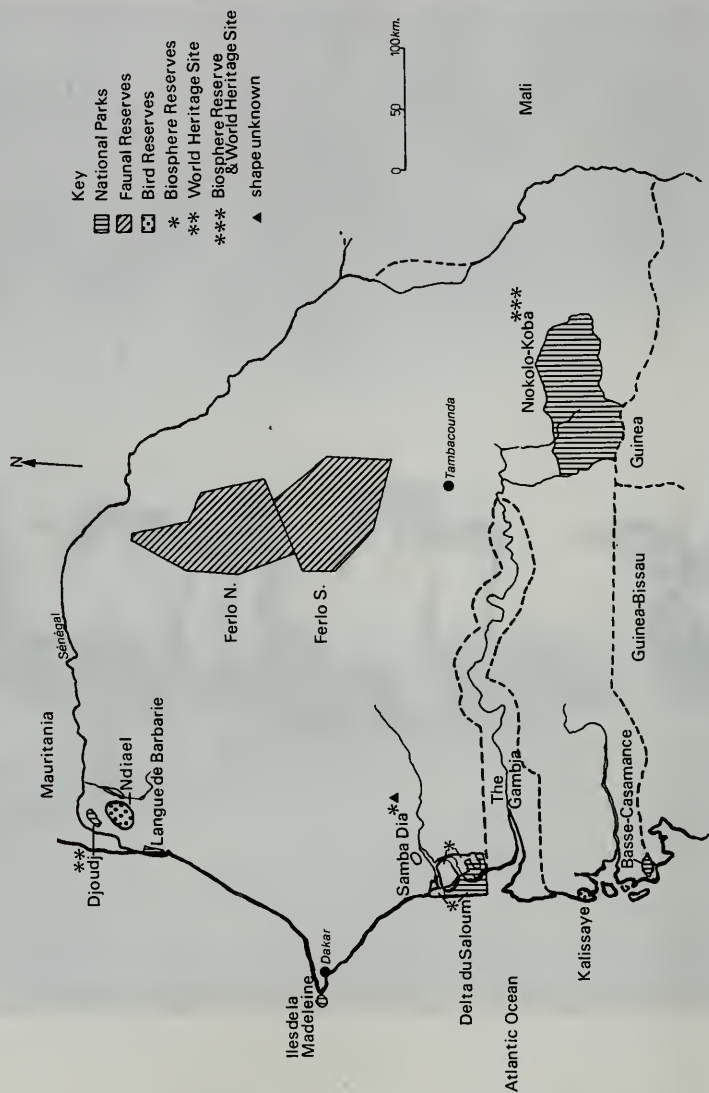
- ° Ministry of Cooperation, Sao Tomé.
- ° Ministry of Agriculture and Animal Husbandry, Sao Tomé.

Additional Information These volcanic islands support a rich endemic flora and fauna comprised of 30 species and 20 subspecies of birds, two species of bat, one species of shrew and 148 endemic species of plants. Forest destruction was widespread during the period 1890-1920 when most lowland areas were cleared for plantations, mainly of cocoa. On Principé, only the upper reaches of Rio Quija and Io Grande retain forest but on Sao Tomé an untouched area of 200 sq.km remains southwest of the main peak. An EEC sponsored consultancy on food production measures included recommendations on land utilization and forestry exploitation, although increased human population and economic and agricultural development and tourism are likely to increase pressure on the remaining forest areas. In 1985 a general discussion dealing with nature conservation was initiated by the Ministry of Agriculture and specifically a joint Sao Tomé government/ICBP survey project (Sao Tomé and Principé Bird Preservation Project) was put forward in January 1985 by the Ministry of Cooperation.

References

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- ° Davis, S.D., Droop, S.J.M., Gregerson, P., Henson, L., Leon, C.J., Lamlein Villa-Lobos, J., Syngae, H. and Zantovska, J. (1986). *Plants in Danger. What do we know?*. IUCN, Gland and Cambridge.
- ° ICBP (1986). The University of Edinburgh and International Council for Bird Preservation Expedition to Sao Tomé and Principé. Unpublished project outline.
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Senegal

SENEGAL

Area 197,160 sq.km

Population 6,300,000 (1984)

Parks and Reserves Legislation A Forest Code and the Code of Hunting and the Protection of Nature (1967) form the principal conservation legislation in force, and are currently being improved. Areas defined by this legislation are National Parks, Réserves de faune, Réserves naturelles intégrale, Réserves spéciales, Zones d'intérêt cynégétique and Classified Forests (forêts domaniales classées). Each national park is established by Presidential Decree, and has its own set of rules and regulations, but essentially all use of natural resources within such areas is prohibited, and they are closed to all activities except scientific research, education and tourism. Within strict reserves, all activities are banned, without special authorisation of the Minister. Within special reserves, protection varies depending on the reasons for establishment, and may range from fairly wide protective measures to protection for a few species, and can be temporary (or presumably seasonal). Réserve de faune is basically the definition applied to all land classified under the Forestry Code other than national parks, strict reserves, and special reserves. All hunting is forbidden except under certain circumstances. Hunting and other forms of exploitation are therefore banned within classified forests (which cover over 10,000 sq.km), though this has not prevented encroachment. Zones d'intérêt cynégétique are areas where hunting is permitted under certain controls which are detailed in the individual pieces of legislation setting up each area. There are nine such areas, covering nearly 20,000 sq.km. Presidential Decree 69-858 of 22 July 1969 made the National Parks Office responsible for all parks, under the direct control of the Prime Minister. The Department of National Parks (Direction des parcs nationaux) was set up by Parks Directorate of April 1973.

Parks and Reserves Administration The National Parks Directorate now comes under the responsibility of the Ministry of Nature Protection. There is also a National Committee to deal with poaching, and a Council of Hunting. Protected areas other than national parks are administered by the Direction des eaux, forêts et chasses.

Address

- ° Direction des parcs nationaux, Ministère de la protection de la nature, Point E, BP 5135, Dakar Fann.
- ° Direction des eaux, forêts et chasses, BP 1831, Dakar.

Additional Information The principal problems concerning nature conservation in Senegal are persistent drought, mining exploration (particularly for iron in the north), the dam at Kereti and other water removal projects, and poaching of species such as marine turtles, sea-birds, crocodiles, and elephant. Prior to 1972 the government responded to the perceived loss of natural heritage by reorganising parks, creating a National Parks Service and six new reserves, and establishing anti-poaching committees at all levels. Legislation and consequent control was also reviewed and improved. However, there was an upsurge in poaching in 1973, and the Government took even stricter measures (including shooting poachers after a legal summons). Senegalese parks are perhaps amongst the most heavily guarded in the world, yet poaching is still a serious problem due to the large financial incentives.

Conservation education has been organised by the National Parks Directorate since 1976 in conjunction with IUCN/WWF. There are seven Amis de la Nature Clubs, and a mobile education unit.

References

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- ° Hesse, J. (1984). Rapport Préparatoire a l'Etude Comparative des Politiques de Conservation de la Nature et de leurs Implications Economiques dans des pays anglophones d'Afrique de l'est (Kenya, Tanzanie) et des pays francophones d'Afrique de l'Ouest (Cameroun, Sénégal). Secretariat d'état a l'environnement et à la qualité de la vie. Federation des parcs naturels de France.
- ° Larivière, J. and Dupuy, A.R. (1978). *Sénégal: Ses Parcs, Ses Animaux*. Editions Fernand Nathan, Paris.
- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° IUCN/WWF Project 1238. Senegal, Conservation Education.
- ° IUCN/WWF Project 1552. Senegal, Education Centre.
- ° IUCN/WWF Project 1774. Senegal, Conservation of Elephants.
- ° IUCN/WWF Project 1814. Senegal, Conservation of Coastal and Marine Resources.

Protected Areas

(hectares)

National Parks

Basse-Casamance	5,000
Delta du Saloum	73,000
Djoudj	16,000
Iles de la Madeleine	450
Langue de Barbarie	2,000
Niokolo-Koba	913,000
Subtotal	1,009,450

Faunal Reserves

Gueumbeul	750
Ferlo-Nord	487,000
Ferlo-Sud	633,700
Subtotal	1,121,450

Reserves

Kalissaye Bird	16
Ndiael Bird	46,550
Subtotal	46,566

Biosphere Reserves

Delta du Saloum	180,000
Foret classée de Samba Dia	756
Parc national du Niokolo-Koba	913,000
Subtotal	1,093,756

World Heritage Sites

Djoudj National Bird Sanctuary	16,000
Niokolo-Koba National Park	913,000
Subtotal	929,000

PARC NATIONAL DE BASSE CASAMANCE

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established 1 April 1970. Appropriated by Law 64-46 of 17 June 1964.

Geographical Location South-west of Ziguinchor in Casamance region in the south-west of the country, near the border with Guinea Bissau. 12°24'N, 16°35'W.

Altitude 0-11m

Area 5,000ha; adjacent to the classified forest of Diantheme

Land Tenure Government

Physical Features The park is in part of the Casamance delta. The western part has numerous meandering tidal channels, fringed with mangroves, which grow in compacted clay soils. Salt collects in the higher tidal zones in the dry season, creating seasonally bare areas. The eastern part of the reserve is higher, but very flat. The wet season is from May to October.

Vegetation The park was set up to preserve an area of Guinean flora and fauna which is only found in this part of Senegal. There are three types of vegetation, tropical forest, wooded savanna, and mangrove. The southern part is covered with degraded forest or secondary brush. The forest contains Guinean species, such as *Parinari excelsa*, with *Pithecolobium altissimum*, *Chlorophora regia*, *Detarium senegalense*, and numerous *Treculia africana* in the lower canopy. These islands of forest are in the Santiaba-Mandjak forest. The mangrove community fringing the estuarine channels is zoned. From the water's edge, these are: mangroves *Rhizophora racemosa*; a thick band of *Rhizophora mangle* with *Paspalum vaginatum*; *Avicennia africana* with *Rhizophora mangle* and an understorey of either *Scirpus littoralis* or *Sesuvium portulacastrum* and *Philoxyrus vermicularis*; and the areas of bare soil described above, which are colonized by *Eleocharis mutata* and *Eleocharis geniculata*.

Fauna More than 50 species of mammal have been recorded, including: a few leopard *Panthera pardus*, buffalo *Syncerus caffer*, and manatee *Trichechus senegalensis* (T). Particularly obvious amongst the mammals are the monkeys, including mona monkey *Cercopithecus campbelli*, Demidoff's galago *Galagoides demidoffi*, bay colobus *Colobus badius temmincki*, also giant pangolin *Manis gigantea* and serval *Felis serval* occur. Beecroft's flying squirrel *Anomalurus beecrofti* occurs nowhere else in Senegal. There are many antelope species. Birds are well represented with over 200 species, including Palaearctic migrants particularly waders. There are two nesting pairs of crowned eagle *Stephanoaetus coronatus*. Large numbers of reptiles include royal python *Python regius*, rock python *Python sebae*, and spitting cobra *Naja nigricollis*.

Conservation Management Some animals including kob *Kobus Kob* have been reintroduced.

Zoning There are administrative sectors coordinated by a conservator.

Disturbances or Deficiencies No information

Visitor Facilities Cap Skirring airport is 20km away, or road access is through Ziguinchor. There are vehicle tracks, paths and observation hides; canoes can be hired. There are bungalows at the campment and hotels nearby in Ziguinchor.

Scientific Research A small amount of research has been sponsored for a number of years by the Institut Fondamental d'Afrique Noire.

Special Scientific Facilities None

Principal Reference Material

- ° Dupuy, A. (1971). Le parc national de Basse-Casamance. *Science et nature* 105 (May-June): 16-21.
- ° Larivière, J. and Dupuy, A. (1978). *Sénégal: Ses parcs, Ses animaux*. Editions Nathan: Paris.
- ° Marius, C. (1979). *Bulletin de l'Institut Fondamental d'Afrique Noire* 41(4): 669-691.

Staff Some 20 personnel directed by a conservator

Budget Personnel: 11,943,000 francs CFA. Maintenance: 5,664,000 francs CFA

Local Park or Reserve Administration Parc Conservator, Parc National de Basse-Casamance, Oussouye.

Date April 1985

DELTA DU SALOUM

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Law 64-46 of 17 June 1964 on state land; law 72-02 of 1 February 1972 relating to territorial organisation; law 72-25 of 19 April 1972 relating to rural communities. Code of hunting and protection of fauna.

Date Established Established as a National Park by Decree no. 76-577, 28 May 1976. An international park with the Gambia is being planned. Accepted as a Biosphere Reserve in 1980 and listed as a Ramsar site in 1984.

Geographical Location The reserve is located 150km from Dakar, on the main road between Dakar and Banjul, and 80km from the town of Kaolack. 13°35'-13°55'N, 16°27'-16°48'W.

Altitude 0-10m

Area The Biosphere Reserve is 180,000ha, with a core zone of 73,000ha (the National Park). Four-fifths of the national park is marine, whereas the biosphere reserve comprises a 72,000ha marine sector, 23,000ha of flooded areas, and 85,000ha of terrestrial islands.

Land Tenure The core area (the National Park) and part of the buffer zone are government-owned. The remainder belongs to the local community.

Physical Features The park and biosphere reserve are in the Delta of the seasonal Sine and Saloum rivers, and the area includes many sand islands and lagoons, the Sangomar point and coastal waters, and the forests of Fathala. Most of the terrestrial area of the park is covered by mangroves, sand dunes, and open forest on sandy soils, and the distributaries of the delta at the coast are almost exclusively saline. The climate comes between the sudanese and the sudano-sahelian types characterised by a rainy season in July-October (maximum in August). The mean annual temperature is 28°C and mean annual precipitation 800mm.

Vegetation The dominant element is mangrove, made up principally of four species: *Rhizophora racemosa*, *R. mangle*, *R. harrisonii* and *Avicennia nitida*. Behind this zone of mangroves are open flat areas: the tanns, denuded of all vegetation. There are, moreover, islands of herbaceous populations of halophiles of varying importance: *Sesuvium portulacastrum*, *Philoxerus vermicularis*, and *Paspalum vaginatum*. Fathala has a dry forest.

Fauna Large mammals have probably never been abundant here. The fauna is, however, sudano-sahelian, and very varied, with many small mammals in the dry forest of Fathala. There are also bay colobus *Colobus badius temmincki* present. On the coast of particular note are the manatee *Trichechus senegalensis* (T) and hump-backed dolphin *Sousa teuszii*. Many seabirds nest on the deserted islands, including about 1,000 pairs each of lesser flamingo *Phoenicopterus minor* and greater flamingo *P. ruber*, 4,000 grey pelicans *Pelecanus rufescens*, and there are ten pairs of goliath heron *Ardea goliath*. Many wintering waders use the area. Reptiles are also well represented predominately by marine turtles, including olive ridley turtle *Lepidochelys olivacea* (E), green turtle *Chelonia mydas* (E), and loggerhead sea turtle *Caretta caretta* (V). It is an important fish spawning ground.

Conservation Management There is an environmental education programme. The inhabitants of the biosphere reserve participate in its running and management through a rural council in liaison with national park and forest service authorities. Radios have been provided by IUCN/WWF Project 3113 to help safeguard the fish spawning grounds.

Zoning The core area of national park is surrounded by a buffer zone (which gives a total of just over 73,000ha). The classified forest zone, where exploitation is forbidden, comprises the forests of the islands of Saloum, Béhtanti, Sangako, and Fathala (around 70,000ha). Part of the groundnut lands and Point Sangomar and its fishing cooperative (around 90,000ha) are included in the buffer zone. A special faunal reserve has been established at Palmarin. Several administrative sectors are co-ordinated by a Park Conservator.

Disturbances or Deficiencies There is a permanent threat to the mangroves by extension of rice culture and exploitation of forest in the Fathala area. Protection does not extend to the salt flats, or to the whole of the Fathala forest. There are, however, proposals to include the whole of the latter within the park. Other threats include: fire in the forest zone, excessive fishing, destruction of bird colonies, projects on reintroducing species such as antelope *Hippotragus* sp., and conflicts with industrial and agricultural development.

Visitor Facilities Access is prohibited onto the sandy islands, but small motor boats can be hired to tour around them. There is tourist potential as the park is close to Dakar and the region of Sine Saloum is a centre for tourism. On the borders of the park, there are two campements, one near park headquarters with excellent facilities.

Scientific Research There have been studies of birds and mammals, vegetation and water pollution, but little published.

Special Scientific Facilities There is a meteorological station.

Principal Reference Material

- ° IUCN/WWF Project 3113. Proposed Delta du Saloum International Park.
- ° Lavière, J. and Dupuy, A. (1978). *Sénégal: Ses parcs, Ses animaux*. Editions Fernand Nathan, Paris.

Staff Some 37 personnel directed by a coordinator

Budget Personnel: 19,585,000 francs CFA. Materials: 7,995,000 francs CFA.

Local Park or Reserve Administration Park warden, BP 307, Kaolack.

Date April 1985

PARC NATIONAL DES OISEAUX DE DJOUDJ

Management Category II (National Park)

World Heritage Site (Criteria: iv)

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Total, with only 'educational tourism' and scientific research allowed

Date Established 14 April 1971 by Decree No. 71-411. Nearby area (3ha) was first classified as a nature reserve by Decree 62-065 of 26 February 1962. Enlarged in 1975 by Decree No. 75-1222 (from 13,000ha to 16,000ha). Listed as a Ramsar Site in 1980 and accepted as a World Heritage site in 1981.

Geographical Location In a low valley 15km north of Ross-Bethio and about 60km north-east of Saint-Louis on the Delta of the Senegal River, Region du Fleuve, in the extreme north of the country. 16°30'N, 16°10'W.

Altitude From near sea level to about 20m

Area 16,000ha; adjacent to the proposed Diawling National Park in Mauritania

Land Tenure Government

Physical Features The park is in a vast basin of impermeable halomorphic soils forming saline flats in the Senegal River Delta between the main channel to the north, the Djoudj bayou and the Gorom, or bayou to the south. This delta, of which Djoudj is a small part, has been subject to flooding and to the development of dyke systems for many years, the latest in 1963. These dykes have allowed the retention of fresh water in the Djoudj basin longer than normal, which benefits the waterbirds. Salinity varies, from nearly fresh during the winter inundations to brackish as the water levels fall. The climate is Sahelian with alternate wet and dry seasons. Mean annual precipitation is 300mm and mean annual temperature 27°C. During the dry season, it is the wettest area in the region, but in recent years rainfall has been less than a fifth of the average and Djoudj has been much dryer.

Vegetation Vegetation reflects a low rainfall on unfavourable halomorphic soils. The Sahelian type savanna is dominated by spiny bushes, acacias such as *Acacia nilotica*, *A. tortilis*, *A. seyal*, tamarisk *Tamarix senegalensis*, and *Balanites aegyptiaca*. During the rains dense populations of *Typha* and waterlily *Nymphaea* spp. species appear in the flooded zones. Halophytic plants, particularly *Salicornia*, cover much of the area.

Fauna The park was mainly established as the area is so important for birds supporting three million waterfowl, and is one of the main west African sanctuaries for Palaearctic migrants. It is one of the first fresh water sources they reach after crossing 200km of the Sahara. From September to April, an estimated three million migrants pass through, including garganey *Anas querquedula*, shoveller *Anas clypeata*, pintail *Anas acuta*, ruff *Philomachus pugnax*, and black-tailed godwit *Limosa limosa*. Thousands of flamingoes *Phoenicopterus ruber* nest here regularly as well as 5,000 white pelicans *Pelecanus onocrotalus*, white-faced tree duck *Dendrocygna viduata*, fulvous tree duck *Dendrocygna bicolor*, spur-winged goose *Plectropterus gambensis*, purple heron *Ardea purpurea*, night heron *Nycticorax nycticorax*, various egrets *Egretta* spp., spoonbill *Platalea leucorodia*, African darter *Anhinga rufa*, common cormorant *Phalacrocorax carbo*, white-breasted cormorant *Phalacrocorax lucidus* and Sudan bustard *Otis arabs*. Mammals include: warthog *Phacochoerus aethiopicus* and West African manatee *Trichechus senegalensis* (T), and several species of crocodile and gazelle have been successfully reintroduced into the area.

Conservation Management National Park wardens are stationed in five watch posts, one in the centre and four on the boundaries. The park is closed three months of the year for park management. A dyke has been built right around the park as well as a dam system so that water levels will not be affected by the alternating flow of the River Senegal after the barrages have been built.

Zoning Various administration zones co-ordinated by a ranger

Disturbances or Deficiencies Rainfall has been too low in the past few years for water levels to be normal. The Compagnie Sucrière Sénégalaise built a temporary dam just upstream of Djoudj at Kheune to prevent salt water flowing up the Senegal River in the dry season. This had the effect of reducing the supply of fresh water to Djoudj. The river's 1984 flood swept this away and Djoudj was replenished normally. In the 1984/1985 dry season, Djoudj was connected by canal with fresh water above the Kheune barrage in an attempt to stop it drying out. Water supply in this region is a problem, and permanent dams are being built to regulate the flow of the Senegal River. Completion of the dam of Diama in 1986 would improve water supply for Djoudj although the effects of another dam at Monatali in Mali (expected 1984) are as yet unknown. However, the habitats at Djoudj are adapted to changing water levels, which may be altered by these dams. Djoudj was put on the list of World Heritage Sites in Danger because of this threat (Thorsell 1985).

Visitor Facilities There is a campement open from mid-November to mid-April and hotels in St Louis nearby. There are a dozen bird observation points on the borders of the most important waterbodies. Canoes can be hired.

Scientific Research Research includes rodent studies, bird ringing to investigate migration routes, and population dynamics. O.R.S.T.O.M. has sponsored research in this area since 1955. Studies of waders were carried out in 1983-1984 by Station Biozofique de la Tour du Valat, France.

Special Scientific Facilities Museum and observation hut

Principal Reference Material

- ° CNPPA Summary Status Report (1984). Threatened Protected Areas of the World. (draft).
- ° Dupuy, A. (1971). Les oiseaux et les mammifères de la cuvette du Djoudj (delta du fleuve Sénégal). *Bull. IFAN* 33, A(1): 237-248.
- ° Dupuy, A. (1971). Contribution à l'étude de l'avifaune du delta du Sénégal. *Bull. IFAN* 33, A(3): 737-753.
- ° Dupuy, A.R. (1971). Mission au nouveau parc national des oiseaux du Djoudj. *Notes Africaines* 132.
- ° Dupuy, A.R. (1972). Le parc national des oiseaux du Djoudj. *Bull. IFAN* 34, A(3): 775-81.
- ° Larivière, J. and Dupuy, A.R. (1978). *Sénégal: Ses parcs, Ses animaux*. Editions Fernand Nathan, Paris.
- ° Roux, F., Jarry, G., Maheao, and Tamisier, R. (1976). Importance, structure et origine des populations d'Anatides hivernant dans le delta du Sénégal. *L'Oiseau R.F.O.* 46: 299-336 and 47: 1-24. Secrétariat d'Etat chargé de la nature. (1974). Le parc national des oiseaux du Djoudj, Dakar.
- ° Thorsell, J. (1985). World Heritage Report - 1984. *Parks* 10(1): 8-9. World Heritage Nomination submitted to UNESCO. Documentation submitted to the Ramsar Convention Secretariat.

Staff Some 35 personnel directed by a conservateur

Budget Personnel: 17,857,000 francs CFA. Maintenance: 10,823,000 francs CFA

Local Park or Reserve Administration Conservateur, Parc national des Oiseaux de Djoudj, Saint Louis BP 80.

Date April 1985

PARC NATIONAL DES ILES DE LA MADELEINE

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total; no access allowed

Date Established Ornithological Reserve since 1949; appropriated by Law 64-46 of 17 June 1964; established as a National Park on 16 January 1976 by Decree No. 76-0033.

Geographical Location About 4km west of Dakar in the Atlantic Ocean; Approximately 14°40'N, 17°40'W.

Altitude 0-35m

Area 450ha; the marine section includes the peripheral area 50m from the beach

Land Tenure Government

Physical Features The park consists of three islands of volcanic origin, composed mainly of basanite. The largest island, Sarpan, is 15ha, and has a central plateau which slopes gently down to a cove on the southern side. There is a natural basin 40 x 10m and 4m deep, on one side of this plateau. Two sources of water exist during part of the year.

Vegetation To date about 100 species of plant have been reported, including baobabs *Adansonia digitata*. The most evident plants are *Jatropha curcas*, jujuba trees *Opuntia tuna* and tamarind trees *Cissus quadrangularis*. *Andropogon gayanus* is found at higher altitudes.

Fauna The varied avifauna is the main feature, with nesting colonies of pied crow *Corvus albus*, black kite *Milvus migrans*, crested lark *Galerida cristata* and red bishop *Euplectes orix*. Some 300 pairs of common cormorant *Phalacrocorax carbo* breed on five sites in the park. The osprey *Pandion haliaetus*, peregrine falcon *Falco peregrinus*, 40 breeding pairs of red-bellied tropic bird *Phaethon aethereus mesonauta*, brown booby *Sula leucogaster*, northern gannet *Morus bassanus*, and bridled tern *Sterna anaethetus* are also present. The marine fauna is rich and varied with many species of fish including *Pomatomus saltatrix* and *Katrumonus pelamus*. Three species of dolphin, common dolphin *Delphinus delphis*, rough toothed dolphin *Steno bredanensis*, and striped dolphin *Stenella coeruleoalba* have also been recorded. The loggerhead turtle *Caretta caretta* has bred on a small beach.

Conservation Management In 1976 a fast sea-going vessel was supplied under IUCN/WWF Project 1232 for carrying out protective patrols and research. Its speed and stability enabled poaching to be completely eradicated.

Zoning No subdivision

Disturbances or Deficiencies Uncontrolled development of sport activities, in particular sport fishing

Scientific Research Protection of archaeological sites and artifacts; biological research by IFAN (1982).

Special Scientific Facilities No information

Principal Reference Material

° IUCN/WWF Project 1232. Iles de la Madeleine, Senegal.

° Larivière, J. and Dupuy, A. (1978). *Senegal: Ses parcs, Ses animaux*. Editions Fernand Nathan, Paris.

Staff 10 personnel directed by a conservator (1980)

Budget Personnel: 6,525,000 francs CFA, Materials, 3,300,000francs CFA (1980)

Local Park or Reserve Administration The Conservator, Parc national des Iles de la Madeleine, BP 5135, Dakar-Fann.

Date April 1985

PARC NATIONAL DE LA LANGUE DE BARBARIE

Management Category II (National Park)

Biogeographical Province 3.12.07 (Western Sahel)

Legal Protection Total; access not allowed without the authorities' approval

Date Established Established January 1976 by Decree No. 76-0016. Appropriated under Law No. 64-46 of 17 June 1964.

Geographical Location At the mouth of the Senegal river, 25km from Saint Louis; 15°55' N, 16°30'W

Altitude Near sea level

Area 2,000ha

Land Tenure Government

Physical Features The park includes a 20km long area of intertidal flats and sand dunes forming a spit across the mouth of the River Senegal and includes both marine and riverine waters. The major terrestrial part of the park is composed of three islands of the Langue de Barbarie, Gandiole Island (2ha), and two smaller ones. There are very infertile sandy soils. Annual rainfall is about 300mm and mean annual temperature 27°C.

Vegetation This is Sahelian, composed of herbaceous species such as *Ipomoea pes-caprae*, *Alternanthera maritima*, *Sporobolus spicatus*, and *Sesuvium portulacastrum*. No trees are found in the area.

Fauna The park supports an interesting maritime avifauna including: many pink-baked pelican *Pelecanus rufescens*, white pelican *P. onocrotalus*, 3,000 pairs of grey-headed gull *Larus cirrhocephalus*, Caspian tern *Hydroprogne caspia*, royal tern *Thalasseus maximus*, 2,000 pairs of slender-billed gull *Larus genei*, gull-billed tern *Gelochelidon nilotica* (southern breeding limit), sooty tern *Sterna fuscata* and little tern *Sterna albifrons* (southern breeding limit), all of which nest in the area. The park is also an important sanctuary for migratory ducks and waders. Ospreys *Pandion haliaetus* can be seen in the area. The marine fauna includes the green turtle *Chelonia mydas* (E), leather-backed turtle *Dermochelys coriacea* (E) hawksbill turtles *Eretmochelys imbricata*, loggerhead sea turtle *Caretta caretta*, and common dolphin *Delphinus delphis*.

Zoning The park is divided into a number of sectors co-ordinated by a conservator.

Disturbances or Deficiencies Insufficient funding

Visitor Facilities Access is by road or boat from St Louis. Visitors are not allowed to land on the islands as this would scare the large numbers of birds, but boats can be hired at the information bureau. St Louis has hotels and an airstrip.

Scientific Research Project to re-introduce gazelles

Special Scientific Facilities None

Principal Reference Material None listed

Staff Fifteen personnel directed by a conservator

Budget Personnel: 9,300,000 francs CFA. Materials: 3,375,000 francs CFA.

Local Park or Reserve Administration Conservator, Parc National de la Langue de Barbarie, Saint Louis BP 305.

Date April 1985

PARC NATIONAL DU NIOKOLO-KOBA

Management Category II and IX (National Park and Biosphere Reserve)

World Heritage Site (Criteria: iii, iv)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established Created as a Hunting Reserve in 1926, Forest Reserve in 1951 and a Fauna Reserve on 19 April 1953 and enlarged by Decrees of 1962, 1965, 1968 and 1969. Accepted as Biosphere Reserve and World Heritage Site in 1981.

Geographical Location Lying across the border between administrative regions of Sénégal-Oriental and La Casamance, on the River Gambia, close to the Guinea border in south-eastern Senegal. 12°30'-13°20'N, 12°20'-13°35'W.

Altitude 16-311m (Mont Assirik)

Area 913,000ha

Land Tenure Government

Physical Features The park is a relatively flat region, with small lines of hills reaching about 200m, separated by wide floodplains which become inundated during the rains. The whole area has superficial formations of laterite and sediments over Cambrian sandstone beds, which outcrop in places, and some metamorphic rock. The park is crossed by the River Gambia and its two tributaries, the Niokolo Koba and the Koulountou. The climate is of a soudanien type with a rainy season from June to October. The average annual rainfall is 1000-1100mm.

Vegetation Vegetation varies from a southern-Soudanien type to Guinean with savanna predominant, more luxuriant vegetation along the course of the rivers and a varying cover of trees and bushes. This vegetation changes its character according to topography and soils. In the valleys and plains, there are vast areas of *Vetiveria* and herbaceous savannas dominated

by *Andropogon gayanus*, occasionally associated with *Panicum anabaptistum*. Seasonally flooded grassland is typically composed of *Paspalum ariculare* and *Echinochloa*. Dry forest is made up of Soudanian species such as *Piliostigma thonningii*, *Pterocarpus erinaceus*, *Pericopsis africana*, *Bombax costatum*, *Burkea africana*, *Prosopis africana*, *Sterculia setigera*, *Ficus ingens*, and *Anogeissus leiocarpus*. There are also areas of bamboo *Oxytenanthera abyssinica*. In the ravines and gallery forests are species indicative of a south Guinean climate, with lianes very abundant, and species such as *Raphia sudanica*, *Baissea multiflora*, *Nauclea latifolia*, *Dalbergia saxatilis*, and *Landolphia dulcis*. On the slopes and hills, the rock outcrops, the alluvial sands and iron pans, the vegetation is different. On the edges of rivers occur semi-aquatic species such as *Rotula aquatica*, *Hygrophila odora*, *Cyperus baikiei*, and annuals, which disappear when the water level rises, are found in the periodically flooded sands. In and around the marshes, most of which are situated in abandoned riverbeds or behind the levées, the vegetation is very variable, depending on the height of the depression, water level, origins, soil structure and sub-soil. Certain ponds are bordered by dry forests, or herbaceous savannas, with species such as *Arundinella ecklonii*, *Eriochrysis brachypogon*, *Hemarthria altissima*, *Hyparrhenia amoena*, *Vetiveria nigriflora*, and *Andropogon gayanus* depending on dampness and the compaction of the soil. Occasionally, the centre of a marsh is occupied by thick thorn bushes of *Mimosa pigra*. Marshes on higher ground have a reduced surface area and scanty soil, very acid and peaty, and vegetation includes *Oryza brachyantha* (a wild rice), *Bryaspis lupulina*, *Adelostemma senegalense*, *Berchemia discolor*, and *Genlisea africana*. On high banks *Acacia nilotica*, *Cratogeomys religiosa*, *Diospyros mespiliformis* and *Ziziphus mucronata* are dominant, localised species occur on the constantly humid low banks, such as *Christiana africana*, *Cola laurifolia*, *Croton scarciessii*, *Cynometra vogelii*, *Diospyros elliotii*, *Syzygium guineense*, *Symmeria paniculata*, and *Ziziphus amphibia*. River bank species also include *Khaya senegalensis*, *Erythrophloeum guineense*, *Ceiba pentandra*, *Detarium senegalense*, *Syzygium guineense*, *Azela africana*, and *Borassus*. Some 1,500 plant species have been recorded and the listing continues.

Fauna There are about 80 species of mammal, 330 species of bird, 36 reptiles, 20 amphibians, and 60 species of fish recorded, as well as numerous invertebrates. Carnivores include: leopard *Panthera pardus* (T), lion *Panthera leo*, and hunting dog *Lycaon pictus* (T). There are also buffalo *Syncerus caffer*, roan *Hippotragus equinus*, giant eland *Taurotragus derbianus* (about 1,000), Guinea baboon *Papio papio*, green monkey *Cercopithecus aethiops sabaeus*, patas monkey *Erythrocebus patas*, bay colobus *Colobus badius temmincki*, all three African crocodiles: Nile *Crocodylus niloticus* (V), slender-snouted *Crocodylus cataphractus* (I) and dwarf *Osteolaemus tetraspis* (I), four tortoise species, and hippopotamus *Hippopotamus amphibius*, which is present in all three large watercourses in the park. The park is the last refuge in Senegal for giraffe *Giraffa camelopardalis* and elephant *Loxodonta africana* (T). About 150 chimpanzee *Pan troglodytes* (T) live in the gallery forest of the park and on Mont Assirik (the north-western limit of their distribution). Birds include: Denham's bustard *Neotis cafra denhami*, ground hornbill *Bucorvus abyssinicus*, violet turaco *Musophaga violacea*, spur-winged goose *Plectropterus gambensis*, white-faced tree duck *Dendrocygna viduata*, martial eagle *Polemaetus bellicosus* and bateleur *Terathopius ecaudatus*.

Conservation Management There is a general plan for management and restoration of natural ecosystems. Regional development plans recognize strict protection of the park. Some controlled burning is done to preserve savanna areas. WWF Project 1774 has supplied a land rover and radios to combat elephant poaching.

Zoning There is a buffer zone 1km wide and six administrative sectors, each of which contains surveillance posts.

Disturbances or Deficiencies The number of leopard and elephant in the park are decreasing because of the poaching over a number of years. The park is threatened by dams planned for the Gambia and Niokola-Koba Rivers, the creation of an artificial lake and increase accessibility associated with industrial exploration including mining and quarrying. When the park was established, it was inhabited by people practising agriculture, cattle raising, and some hunting and bush fires were used to control the vegetation which resulted in degraded soils, the emergence of savanna vegetation, and the disappearance of large animals in some areas.

However, all inhabitants were relocated outside the park area a decade ago, but areas outside and within the park are still burnt.

Visitor Facilities There is a luxury hotel at Simenti, which is the most visited part of the park. There are also bungalows and an hotel at Niokolo-Koba, lodgings at Badi, and several camping grounds. Animals can be watched from hides or on guided safaris. Animals disperse in the rains, so best viewing times are from the end of October to the end of June, when tours are most organized. There is an airstrip at Simenti.

Scientific Research Research is regarded as important with further details within the Memoirs of the IFAN of Dakar, particularly 1956, 1961, 1969, and 1982. An elephant survey was conducted in 1981 under IUCN/WWF Project 1774.

Special Scientific Facilities No information

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Staff Over 200 personnel directed by a conservator and assistant

Budget Personnel 116,570,000 francs CFA, maintenance 31,201,000 francs CFA.

Local Park or Reserve Administration Parc Conservateur, PN Niokolo-Koba, Tamba-Counda, BP 37. IUCN/WWF Project 1774.

Date July 1981

RESERVE DE FAUNE FERLO NORD/RESERVE DE FAUNE FERLO SUD

Management Category IV (Managed Nature Reserves)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Complete, except that grazing is permitted

Date Established Appropriated by Law No. 64-46 of 17 June 1964. Ferlo Nord was established 21 March 1971 by Decree No. 72.327, and Ferlo Sud on 21 March 1972 by Decree of Classification No. 72.347.

Geographical Location Central north-eastern Senegal. 14°20'-16°0'N, 13°20'-14°30'W.

Altitude Less than 100m

Area Ferlo Nord (487,000ha) and Ferlo Sud (663,700ha)

Land Tenure Government created by law no. 64-46 of 17 June 1964.

Physical Features The area is low-lying although over 300km inland. It has a flat sandy terrain, with pockets of clay. The area is crossed by several intermittent rivers, including the Ferlo. In the rainy season, the waters of streams form backwaters and basins which leads to large concentrations of animals. In recent years, rainfall has been very low, vegetation cover sparse, and strong winds have caused much erosion.

Vegetation Both areas are grassland and bushy savanna, with *Bombax costatum*, *Pterocarpus erinaceus*, *Combretum glutinosum* and *Acacia* spp., *Balanites aegyptiaca*, and *Boscia* spp.. However, recent low rainfalls and overgrazing are turning the area into desert.

Fauna This is declining in numbers and variety. Remaining but rare mammals include: red-fronted gazelle *Gazella rufifrons*, common duiker *Sylvicapra grimmia*, golden jackal *Canis aureus* striped hyena *Hyaena hyaena*, warthog *Phacochoerus aethiopicus*, aardvark *Orycteropus afer*, and patas *Erythrocebus patas*. Smaller mammals are more common, including crested porcupine *Hystrix cristata*, bush hare *Lepus whytei*, African civet *Civettictis civetta*, zorilla *Ictonyx striatus*, ratel *Mellivora capensis*, pale fox *Vulpes pallida*, and wild cat *Felis sylvestris*. *Testudo sulcata* also occur. Ostrich *Struthio camelus* are probably extinct in Senegal, there being no nests and only two birds in 1984, due to hunting. This whole area is an important wintering ground for many Palaearctic migrants, particularly raptors. Other birds include ground hornbill *Bucorvus abyssinicus*, Sudan bustard *Otis arabs*, and bateleur *Terathopius ecaudatus*.

Zoning Both reserves are divided into zones of surveillance for administrative purposes. There are six such zones in Ferlo Nord. There are proposals to establish a further zone within Ferlo Sud.

Disturbances or Deficiencies Some hunting and tree-cutting occurs, but the worst problem is overgrazing, aggravated by years of low rainfall. Many areas are bare sand and grass that does sprout after rain is eaten before it seeds. Strong winds erode bare areas and cause dust storms. There is no control on habitat destruction.

Scientific Research O.R.S.T.O.M. has done a lot of work in this area on birds (Morel and Morel, vegetation changes (Valenza), and social geography (Benoit).

Special Scientific Facilities None

Principal Reference Material

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Staff Provided by the Direction des Eaux, Forêts et Chasses, apart from the one man in charge

Budget Variable annual budget, allocated from a central budget

Local Park or Reserve Administration Direction des Eaux-Forêts et Chasses, BP 1831, Dakar.

Date April 1985

SANCTUAIRE ORNITHOLOGIQUE DE LA POINTE DE KALISSAYE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Integral

Date Established 28 July 1978 by Decree No. 78-809. Appropriated by Law No. 64-46 of 17 June 1964

Geographical Location Sankoye Point is in the department of Bignona (Casamance). 12°40'N, 16°45'W.

Altitude Near sea level

Area 16ha

Land Tenure Government

Physical Features The reserve is at the mouth of the Kalissaye. There are two sandy islands in the reserve. Changing currents alter the mobile sandy substrate continually, removing and accreting islands.

Vegetation There is herbaceous vegetation of sand-loving species of a littoral type. The vegetation of Sankoye Point is mainly of a bush type, contrasting with that of the islands, which is represented by such species as *Ipomoea pes-caprae*, *Sporobolus spicatus*, and *Alternanthera maritima*.

Fauna The sanctuary was set up to protect the breeding colonies of seabirds and breeding sites of marine turtles. There are at least 10,000 pairs of Caspian tern *Hydroprogne caspia*; many royal terns *Thalasseus maximus* and a large colony of white pelicans *Pelecanus onocrotalus*. Other bird species to be found in the reserve area include: gull-billed tern *Gelochelidon nilotica*, slender-billed gull *Larus genei*, grey-headed gull *Larus cirrhocephalus*, reef heron *Egretta gularis* (500 pairs), and osprey *Pandion haliaetus*. The marine fauna includes common dolphin *Delphinus delphis*. Crocodiles *Crocodylus niloticus* (V) and manatees *Trichechus senegalensis* (T) occur in the river areas of the reserve. Many marine turtles breed here, including green turtle *Chelonia mydas* (F) and loggerhead sea turtle *Caretta caretta* (V).

Zoning No information

Disturbances or Deficiencies The island, which forms the pelican colony, and a small sand bar, is suffering some erosion by currents.

Scientific Research The staff attempt to keep records of bird counts and unusual sightings.

Special Scientific Facilities A small, but very remote museum.

Principal Reference Material None listed

Staff A conservateur, based at Diouloulou, and four guards who have a camp near the sanctuary.

Budget Administration: 2,580,000 francs CFA

Local Park or Reserve Administration Bignona (Casamance).

Date April 1985

FORET CLASSEE DE SAMBA DIA

Management Category IX (Biosphere Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Traditional human intervention is allowed, but strictly supervised to avoid direct or indirect damage to the fauna.

Date Established Protected as classified forest since 1936. Approved as a Biosphere Reserve in 1979

Geographical Location Located in the Fatick district in the Sine-Saloum region, 6km from the Atlantic Ocean. Centred 14°08'N, 16°45'W.

Altitude 5-10m

Area 756ha

Land Tenure Government

Physical Features This forest is situated close to the sea and is subject to the influence of Atlantic trade winds. The climate is cool and humidity high. Mean annual rainfall is approximately 800mm.

Vegetation The coastal zone forests are similar to those of the Casamance, with species of the genera *Elaeis*, *Daniellia*, and *Pterocarpus*. The vegetation is dominated by *Borassus aethiopum*, but important species are: *Acacia seyal* forming pure stands in the lowest zones; Combretaceae, normal in this zone, are represented by *Combretum glutinosum* and *Anogeissus leiocarpus*; large trees of the sahelio-sudanian savanna are present. The most common species are: *Borassus flabellifer*, *Acacia seyal*, *Combretum glutinosum*, *Detarium microcarpum*, *D. senegalense*, *Acacia senegal*, *A. albida*, *Pterocarpus erinaceus*, *Khaya senegalensis*, *Sclerocarya birrea*, *Prosopis africana*, *Sterculia setigera*, *Parinarium macrophyllum*, *Tamarindus indica*, *Cordyla africana*, *Parkia biglobosa*, *Cassia sieberana*, *Grewia bicolor*, *Anogeissus leiocarpus*, *Daniellia oliveri*, *Mitragyna inermis*, *Dichrostachys cinerea*, *Annona glabra*, *Terminalia macroptera*, *Piliostigma reticulatum*, *Ficus* sp., *Elaeis guineensis*, *Phoenix reclinata*, *Tamarix senegalensis*, *Chloris prieurii*, *Gloriosa simplex*, *Asparagus pauli-guilelmi*, *Aristida* sp., *Hibiscus asper*, *Cenchrus biflorus*, *Sesbania pachycarpa*, *Cassia obtusifolia*, *Cyperus podocarpus*, *Dactyloctenium aegyptium*, and *Nymphaea micrantha*.

Fauna Mammals include: patas monkey *Erythrocebus patas*, palm rat *Xerus erythropus*, red mongoose *Herpestes sanguineus*, bushbuck *Tragelaphus scriptus*, civet *Civettictis civetta*, red-flanked jackal *Canis adustus*, common jackal *Canis aureus* and bush hare *Lepus whytei*.

Birds include: ground hornbill *Bucorvus abyssinicus*, red-billed hornbill *Tockus erythrorhynchus*, black dwarf-hornbill *Tockus harilaubi*, grey plantain-eater *Crinifer piscator*, green pigeon *Treron calva*, red-eyed dove *Streptopelia semitorquata*, common francolin *Francolinus bicalcaratus*, Namaqua dove *Oena capensis*, long-tailed glossy starling *Lamprotornis caudatus*, Senegal fire-finch *Lagonosticta senegala*, Senegal coucal *Centropus senegalensis*, chestnut-bellied sand grouse *Pterocles exustus*, rose-ringed parakeet *Psittacula krameri*, black kite *Milvus migrans*, pied crow *Corvus albus*, African pygmy kingfisher *Ispidina picta*, white-backed vulture *Gyps africanus*, hooded vulture *Necrosyrtes monachus*, cattle egret *Bubulcus ibis*, speckled pigeon *Columba guinea*, Abyssinian roller *Coracias abyssinica*, hoopoe *Upupa epops*, palm-nut vulture *Gypohierax angolensis*, laughing dove *Streptopelia senegalensis*, spur-winged plover *Vanellus spinosus*, grey kestrel *Falco ardosiaceus*, intermediate egret *Egretta intermedia*, and little egret *Egretta garzetta*. Reptiles include: rock python *Python sebae*, Nile monitor *Varanus niloticus*, green mamba *Dendroaspis viridis*, tortoise *Geochelone sulcata*, Nile crocodile *Crocodylus niloticus* (V), and puff adder *Bitis arietans*.

Conservation Management The preservation of the typical *Borassus* landscape necessitates the continuation of traditional human intervention and the management plan for the reserve takes this into account by allowing traditional collection of dead wood, wild fruits, medicinal herbs, gums and resins of *Borassus* plant parts by the local population who live outside the reserve. The peripheral areas of the reserve are farmed under contractual agreement, one of the clauses stipulating that a certain number of *Borassus* palms be left per hectare of cultivated land. Moderate grazing is practised in these areas in the dry season after harvesting.

Zoning No information

Disturbances or Deficiencies Farming and grazing in peripheral areas.

Visitor Facilities No information

Scientific Research The reserve offers great potential for research on man-environment interactions, particularly with *Borassus* palm use.

Special Scientific Facilities No information

Principal Reference Material

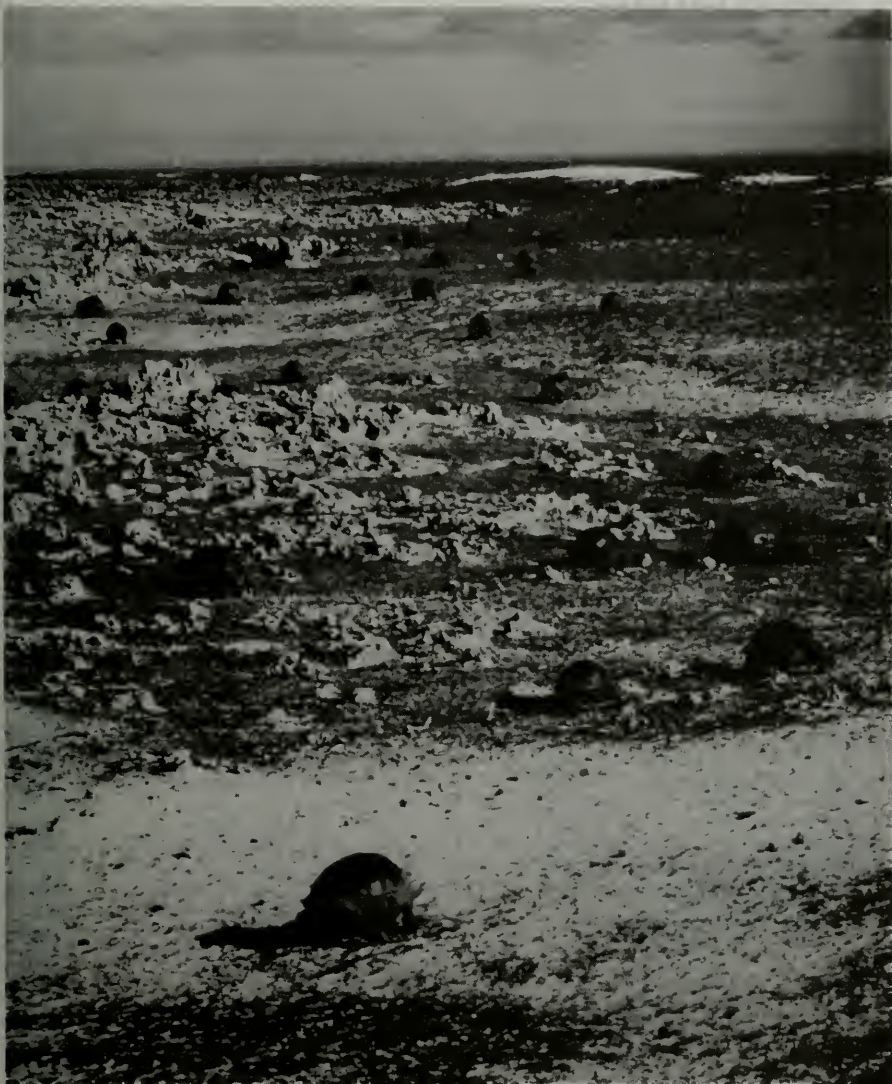
° None listed

Staff One Engineer and one Technician from the Forestry Service

Budget No information

Local Park or Reserve Administration Inspecteur des Eaux, Forêts et Chasses, Kaolack, Sine Saloum.

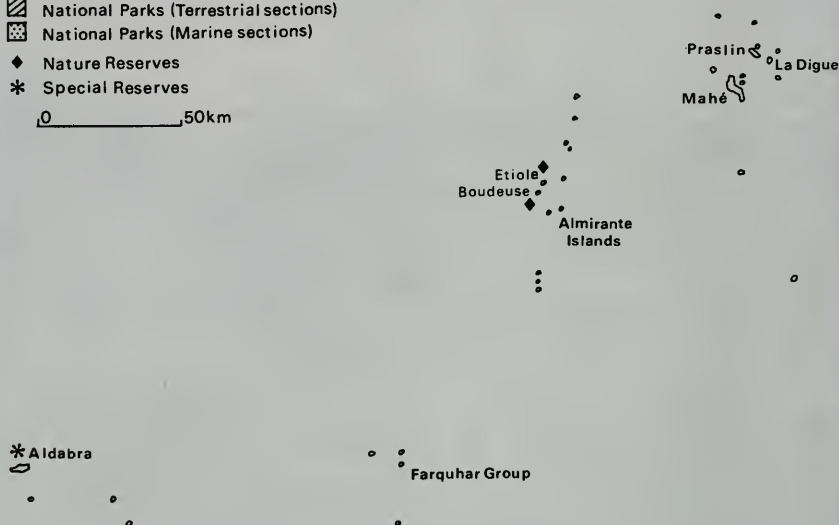
Date 1985



Seychelles

-  National Parks (Terrestrial sections)
-  National Parks (Marine sections)
-  Nature Reserves
-  Special Reserves

0 50km



SEYCHELLES

Area 444 sq.km

Population 64,718 (1984)

Parks and Reserves Legislation The National Parks and Nature Conservancy Ordinance 1969 and its various amendments (Ordinances, No. 14 of 1970 and No. 7 of 1973, Statutory Instrument No. 95 of 1975, and Act 19 of 1982), and the National Parks and Nature Conservancy Regulations, Statutory Instrument of No. 110 1971, provide the basis for the network of protected areas in the Seychelles. Section 2 of the Ordinance defines four types of protected area. An Area of Outstanding Natural Beauty would be an area set aside by reason of its natural beauty or other special characteristics for its preservation and maintenance for the benefit, advantage and enjoyment of the general public. National Parks are areas set aside for the propagation, protection and preservation of wildlife, or the preservation of sites of aesthetic, geological, prehistoric, historical, archaeological or other scientific interest, for the benefit of the general public. Special mention is made of Marine National Parks. It should be noted that designation of an area as a national park does not necessarily preclude agriculture, forestry or residential development. Special Reserves are areas set aside for the protection of characteristic wildlife, with all other interests subordinate to this aim. Strict Nature Reserves are areas set aside to permit free interaction of ecological factors without outside interference (except that necessary in safeguarding the reserve). The 1969 Ordinance also set up the National Parks and Nature Conservancy Commission, renamed the Seychelles National Environment Commission in 1982. The Forest Reserves Ordinance 1955 provides for the creation of Forest Reserves, though no clear definition of what such a reserve would constitute is given. Complete protection is given to woody vegetation and forest produce. The Wild Animals and Birds (protection) Ordinance 1961, as well as protecting most birds, the Giant Land Tortoise and the Seychelles pond turtle, allows for the establishment of Nature Reserves. The Wild Birds Protection (Nature Reserves) Regulation (S.I. 27 of 1966) created nature reserves on the islands of Beacon (Ile Seche), Booby (Ile aux Fous), Boudeuse, Etoile, King Ross (Lamperiaire), Les Mamelles, Cousin and Vache Marine, and the Vallée de Mai on Praslin. The emphasis is on protection of the species, however, with little direct provision in the Act for conservation of habitat. Nevertheless, the owner is charged with ensuring that no activity in the reserve adversely affects bird life. The Marine Mammals Sanctuary Decree (No. 28 of 1979) provides for the establishment of a sanctuary within the Seychelles territorial waters and exclusive economic zone, where the killing or harassment of any marine mammal is prohibited. Woodlands can be protected under the Town and Country Planning Ordinance, for the "interests of amenity", river reserves under the Government Land River Reserves Act, and certain beaches on Mahé, Praslin and La Digue have been designated Protected Beaches. Four areas are declared Shell Reserves in a schedule to the Conservation of Marine Shells Act (No. 4 of 1981) where collection of shells (with the exception of a number of specifically exempted species), disturbance of their natural environment and the possession of explosives is an offence. It should be finally be noted that some of the Seychelles Islands are privately owned; for example the International Council for Bird Preservation owns Cousin Island and manages it as a Strict Nature Reserve.

Parks and Reserves Administration The functions of the Seychelles National Environment Commission (SNEC) are: development and review of policy matters relating to the environment; review of relevant legislation; review of conservation and management; coordination of all activities relating to conservation and management of the environment; promotion of education; and international issues related to the environment. The Forestry and Conservation Division of the recently created Ministry of National Development (comprising the former Ministry of Agriculture and Land Use, the Physical Planning Division, Environmental Division, Lands Division and the Survey Division) is the main executive for the conservation policy and is responsible for the creation and management of all protected areas in Seychelles apart from Aldabra (SIF), Cousin (ICBP) and Aride (RSNC). Each protected area

has a management plan prepared by consultants. The Royal Society for Nature Conservation (RSNC) prepared plans for Aride, the International Council for Bird Preservation (ICBP) for Cousin, while Roger Wilson, as conservation advisor, prepared plans for the remaining areas. All plans have been approved by the Council of Ministers, but the Praslin, Morne Seychellois, Port Launay and Baie Ternaie parks' plans have yet to be properly implemented, due to lack of personnel, funds and equipment. Most of the protected areas are manned by senior park rangers, park wardens, park rangers grade I & II, Assistant park rangers and labourers from park ranger grade II upwards (all of whom are sworn special police constables with the powers of arrest). The Seychelles Island foundation (SIF) is an international group which manages Aldabra Atoll as a strict nature reserve. Organisations associated with the foundation include the Royal Society (U.K. based), Organisation recherche scientifique et technique outre-mer (ORSTOM), Smithsonian Institute, World Wildlife Fund and the Royal Society for Nature Conservation (U.K. based).

Address

° Conservation Office, Ministry of National Development, Independence House, PO Box 199, Victoria, Mahé

Additional Information In 1982, SNEC set up sub-commissions to produce reports covering topics such as pollution, legislation, education, and national parks. These reports are to be used in structuring a National Conservation Strategy which will replace the 1971 White Paper on the Conservation Policy of the Seychelles. The White Paper was based on a report by a conservation advisor from the U.K. Ministry of Overseas Development (Procter, 1970). Salm (1978) reviewed the conservation of marine resources in the Seychelles, and emphasised the low priority given in the past to marine and coastal conservation. The subsequent establishment of one marine reserve and two marine national parks has since improved the situation.

The National Parks and Nature Conservancy (Amendment) Act 1982, as well as detailing the functions of the Seychelles National Environment Commission, adds a second schedule to the 1971 Ordinance fully accepting the three major objectives of environmental conservation as identified in the World Conservation Strategy. The 1971 White Paper previously defined conservation as "the wise use or management of renewable natural resources so that at the end the resource is no poorer nor less able to renew itself than at the beginning".

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Protected Areas*National Parks*

Morne Seychellois	3,045
Praslin	675
Subtotal	3,720

Marine National Parks

Baie Ternaie	80
Curieuse	1,470
Port Launay	158
St Anne	1,423
Subtotal	3,131

Strict Nature Reserves

Aldabra	35,000
Vallee de Mai	18

Reserves

Aride Island Special	70
Cousin Island Special	28
La Digue Veuve	8
Subtotal	106

World Heritage Sites

Aldabra Atoll	35,000
Vallee de Mai Nature Reserve	18
Subtotal	35,018

MORNE SEYCHELLOIS NATIONAL PARK

Management Category VIII (Multiple Use Reserve)

Biogeographical Province 4.16.13 (Seychelles and Amirantes Islands)

Legal Protection Morne Seychellois National Park only protects terrestrial biota, the two bays which flank Ternay Bluff (Baie Ternay and Port Launay) are designated separately as marine national parks. The birds are protected under the Wild Animals and Birds Protection ordinance, No. 37 1961.

Date Established Designated as a national park in 1979 by Statutory Instrument No. 53, Morne Seychellois National Park (Designation) Order.

Geographical Location Covers most of the West and central massif of Mahé Island south of Victoria. 4°37'-4°40'S, 55°22'-55°28'E.

Altitude Sea level to 905m

Area 3,045ha, contiguous to Baie Ternay Marine National Park (80ha) and Port Launay Marine National Park (158ha).

Land Tenure Mostly government although the entire north-west section is private land and there is a complex ownership pattern along the Forêt Noire road, particularly in the Sans Souci-L'Exil area.

Physical Features A very rugged part of the largest granitic oceanic island, rising from sea-level at the south coast of Mahé, to 905m (Morne Seychellois Peak) within the park boundaries. Contains a variety of habitats with a relatively rich biota and high degree of endemism, including the best area of montane moss forest on Mahé and a number of key sites rich in endemic species. Numerous rivers drain the rugged upland region including the Mare aux Cochons which flows southwards, the Boulay flowing north-west into North West Bay and the Grande Anse flowing south into Grand Anse Bay. The climate is determined by two alternating monsoons, or seasonal winds, the strong dry winds of the south-east monsoon blow from May to October and the erratic north-west monsoon, alternating between periods of calm, terrific squalls and torrential rains, blows from December to March; November and April are the transitory months. The mean annual temperature varies from 24°C to 30°C and the relative humidity is always high, averaging 75-80%.

Vegetation All the endemic plants known from Mahé are present within the park. At least one species, Balsamine *Impatiens thomassetii* is limited to a single locality only. Although largely invaded by exotics, such as *Albizia falcataria* and *Cinnamomum zeylanicum*, it still contains some relic communities of native *Randia sericea*, *Nepenthes pervillei*, and *Northea seychellarum*. The largest known populations of two of the four species listed for the Seychelles in the IUCN Plant Red Data Book, 'Bois de Fer' *Vateria seychellarum* and 'Bois meduse' *Medusagyne oppositifolia*, are also found in the area. Other threatened species present are the palm *Rocheria melanochaetes*, which is well represented in the park, and *Toxocarpus schimperianus*, only recently discovered at two sites.

Fauna Several large roosts of endemic fruit bat *Pteropus seychellensis* survive here, and the endemic sheath-tailed bat *Coleura seychellensis*, has been seen, and all the endemic bird species known for Mahé have been recorded from the park; it is assumed that other taxa are also fully represented. The greater part of the known populations of two of threatened birds limited to Mahé, the bare-legged scops owl *Otus insularis* (R) and the Seychelles white-eye *Zosterops modestus* (E), exist in the park. Of the 15 other species of terrestrial birds recorded, nine of them are occur in particularly large numbers, especially the blue pigeon *Alectroenas pulcherrima*, thick-billed bulbul *Hypsipetes crassirostris*, swiftlet *Collocalia francica* and Seychelles sunbird *Nectarinia dussumieri*. A significant number of white-tailed tropic bird *Phaethon lepturus* still breed on the mountains. Many of the native Seychelles reptiles are present, such as Seychelles house snakes *Boaedon geometricus*, Seychelles wolf snake *Lycognophus seychellensis*, Brahminy blind-snake *Ramphotyphlops braminus* and the lizards *Chamaeleo tigris*, *Phelsuma astriata* and *P. longisulae*. All known species of caecilians native to the Seychelles are to be found, including the very uncommon *Prastinia cooperii* (in fact only rediscovered in June 1983).

Population There are a few small farms and settlements within the boundaries of the park and some areas of cultivation are quite extensive (Republic of Seychelles, 1978).

Conservation Management A draft management plan drawn up in 1979 has yet to be implemented. Other areas principally degraded are being reafforested, mostly with Meliaceae such as *Sandoricum ratiatum* and *Swietenia macrophylla*. An additional small area is under tea plantation.

Zoning Certain areas are administered as strict nature reserves where only scientists accompanied by forest rangers are allowed. Since 1983, even the traditional cinnamon pickers have been instructed to stay clear of these areas.

Disturbances or Deficiencies Past exploitation of timber and forest fires has done irreparable damage. Since 1950, the reafforestation work has resulted in the vegetation cover being re-established to some extent. Exotic species like *Albizia*, cinnamon *Ochorosia*, *Psidium*, and *Lantana* are encroaching on a large scale. There has been some tree felling for the erection of a 33kv powerline. The Forêt Noire Road from Victoria to the south coast passes through the western portion of the park. Ternay Bluff is separated from the rest of the park by a track and a strip of pasture/cultivation. Army exercises are carried out in the park occasionally.

Visitor Facilities Tourism development consists primarily of provision of viewing points, refreshment facilities, paths, interpretive facilities, and literature.

Scientific Research Studies of the systematics and ecology of the reptiles and amphibians; some surveys on the distribution of rare endemic plants; estimates of the various fruit bat colonies; preliminary work on the Seychelles white-eye and the scops owl; and a doctoral study on the Seychelles kestrel.

Special Scientific Facilities No information

Principal Reference Material

- ° Collar, N.J. and Stuart, S.N. (1985). *Threatened Birds of Africa and Related Islands*. ICBP/IUCN Red Data Book, 3rd edn. Part 1 p. 324 and p. 597.
- ° Republic of Seychelles (1978). Mahé, 1:10,000 scale map prepared by the British Governments Ministry of Overseas Development (Directorate of Overseas Surveys. Series Y851 (D.O.S 204).
- ° Wilson, J.R. (1980). The Morne Seychellois National Park, A preliminary Management Plan.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date June 1983

BAIE TERNAY MARINE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 4.16.13 (Seychelles and Amirantes Islands)

Legal Protection It is illegal to disturb marine turtles in any way (Mortimer, 1985), and the area is a declared fishing reserve.

Date Established Designated as a marine national park in 1979 by Statutory Instrument No. 54, Baie Ternay Marine National Park (Designation) Order.

Geographical Location A sheltered bay on the extreme western tip of Mahé Island. 4°38'S, 55°22'E.

Altitude Sea level down to 37m depth

Area 80ha, contiguous to the wholly terrestrial Morne Seychellois National Park (3,045ha) and on the other side of Ternay Bluff to Port Launay Marine National Park (158ha).

Land Tenure Government

Physical Features A shallow lagoon approximately 800m wide lies between the continuous fringing reef at the head of the bay from the shore. It is grooved and cut by numerous surge channels and this section of reef offers a valuable refuge to a host of large and small reef fishes. The climate is determined by two alternating monsoons, or seasonal winds, the strong dry winds of the south-east monsoon blow from May to October and the erratic north-west

monsoon, alternating between periods of calm, terrific squalls and torrential rains, blows from December to March; November and April are the transitory months. The mean annual temperature ranges from 24° to 30°C and relative humidity is always high, averaging 75-80%.

Vegetation The shallow reef-flat is covered by a variety of seaweeds including stalked *Turbinaria*.

Fauna Hawksbill turtle *Eretmochelys imbricata* (E) breed here and there is an abundant reef fish fauna. Pillai *et al.* (1973) have described some of the corals found in this area; Salm (1977) also gives a brief description of the reefs. Reef development is not extensive and there are few living corals. The deeper reefs fringing the rocky headlands are in very good condition, comprising soft corals (Alcyonaria) anchored on dead *Porites* colonies (Salm, 1977 and UNEP/IUCN, in prep.). Salm (1977) describes these soft coral communities found in the bay as the best on Mahé.

Conservation Management This park was primarily established both for maintenance of an area of natural beauty for the benefit of the general public, including tourists, and to protect the reef to maintain its value for tourism. A draft management plan covering both Baie Ternay and Port Launay has been drawn up (Wilson, 1980) and lays increased emphasis on other aspects of nature conservation, but this plan has yet to be fully implemented. The park boundaries currently exclude the beaches to allow recreational activities to continue. It has been proposed (Salm, 1977) that they be incorporated into the park and provisions for recreation developed.

Zoning No information

Disturbances or Deficiencies To date, lack of trained personnel, equipment and houses has meant that there is no enforcement of park regulations. There is some poaching of corals, shells and hawksbill turtles, though numbers taken within the protected area are lower than outside the boundaries (Mortimer, 1985). Since early 1983, the second and largest National Youth Service camp has been sited next to the Bay which has effectively closed the bay to the general public. There is some fishing with handlines and traps and some seine netting of mackerel by staff and students. The treated sewage (stored in three oxidation ponds) from the settlement is discharged into the enclosed bay; the precise impact of this has yet to be assessed. Some of the existing mangrove swamp has been lost to reclamation.

Visitor Facilities Popular for swimming and snorkelling, being easily accessible from Beauvallon. Glass bottomed boats are available for hire.

Scientific Research General survey by a group from Galway University.

Special Scientific Facilities None

Principal Reference Material

- ° Mortimer, J.A. (1985). Marine turtles in the Republic of the Seychelles, status and management. IUCN/WWF, Gland, Switzerland.
- ° Pillai, C.S.G., Vine, P.J. and Scheer, G. (1973). Bericht uber eine Korallensammlung von den Seychellen. *Zool. Jb. Syst.* 100: 45-465.
- ° Salm, R.V. (1977). *A guide to snorkelling and diving in Seychelles*. Octavian Books, London. 60 pp.
- ° Salm, R.V. (1978). Conservation of Marine Resources in Seychelles. IUCN/WWF report, Morges, Switzerland.
- ° Wilson, R. (1980). Baie Ternay National Park, Port Launay National Park and the La Plaine intertidal swamp - a draft management plan (mimeo).
- ° UNEP/IUCN (in prep.). Directory of Coral Reefs of International Importance. Volume 2. Indian Ocean.

Staff None

Budget None

Local Park or Reserve Administration No information

Date June 1983

CURIEUSE MARINE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 4.16.13 (Seychelles and Amirantes Islands)

Legal Protection The collection of seashells is prohibited under the protection of shells Ordinance (Cap.138) of 1965. Curieuse is also listed as a protected breeding site under the Turtle Protection Act, under which it is illegal to hunt turtles in the sea area 1,000m from the high water mark.

Date Established Declared a marine national park in 1979 by Statutory Instrument No. 55, Curieuse Marine National Park (Designation) Order. Protective regulations under this act have been drafted and will be introduced when designation is complete.

Geographical Location Comprises the irregular-shaped Curieuse Island and its surrounding waters, including the outlying St Pierre Islet and the channel between the island and Anse Boudin, up to high water mark along the north-east coast of Praslin. 4°16'-4°18'S, 55°43'E.

Altitude 30m below sea level to 172m

Area 1,470ha total (of which 283ha is marine)

Land Tenure Government

Physical Features Comprises the rugged granitic island of Curieuse (2.83 ha), which rises to Curieuse peak (172m); St Pierre Islet at the south-west extreme of the park; the northern coastline of Praslin from Chevalier Point in the west to Pointe Zanguilles in the east; and the marine channel between the islands. The marine part of the park ranges from shallow water reefs, exposed at low tide, to a 30m drop-off. The major habitats are, deep patch reefs, algal reef flats, mangrove swamp, intertidal rocky shore and sandy beaches, and wooded slopes. The low-lying area on the eastern side of Curieuse has been cultivated and there are several coconut plantations there. A causeway has been constructed across the mouth of Larai Bay on Curieuse, creating a small enclosed lagoon known as Turtle Pond.

Vegetation The island is significant as one of only two islands where the coco-de-mer *Lodoicea maldivica* grows naturally (the other locality is Vallée de Mai on Praslin Island where it is much more extensive). It is also the principal locality for the endemic vine *Toxocarpus schimperianus*. Some of the finest specimens of the *Northea seychellarum* are to be found behind Baie La Raie. In the lagoon formed behind the causeway, a patch of mangrove swamp is developing, characterised by *Rhizophora mucronata*, *Lumnitzera* sp., *Sonneratia* sp. and *Xylocarpus* sp.. A new species of banana *Gastonia* sp. was discovered on the island in 1982.

Fauna Land birds common to the Seychelles which are known from the park include: Seychelles sunbird *Nectarinia dussumieri* and thick-billed bulbul *Hypsipetes crassirostris*, together with certain seabirds, such as fairy tern *Gygis alba*. A population of some 300 giant tortoises *Geochelone gigantea* (R) introduced from Aldabra breed successfully on the island.

About 20 to 40 female hawksbill turtles *Eretmochelys imbricata* (E) regularly use the beaches on Curieuse during the breeding season. Brahminy blind-snake *Ramphotyphlops braminus* and at least one species of caecilian can be found. Lizards include *Phelsuma astriata*, *P. sunbergi*, *Gehyra mutilata*, *Mabuya sechellensis* and *Scelotes gardineri*. The marine section has good coral growth, especially around St Pierre Islet, which is well known for its tubular coral colonies, and Anse Petit Coeur on the west side of Pointe Zanguilles on Praslin. Most noticeable are colonies of blue-tipped *Acropora*, mauve or brown staghorn and pink *Pocillopora*. The fish life is remarkably rich and varied. Many large angelfish and groupers lurk with the soldierfish *Holocentrus* sp. around the caves in the pitted bases of larger boulder corals. Curieuse was once well-known for its abundant molluscs, octopi and lobsters, but these numbers have declined and the crab population in the mangrove areas are only now recovering; the land crab *Cardiosoma* is still abundant on the coastal strip.

Population Curieuse is still inhabited and cultivated, though the number of people living here has fallen.

Conservation Management Much management activity has been directed towards rehabilitation of burnt over and severely eroded slopes. A draft management plan was prepared in 1979.

Zoning Divided into three main zones, Conservation, by far the most extensive including the badly burnt hillsides which are being restored; Agricultural, including commercial forest (the fertile land by the ex-leper colony has been earmarked for a fruit farm and piggery); and Tourism, there is a proposal to turn the old doctor's house into an information centre and to have some chalet-style hotel development.

Disturbances or Deficiencies Some areas of the island have been badly burnt and extensive anti-erosion work in the form of contour drains, and *Casuarina* plantations are visible. The eastern Peninsula was particularly badly damaged by a fire in 1967, the vegetation was decimated and there were no signs of regeneration four years later (Procter, 1971) as the native plants appear insufficiently resilient to recover. It is probable that in their search for boat building material, the government will want to exploit the fine stands of takamaka *Calophyllum inophyllum*. There have been various proposals to drain the marshes and develop them for vegetable farms. If this happens, the most suitable site for starting a second colony of Seychelles paradise flycatcher will be lost. Some of the families living on the Praslin side continue to illegally hunt hawksbill turtle, but the numbers lost are lower than from areas outside the park boundaries (Mortimer, 1985).

Visitor Facilities Facilities are planned, particularly in the Anse St. Jose/Caiman plateau area. Two areas are also designated swimming zones.

Scientific Research The introduced giant tortoise *Geochelone gigantea* population is being closely monitored as well as its impact on the vegetation. A tagging programme for female hawksbill turtles during the breeding season was initiated in 1981 (Mortimer, 1985). Some preliminary terrestrial plant surveys have also been carried out.

Special Scientific Facilities No information

Principal Reference Material

- ° Frazier, J. (1974). Sea turtles in Seychelles. *Biol. Conserv.* 6: 71-73.
- ° Mortimer, J.A. (1985). Marine turtles in the Republic of the Seychelles, status and management. IUCN/WWF, Gland, Switzerland.
- ° Republic of Seychelles (1978). Praslin 1 and 3, 1:10,000 scale map prepared by the British Governments Ministry of Overseas Development (Directorate of Overseas Surveys). Series Y851 (D.O.S. 204).
- ° Salm, R.V. (1977). *A guide to snorkelling and diving in Seychelles*. Octavian books. London. 60 pp.
- ° Salm, R.V. (1978). Conservation of marine resources in Seychelles. Report on current status and future management. *IUCN/WWF report*, Gland, Switzerland.
- ° Wilson, J.R. (1979). The Curieuse National Park, A Draft Management Plan.

Staff One senior park ranger, one park ranger grade 11, and eight labourers

Budget Curieuse is within the park system administered by the Conservation Division, which has a total annual budget of 600,000 SR (US\$90,000)

Local Park or Reserve Administration No information

Date June 1983

PORT LAUNAY MARINE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 4.16.13 (Seychelles and Amirantes Islands)

Legal Protection The Port Launay Marine National Park Regulations 1981 detail how the park may and may not be used. Damage of sandbank, reef, rock or area of seashore or foreshore, or the killing, capturing or damaging of wildlife (alive or dead), or the removal of any material from the seabed is prohibited. It is illegal to disturb marine turtles in any way, and the area is also a declared fishing reserve.

Date Established Designated as a marine national park in 1979 by Statutory Instrument No. 56, Port Launay Marine National Park (Designation Order).

Geographical Location A cove on the south-west coast of Mahé Island. 4°39'S, 55°23'E.

Altitude From sea level to 20m depth

Area 158ha contiguous to the wholly terrestrial Morne Seychellois National Park (3,045ha) and on the other side of Ternay Bluff to Baie Ternay Marine National Park (80ha).

Land Tenure Government

Physical Features A sheltered cove with a primarily rocky shoreline with sandy beaches. Reefs fringe the rocky shores at either end of the beach, comprising boulder type coral, with *Porites* spp. dominant; characteristic of areas of calm sea and erratic temperature and salinity. The back-reef zones are shallow and covered by the stalked seaweed *Turbinaria*. The climate is determined by two alternating monsoons, or seasonal winds. The strong dry winds of the south-east monsoon blow from May to October and the erratic north-west monsoon, alternating between periods of calm, terrific squalls and torrential rains, blows from December to March; November and April are the transitory months. The mean annual temperature varies from 24°-30°C, while the relative humidity is always high, averaging 75-80%.

Vegetation Mangrove forests characterised by genera such as *Avicennia*, *Rhizophora*, *Bruguiera*, *Xylocarpus*, and *Ceriops* fringe the steep forested coastal slopes. *Turbinaria* spp. cover the back-reef zone.

Fauna Seychelles blue pigeon *Alectroenas pulcherrima* occurs in the coastal mangroves (Feare, 1973). Reef development is not extensive and living corals are few. Pillai *et al.* (1973) have described some of the corals found in this area. Salm (1977) also gives a brief description of the reefs. The deeper reefs fringing the rocky headlands are in very good condition, comprising soft corals (Alcyonaria) anchored on dead *Porites* colonies (Salm, 1977 and UNEP/IUCN, in prep.). According to the management plan, however, coral growth is poor in comparison with Baie Ternay and Ste. Anne.

Conservation Management This park was primarily established to maintain an area of natural beauty for the benefit of the general public, including tourists. A draft management plan covering both Baie Ternay and Port Launay has been drawn up (Wilson, 1980) and lays increased emphasis on other aspects of nature conservation, but this plan has yet to be fully implemented. Since the establishment of the first National Youth Service (NYS) camp at Port Launay, access to the area by the general public has been limited.

Zoning No information

Disturbances or Deficiencies Some fishing with handline and traps and even some seine netting (mostly mackerel) is carried out by the NYS staff and students. Poaching of marine turtles is still a problem (Mortimer, 1985). According to the management plan, because the bay is sheltered from the prevailing winds it is frequently used as an anchorage. The mangrove area receives no formal protection.

Visitor Facilities No information

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- Feare, C.J. (1973). The utilisation of mangroves by Seychelles birds. Short communication. Edward Grey Institute of Field Ornithology, Oxford.
- Mortimer, J.A. (1985). Marine Turtles in the Republic of the Seychelles, status and management. IUCN/WWF, Gland, Switzerland.
- Pillai, C.S.G., Vine, P.J. and Scheer, G. (1973). Bericht uber eine Korallensammlung von den Seychellen. *Zool. Jb. Syst.* 100: 45-465.
- Salm, R.V. (1977). *A guide to snorkelling and diving in Seychelles*. Octavian Books, London. 60 pp.
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- Wilson, R. (1980). Baie Ternay National Park, Port Launay National Park and the La Plaine intertidal swamp - draft management plan (mimeo.).
- UNEP/IUCN (in prep.). *Directory of Coral Reefs of International Importance*. Volume 2. Indian Ocean.

Staff None

Budget None

Local Park or Reserve Administration No information

Date 1983

SAINT ANNE MARINE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 4.16.13 (Seychelles and Amirantes Islands)

Legal Protection The Ste. Anne Marine National Park Regulations 1973 details how the park may and may not be used. For example areas are demarcated for swimmers, and water-skiing within the park is prohibited. The regulations make it unlawful to kill or disturb "living things

or their habitats", with a few exceptions for residents and management needs. These regulations were brought into force in 1975 by the Ste. Anne Marine National Park (Commencement) Notice. It is illegal to disturb marine turtles in any way.

Date Established Declared a marine national park in 1973 by Statutory Instrument No. 21, the National Park (Ste. Anne Marine) Designation Order.

Geographical Location A group of six granitic islands, some five kilometres due east of Victoria, the Capital of Seychelles, on Mahé Island. 4°35'S, 55°30'E.

Altitude 30m below sea level to 250m

Area 1,423ha, all the surrounding reefs and seas between the islands forming part of the park.

Land Tenure The islands of Saint Anne, Round, and Long are government owned, while the islands of Moyenne, Cerf and Le Cachée are privately owned; the marine area is part of the Seychelles Territorial Sea.

Physical Features A group of six small rugged granitic islands (Saint Anne, Round, Long, Moyenne, Cerf and Le Cachée), together with adjacent reefs and sea. The Saint Anne channel is the deepest part, down to about 30m, while Saint Anne island rises to some 250m above sea-level. Habitats to be found within the park include: exposed and fringing reefs, patch reefs, coral encrusted granite boulders, sandflats and seagrass beds, intertidal rocks and sandy beaches.

Vegetation Among some of the dead reefs are fairly extensive beds of *Sargassum* seaweeds. The seagrass *Thalassia hemprichii* is to be found between Round Island and Cerf. The islands are mainly covered by secondary vegetation, with coconut *Cocos nucifera* the most common tree. On the north-east side of Saint Anne, there is a very steep and rocky area which still has fine stands of the native palm *Phoenixophorium* and various *Pandanus* species.

Fauna No information

Conservation Management There are seven areas of delicate shallow water coral reefs which were to be administered as viewing areas only, anchoring and fishing being prohibited. However, it has not been easy to demarcate these sites, even though most of the glass bottom boat operators (the main park users) know these areas well.

Zoning Shallow water reef areas, defined in a schedule to the regulations, are set aside for viewing only. Two of the areas are on the coast of Saint Anne, one to the north west, and the other southeast. The other five areas are on the north western side of the other group of islands.

Disturbances or Deficiencies In the past, shell collecting caused some damage to the corals. Many of the reefs have been killed by unknown causes in addition to siltation resulting from the dredging in Port Victoria and the construction work at Seychelles International Airport on Mahé. The planned construction of a fisheries harbour, combined with the east coast road scheme, will aggravate the problem. The main problem is persistent poaching by two or three families from the Les Mamelles area on Mahé. The ranger staff are youthful and have not been formally trained, hampering efficient protection. Due to the strong south-east monsoon winds, the park boundary buoys have to be renewed every year, which can be quite a major exercise.

Visitor Facilities The reefs attract numerous visitors and there are several glass bottom boats available for hire. For a long time there have been plans to construct an oceanarium. This seems unlikely to be realised for many years.

Scientific Research Some studies on the growth rate of sea urchins. The Fisheries Division has monitoring the fish catches from the licensed fishermen in the past. Since 1981, a

programme has been underway to tag hawksbill turtles and to count tracks. The starfish *Acanthaster* population is being monitored.

Special Scientific Facilities No information

Principal Reference Material

- ° Mortimer, J.A. (1985). Marine Turtles in the Republic of the Seychelles, status and management. IUCN/WWF, Gland, Switzerland.
- ° Robertson, I.J.B. (1972). Seychelles Marine National Parks. IUCN/WWF report No. 726, Gland, Switzerland.
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- ° Stoddart, D.R. (Ed.) (1984). *Biogeography and ecology of the Seychelles Islands*. Dr. W. Junk Publishers, The Hague.
- ° Taylor, J.D. (1968). Coral reef and associated invertebrate communities (mainly molluscan) around Mahé, Seychelles. *Phil. Trans. R. Soc.* (8)254: 129-206.
- ° UNEP/IUCN (in prep.). *Directory of Coral Reefs of International Importance*. Volume 2. Indian Ocean.

Staff Two park rangers grade I, and two park rangers grade II. The two labourers formerly attached to the park have since been transferred to the National Youth Service village.

Budget Falls within the budget of the Conservation Section, which has a total budget of 600,000 SR (US\$90,000) per annum. On average, about 150,000 SR (US\$22,000) are collected as entrance fees to the park every year.

Local Park or Reserve Administration No information

Date June 1983

ALDABRA ATOLL

Management Category I (Strict Nature Reserve)

World Heritage Site (Criteria: ii, iii, iv)

Biogeographical Province 3.24.13 (Comores Islands and Aldabra)

Legal Protection Protective regulations under the 1971 act have been drafted (Aldabra Special Reserve Regulations, 1981) and signed, and will be introduced when designation is complete. Previously, only partial protection for specified animals was provided. The reserve extends to 1km below the high water mark.

Date Established 17 February 1976 as a Strict Nature Reserve under the Protection and Preservation of Wild Life Ordinance, 1970 (BIOT). Designated as a Special Reserve by Designation of Special Reserve (Aldabra) Order, 1981. Accepted as a World Heritage Site in 1982.

Geographical Location An atoll north of the Mozambique Channel, 420km north-west of Madagascar and 640km east of the East African mainland. 9°25'S, 46°25'E.

Altitude Most of the reserve is less than 3m above sea level.

Area 35,000ha (18,800ha land, 2,000ha mangrove, and 14,200ha sea)

Land Tenure Government, administered by the Seychelles Island Foundation. The Royal Society acquired a 14 year lease in 1976 from the Government of the British Indian Ocean Territory. This was then taken over in 1980 by the Seychelles Islands Foundation, a charitable trust established under the Seychelles Islands Foundation Decree 1979.

Physical Features Aldabra is a classic coral atoll, 34km long by maximum of 14.5km wide, which has been built up from the seabed. It consists of four main islands of coral limestone separated by narrow passes and enclosing a large shallow lagoon. Most of the land surface comprises on ancient coral reef (about 125,000 years old) now raised above sea-level, the rest being even older reef limestones. The lagoon, which covers some 15,000ha, contains many smaller islands and the entire atoll is surrounded by an outer reef. Geomorphological processes have produced a varied topography, generally rugged, which supports a variety of habitats with a relatively rich biota for an oceanic island, and a high degree of endemism. Over much of the surface of the islands, weathering has led to dissection of the limestones into holes and pits, though at the eastern end the surface is more continuous on upraised lagoonal sediments. Along the coast are undercut limestone cliffs, with a perched beach and sand dunes on the southern (windward) coast. Marine habitats range from coral reefs to mangrove mudflats with minimal human impact. Tidal range is more than 3m, which can lead to strong channel currents. The climate is semi-arid with a pronounced wet season from November to April. Average annual rainfall 1200mm, though this is very variable.

Vegetation The terrestrial flora is exceptionally rich for a small coral island, with 273 species of flowering plant and fern. Much of the land is covered with dense *Pemphis acidula* thicket and other shrubs. There are 19 endemic species including *Peponium sublitoreale* (R), which is only known on the south island. A further 22 species are shared only with neighbouring islands. Many of these plants are considered to be threatened. Mangroves surround the lagoon, and inshore waters also support sea-grass meadows.

Fauna This island group is one of the few areas of the world where reptiles dominate the terrestrial fauna, with the largest world population (152,000) of giant tortoise *Geochelone gigantea* (R), which appears to be self-sustaining. Green turtle *Chelonia mydas* (E) breed here, with approximately 1,000 females laying annually. There are 13 species of terrestrial birds including the last representative of the western Indian Ocean flightless birds - the Aldabran rail *Dryolimnas cuvieri aldabranus* (about 5,000 individuals) with two endemic Aldabran forms. There are two endemic birds, the Aldabra warbler *Nesillas aldabranus* (E) (restricted to 10ha of coastal tall scrub and possibly the most endangered bird in the world, as only five birds have been seen since its discovery in 1968 (Collar and Stuart, 1985), and the Aldabran drongo *Dicrurus aldabranus* (1,500 birds inhabit the scrub, mangrove and *Casuarina* on Aldabra), and some endemic subspecies including the Aldabra white-throated rail. There is a population of about 8000 birds of this flightless race, which does not seem seriously threatened by the feral cats. The islands are important breeding grounds for thousands of seabirds, including several thousand each of red-tailed tropicbird *Phaethon rubricauda* and white-tailed tropicbird *P. lepturus*, hundreds of masked booby *Sula dactylatra*, several thousand red-footed booby *S. sula*, some Abbott's booby *S. leucogaster*, and thousands each of greater frigatebird *Fregata minor* and lesser frigatebird *F. ariel*. There are also thousands of nesting terns (Feare, 1984). The only endemic mammal is a flying fox. So far about 1,000 species of insect have been recorded, many of them new and endemic forms.

Conservation Management The atoll is managed by four subcommittees (Management, Scientific Advisory, Finance and Appeal) set up under the Seychelles Island Foundation. The history of conservation at Aldabra is fully described in Stoddart (1971). The present requirement is to maintain the policy of minimum human interference while continuing the research/monitoring programme. Particular attention must be directed towards the ecology of exotic species to provide a basis for future management. Successive national development plans stress provision for the economic development of the outer islands of the Seychelles. The Seychelles Islands Foundation/Royal Society document 'A management plan for Aldabra', has been accepted by the Government of Seychelles as a guideline for the future management of the atoll.

Zoning 1km coastal protection zone

Disturbances or Deficiencies The mangroves and populations of turtles, fish and tortoises have recovered from past exploitation, however, the difficulties of effective patrolling of the atoll and easy access by sea threatens the integrity of the reserve through unauthorised export of tortoises and turtles, disturbance of seabird colonies and other wildlife, and the hazard of fire. Rats, cats and goats have been introduced and established. Goats increased fourfold between 1977 and 1982 and their eradication from Middle Island is urgently needed, as they are destroying habitat, particularly of the highly endangered Aldabra warbler. Prys-Jones (1979) recommended that no east-west paths should be cut on this island, to try and limit goat or tortoise encroachment. Attempts have been made to control the spread of exotic plants. The maintenance of conservation interest, and realisation of full scientific value of the site, is dependent upon the ability of the Foundation to support adequate wardening staff and a functioning research station. The Foundation is wholly dependent upon subscription and donation income, and shortage of funds, is therefore, a potential danger. Development is restricted to small-scale tourism, deep-sea fishing and limited exploitation of some natural resources.

Scientific Research An intensive research effort covering the whole atoll has been in operation since 1967. Particular mention should be made of the survey and monitoring of the tortoise and turtle populations initiated in 1982 (funded by WWF), and the study made on the Aldabra warbler by Prys-Jones (1979).

Special Scientific Facilities A fully-equipped research station was established by the Royal Society in 1971, and is maintained by the Foundation to whom they donated it in 1980. The Seychelles Government maintains a meteorological station. Accommodation and a network of field stations is available for a maximum of 15 scientists.

Principal Reference Material

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- Stoddart, D.R. and Morris, M.G. (1980). *A management plan for Aldabra*. (Draft, 59 pp including many diagrams and maps).
- World Heritage Nomination (1981). Aldabra Atoll.

Staff Warden appointed by the Seychelles Island Foundation in 1982 and funded by WWF, with 10-12 resident Foundation employees.

Budget 1981 - US\$534,000 raised in the 1979 appeal. 1982 - £45,000 annual grant one-third of which was provided by the Seychelles Government.

Local Park or Reserve Administration The Chairman, Seychelles Islands Foundation, c/o Department of Agriculture and Land Use, PO Box 54, Mahé.

Date 1984

VALLEE DE MAI NATURE RESERVE

Management Category IV (Managed Nature Reserve)

World Heritage Site (Criteria: i, ii, iii, iv)

Biogeographical Province 4.16.13 (Seychelles and Amirantes Islands)

Legal Protection Well protected within reserve

Date Established 18 April 1966 as a nature reserve under the Wild Birds Protection (Nature Reserves) Regulation S.I. No. 27. Further protection under the National Parks and Nature Conservancy Act (Cap. 159) S.I. No. 57 of 1979, Praslin National Park (Designation) Order of 1979, and the Coco-de-mer Management Decree 1978. Inscribed as a World Heritage Site in 1983.

Geographical Location Within Praslin National Park on Praslin Island, 50km north-east of Mahé in the Seychelles. 4°19'S, 55°44'E.

Altitude Close to sea level to approximately 500m

Area 18ha, within Praslin National Park (675ha)

Land Tenure Government

Physical Features A valley close to sea-level in the north-eastern portion of Praslin National Park on the granitic island of Praslin. The streams originating in the valley feed into Nouvelle De-Couverte River which flows eastward through the national park, joining the sea to the north of Fonde de l'Anse. The other principal river in the park, Fond B'Offay, flows westward into Baie Sainte Anne. This area survived untouched until the 1930's and still retains some palm forest in a near natural state.

Vegetation Four principal vegetation types have been identified from Praslin, three of which occur in the Vallée de Mai area. 1) Lowland forest (30-180m) once dominated by large timber trees such as *Mimusops* sp. and *Eugenia* spp. but, following human settlement, now comprises well developed secondary forest with the endemic palm *Phoenixophorium borsigianum*, cinnamon *Cinnamomum zeylanicum*, *Dodonaea viscosa*, mango *Mangifera indica*, *Sideroxylon ferrugineum*, and *Randia lancifolia*; 2) intermediate palm forest (30-500m), unique within the Seychelles being the only area where five of the endemic palm species occur together. 3) Vallée de Mai, with the monospecific palms *Deckenia nobilis*, *P. borsigiana*, coco-de-mer *Lodoicea maldivica* (V) (bearer of the largest seed in the Plant Kingdom), *Versaffeltia splendida* and *Nephrosperma vanhoutteana* (all endemic to the Seychelles), together with *Pandanus* spp., *Dillenia* sp., and *Adenanthera pavonina*; 4) eroded land (100-500m), resulting from burning and subsequent soil erosion, has been recolonised by *Randia lancifolia*, *P. borsigiana*, *Dodonaea* sp., and *Dillenia ferruginea*, or planted with 'coco plum' *Chrysobalanus icaco*, mahogany *Swietenia* sp., and lemon grass *Cymbopogon citratus* in an attempt to stabilise the substrate - it previously supported intermediate and lowland forest. In addition to the palms, a further 28 endemic species of plants have been identified on the island, including *Toxocarpus schimperianus* (E), a species of vine once thought extinct and then believed to exist only on Curieuse island. Takamaka *Callophyllum inophyllum* and calice du pape *Tabebuia pallida* are two of the species introduced to the island.

Fauna The most noteworthy bird (with a population of 90 in 1976) is the endemic subspecies of black parrot *Coracopsis nigra barklyi* (E), restricted to Praslin Island and totally dependent on the Vallée de Mai and surrounding palm forest. Other birds include: African barn owl *Tyto alba affinis*, Seychelles bulbul *Hypsipetes crassirostris*, blue pigeon *Alectroenas pulcherrima*, sunbird *Nectarinia dussamieri*, and cave-nesting swiftlet *Collocalia francica elaphra*. There are few mammal species on the island, apart from the endemic Seychelles flying fox *Pteropus seychellensis* (which roosts in the reserve), *Coleura seychellensis* (seen regularly) and the

insectivorous tenrec *Tenrec ecaudatus*, introduced to the Seychelles from Madagascar. Reptiles include the endemic chameleon *Chamaeleo tigris*, Seychelles house snake *Boaedon geometricus*, Seychelles wolf snake *Lycognathophis seychellensis* and blind snake *Ramphotyphlops braminus*, green geckos *Phelsuma sundbergi* and *Phelsuma astriata*, bronze gecko *Ailuronyx sechellensis*, skinks *Mabuya sechellensis*, *Scelotes gardineri*, and *Scelotes braueri*. Six species of caecilians are known to occur in the deep beds of moist humus, but they are only rarely seen. The stream contains freshwater crab *Dekenia allaudi*, the large freshwater prawn *Macrobrachium* lar, shrimp *Caridina* sp. and the only species of freshwater fish endemic to the Seychelles, the gourgeon *Pachypanchax playfairi*. The two endemic snails known to occur are brown snail *Stylodonta studeriana* and blackfish snail *Pachnodus arnatus*.

Population None within the Vallée de Mai, but a settlement has grown up beside the road bisecting the national park from east to west.

Conservation Management The Nature Reserve is completely surrounded by the Praslin National Park, a multiple use management area mainly devoted to timber production and rehabilitation of eroded land. Access within the reserve is restricted to a carefully designed system of paths. Policies are decided by the Seychelles National Environment Commission and a draft management plan, which includes the reserve, has been prepared for the Praslin National Park. Under present conditions, the palm forest must be maintained by direct human manipulation with the collection and planting of the coco-de-mer seeds before they are stolen to be sold.

Zoning The reserve itself is a strictly protected zone within Praslin National Park.

Disturbances or Deficiencies There has been exploitation of timber and planting of exotics such as coffee, patchouli *Pogostemon cablin*, *Albizia falcataria*, *Cinnamomum zeylanicum*, *Psidium cattleianum* and *Philodendron* sp., but much of the Vallée has been replanted with endemic palms. Attempts to remove dead vegetation have led to erosion but remaining litter is suggested to constitute a fire hazard. Collection of coco-de-mer nuts needs to be controlled so that a certain proportion are allowed to germinate, and the registration system now implemented for selling nuts seems to facilitate this. The national park enclosing the valley constitutes a multiple-use zone; a road bisects it providing a transport route for the tea plantation in the south of the park, and there is a village settlement within the boundaries. In 1984 there were intentions to construct a government road through the valley, but the plans have been shelved (Willis, 1984). A potential problem is that the area does not include the whole water catchment and the human population of Praslin is growing rapidly.

Visitor Facilities Access to the valley is on foot along marked trails from the road, which divides the national park in two, where it passes the mouth of the valley.

Scientific Research Some work has been done by individuals on the black parrot and on palm geckos and a University Expedition to the island (Ascroft 1976 and 1977) studied forest regeneration, Seychelles fruit bat, tenrecs and black parrot. The palm forests are of great botanical interest.

Special Scientific Facilities None

Principal Reference Material

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Procter, J. (1975). The Vallée de Mai information leaflet.
Willis, D. (1984). The wild sanctuaries of the Seychelles. *Swara* 7(4): 24-27.
Wilson, J.R. (1980). The Praslin National Park, A Draft Management Plan.

Staff Staff of the Forestry and Conservation Division

Budget Included in Forestry and Conservation Divisions recurrent budget

Local Park or Reserve Administration Conservation Officer, c/o Ministry of National Development, PO Box 53, Mahé.

Date June 1983

ARIDE ISLAND SPECIAL RESERVE

Management Category I (Strict Nature Reserve)

Biogeographical Province 4.16.13 (Seychelles and Amirantes Island)

Legal Protection The Aride Island Special Reserve Regulations 1979 (S.I. No. 92) define what is allowable within the reserve. Also listed as protected breeding site under the Turtle Protection Act, under which it is illegal to hunt turtles in the sea area 1,000m from the high water mark.

Date Established Aride was purchased in 1973 by Christopher Cadbury for the Royal Society for Nature Conservation (formerly the Society for the Promotion of Nature Reserves). Declared a Special Reserve 17 June 1975 by the National Parks and Nature Conservancy (Designation of Special Reserve) (Aride Island) Order.

Geographical Location Aride is the northernmost granitic island of the Seychelles group some nine kilometers north-north-east of Praslin Island. 4°08'S, 55°40'E.

Altitude Sea level to 134m

Area 70ha

Land Tenure Royal Society for Nature Conservation (RSNC), United Kingdom.

Physical Features Some 90% of the crescent-shaped island is occupied by a rugged hill rising to 134m, while the remaining area is a flat coastal plain (plateau) not more than 4m above high tide level. The fairly exposed fringing coral reefs around the island, notable for the spur and groove formations found near the landing stage, have been proposed for inclusion in the park.

Vegetation The vegetation of the Aride hill is largely free of exotic plant species and is the most natural and undisturbed of any of the small islands in the Seychelles. Since the coppicing of *Pisonia grandis* stopped in 1975, it has grown quickly to become the dominant species. Aride is reknowned as the only known locality of Wright's gardenia *Rothmania annae*. Other significant species include various *Ficus* species, 'Bois du Lait' *Euphorbia pycnantha* and 'Liane sans famille' *Tsatsi bijuga*, *Hernandia ovigera*, *Morinda citrifolia*, *Barringtonia asiatica*, *Tournefortia argentea* and *Hibiscus tiliaceus*. There is also an extensive stand of cultivated banana *Musa* sp. and the small freshwater swamp is dominated by coco yam.

Fauna Aride is the home of over a million pairs of seabirds comprising 11 species and boasts the world's largest colonies of both the lesser noddy *Anous stolidus* and roseate tern *Sterna dougalli*. It is the only place in granitic Seychelles where the red-tailed tropic bird *Phaeton rubricauda* is still breeding, though only in low numbers. Among the other seabirds to be seen are: fairy tern *Gygis alba*, black noddy *Anous tenuirostris*, bridled tern *Sterna anaethetus*, sooty tern *Sterna fuscata*, white-tailed tropic bird *Phaeton lepturus*, wedge-tailed shearwater *Puffinus pacificus*, Audubon shearwater *Puffinus iherminieri*, Lesser frigate bird *Fregata ariel*, and greater frigate bird *Fregata minor*. It also has a single male magpie

robin *Copsychus sechellarum*, the sole survivor of two attempts to establish a second breeding population from Fregate Island. Its marsh and plateau are the best sites for observing the endemic moorhen *Gallinula chloropus sechellarum*; apart from this, there are no other native land birds surviving on the island (Diamond and Feare, 1980). A small number of hawksbill turtles *Eretmochelys imbricata* (E) nest on the beach. At least two species of skink are known from the island, occurring in large numbers. They are the principal predators of the sea birds' eggs and young chicks. Lizards include: *Mabuya sechellensis*, *Mabuya wrightii*, *Scelores gardineri*, *Ailuronyx sechellensis*, *Phyllodactylus inexpectatus*, *Phelsuma astriata*, and snake species include *Lycognathophis sechellensis*. Aride is also noted for a particularly brightly coloured variety of the ultra-marine surgeon fish *Acanthurus* sp. and fine groves of staghorn corals.

Population The area immediately surrounding the bay is cultivated, interspersed with small plantations of coconut and banana. The small farm workforce is also housed in the vicinity of the bay.

Conservation Management A management plan has been enforced since 1975, but it does not cover the reefs just outside the currently protected area. The principal management objectives are to all development of the island's ecosystems to increase diversity of habitats, maintain the island's importance for seabirds, conserve native trees, protect coral reefs and marine life, education and research. No agriculture is carried out on the hills and certain areas such as the Frigate bird colony and red-tailed tropic bird nest are out of bounds. A network of footpaths is maintained. It has been proposed that the marine area up to a distance of 300m from the shore be declared a marine park.

Zoning Access to some areas on the island is restricted.

Disturbances or Deficiencies Aride is one of the few islands in the Seychelles which has remained free from rats, cats and dogs, though since *Mus musculus* are unfortunately common, and the reefs are reported to be undamaged. Wildlife protection is hampered by the lack of trained and motivated staff and there is still some poaching of turtles, though fewer than are taken from outside the boundaries (Mortimer, 1985). Large numbers of birds eggs are also collected, both for consumption by the farm employees and for sale on other islands, this has affected bird numbers. Two plant species, the wild pineapple and the cactus (*Opuntia* sp.), are encroaching on the sooty tern colonies.

Visitor Facilities The majority of visitors come to the island to see the bird colonies and considerable revenue is generated through tourism. Bathing is permitted and snorkelling and diving are considered excellent (Salm, 1977).

Scientific Research There have been studies carried out on the vegetation and the seabird colonies (summarized by Chongseng, 1985), but there is no programme of continuous monitoring. Steven Warmer has done a brief survey of the reefs. Tagging of turtles.

Special Scientific Facilities None

Principal Reference Material

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- Salm, R.V. (1977) *A guide to snorkelling and diving in the Seychelles*. Octavian Books, London. 60 pp.
- Society for the Promotion of Nature Conservation, Aride Island Nature Reserve, Seychelles Management Plan (1978).

- ° Stoddart, D.R. (Ed.) (1984). *Biogeography and Ecology of the Seychelles Islands*. Dr. W. Junk Publishers, The Hague.
- ° UNEP/IUCN (in prep.). *Directory of Coral Reefs of International Importance*. Volume 2. Indian Ocean.

Staff One manager, six labourers, one boatman, one tourist guide

Budget 1982 - expenditure 191,465SR; income 67,800SR

Local Park or Reserve Administration No information

Date 1983

COUSIN ISLAND SPECIAL RESERVE

Management Category I (Strict Nature Reserve)

Biogeographical Province 4.16.13 (Seychelles and Amirantes Islands)

Legal Protection The Cousin Island Special Reserve Regulations (S.I. No. 93) were gazetted in 1979. The marine turtles are further protected under The Turtle Act, which lists Cousin as a protected breeding site. No turtles to be caught, killed, etc., within 1,000m of the high water mark. The collection of sea shells is prohibited under the protection of seashells Ordinance (Cap.138) of 1965.

Date Established Designated as a special reserve by the Seychelles Government in 1975 by the National Parks and Nature Conservancy (Designation of Special Reserve) (Cousin Island) Order. However, administered as a bird sanctuary since 1968 under the Wild Animals and Birds Protection Ordinance 1966.

Geographical Location A small island on the shallow Seychelles Bank, 2.35km west-south-west of Miller's Point on Praslin Island. 4°19'S, 55°39'E

Altitude Below sea level to 69m

Area 27ha land area, extends 400m offshore from the high water mark (the former bird sanctuary only included the island down to high water mark).

Land Tenure Purchased by the International Council for Bird Preservation, British Section in 1968. Responsibility has recently been transferred to ICBP International.

Physical Features The island is approximately rectangular in shape with a group of rocks (Roche Cannon) located some 200-300m off the north-west point, linked with the main island by a natural stony causeway which is exposed at low tide. About 80% of the island comprises a flat, coastal plain of phosphate sandstone on the northern and eastern flanks of the granite hill, which rises to 69m. The southern and western slopes are rocky and barren, right down to the shore, while the northern and eastern slopes support dense stands of trees. The north-west, north, and north-east shores are characterised by beaches of fine white sand, making up some 80% of the shoreline. The seasonal change in wind direction (north-west/south-east) leads to the constant movement of sand between the east and north coasts, which affects the strand line vegetation and littoral beach organisms, as well as the marine turtle nesting grounds. During the north-west monsoon the North Beach is eroded out, exposing banks of beach rock, while the East Beach develops a wide beach platform; the south-east monsoon reverses this and North Beach develops a supralittoral beach flat, up to 100m wide. There is also a fringing coral reef

surrounding the island which extends, on average, some 200m out from the high water mark. The only running fresh water on the island is a small, seasonal rivulet carrying run-off from the hill down the northern slope to the depression near some wells. The climate is humid and tropical, with a mean annual rainfall of 1,620mm. The highest monthly rainfall occurs between December and February (north-west monsoon), while May to July is the driest season. Monthly temperatures range from 24°C to 26°C, being lowest from April to October/November when the south-east trade winds are at their strongest.

Vegetation The island supports a variety of vegetation types: coastal herb communities maintained by wind-blown salt-spray, characterised by *Boerhavia repens*, *Passiflora suberosa* and *Stenotaphrum dimidiatum*; mature *Pisonia grandis* forest; regenerated *Pisonia/Morinda citrifolia* woodland emerging under the abandoned coconut *Cocos nucifera* plantations on the coastal plain; *Panicum maximum*, *Cyperus polyphyllus* and *Fimbristylis/Bulbostylis* communities on the north and east hillside; *Cyperus ligularis* and the halophyte *Portulaca oleracea* on the south and west hill slopes; dense *Euphorbia pyrifolia* and *Pandanus balfourii* thickets and open sedge/herb communities on the granite slopes; substantial areas of mangrove *Avicennia marina* swamp in the shallow depression, flooded by high spring tides, between Anse Fregate and Ilot (SW), and a small freshwater marsh. Other notable species include the halophytes *Carica papaya* and *Scaevola taccata* found on the beach crests, *Casuarina equisetifolia* fringing the beaches, *Pandanus multispicatus*, *Guetardia speciosa*, *Ficus malarum*, *Ficus avi-avis* and *Lagresia madagascariensis* (previously thought confined to Roche Cannon, but now recorded on the main island). More than 125 plant species have been recorded, over half of which are believed to be introduced (Fosberg, 1970), such as paw paw *Carica papaya* and castor oil *Ricinus communis*. By restricting the clearing of undergrowth, ICBP is hoping to re-establish the original island vegetation, which was thought to comprise forests of tall *Pisonia grandis* on the plateau; thickets of *Scaevola taccata* and *Suriana maritima* along the coast, backed by a dense hedge of *Cordia subcordata*, *Guetardia speciosa* and *Morinda citrifolia*; and dense woods of *Morinda* and *Ficus* spp. (Fosberg, 1970).

Fauna Cousin was acquired mainly because it was the home of three threatened endemic land birds namely: Seychelles brush warbler, *Acrocephalus sechellensis* (formerly *Bebrornis*) (R), Seychelles fody *Foudia sechellarum* (R), and Seychelles turtle dove *Streptopelia picturata rostrata* (E). This latter endemic race is believed to be extinct through hybridisation with the introduced race. By far the largest biomass is represented by large seabird colonies, including what is probably the largest breeding colony of the white fairy tern *Gygis alba* (10,000 in 1980) in the Seychelles, together with Audubon shearwater *Puffinus terminiera* (1,000 in 1980), wedge-tail shearwater *P. pacificus* (35,000 in 1980), white-tailed tropic birds *Phaethon lepturus* (1,000 in 1980), and bridled terns *Sterna anaethetus* nesting on the hill, while black noddy *Anous tenuirostris* (200,000 in 1980) and common noddy *A. stolidus* (3,000 in 1980) prefer the coastal plain for their nest sites. In all, some 52 species of bird have been recorded from Cousin. Other notable species not already listed are, Madagascar fody *Foudia madagascariensis*, barn owl *Tyto alba*, and Indian mynah *Acridotheres tristis* (introduced species), Seychelles sunbird *Nectarina dussumieri* (endemic), great frigate bird *Fregata minor* (regular visitor), lesser frigate bird *F. ariel*, and European hobby *Falco subbuteo* (migrant). The only residential mammal is the hare *Lepus nigricollis*, which was introduced from India in the 1920s, but fruit bat *Pteropus sechellensis* commute from neighbouring Praslin to feed on ripe fruit. All domestic animals surviving from the days when the island was inhabited have been eliminated. There is an abundance of the skinks *Mabuya wrightii*, and *Scelotes gardineri*, and brown "loose skin" gecko *Ailuronyx sechellensis* are also fairly common. Cousin is acknowledged as having one of the largest populations of breeding hawksbill turtle *Eretmochelys imbricata* (E) in Seychelles and green turtle *Chelonia mydas* (E) also breed here occasionally. Other reptiles are: Seychelles terrapin *Pelusios subniger*, small green gecko *Phelsuma astriata* a small number of reintroduced giant tortoise *Geochelone gigantea* (R), *Mabuya sechellensis*, at least one species of Caecilian and *Phyllodactylus inexpectatus*. Over 230 fish species have so far been identified from the reefs (checklist in Frazier and Polunin, 1973). The most conspicuous invertebrates are the crabs, with three species of ghost crab *Ocypode* spp., and hermit crabs *Coenobita* spp.. Interesting terrestrial invertebrates include: the giant millipede *Scaphiostreptus madcassus*, scorpion *Isometrus maculatus*, an uncommon species of tail-less whip scorpion *Amblypygi* which is confined to Cousin, Cousine and Aride islands, and the Madagascar termite *Nasutitermes migricans*. Butterflies are

extremely scarce with only six species recorded including painted lady *Cynthia cardui* and *Parallelia torrida*. The coral reefs were surveyed in detail by Frazier and Polunin (1973) (includes species checklists of reef fish and corals) and UNEP/IUCN (in prep.) contains a summary of the reef structure and coral communities found encircling the island. The *Acropora* assemblage is most common, other characteristic coral species are: *Millepora platyphylla* and *M. dichotoma* in exposed areas, *Pocillopora* and *Stylophora*, *Porites* at the base of reef slopes.

Conservation Management ICBP manages the island as a nature reserve, integrating the interests of conservation, scientific research and limited tourism. The management objectives defined in the revised management plan (Diamond, 1980) are as follows (in order of priority): maintain the maximum possible number of the three endemic land birds; within this framework to restore the original habitat of the island, except when this conflicts with the primary objective; maintain the maximum possible population of hawksbill turtle on and around the island; maintain the maximum possible populations of seabirds breeding on the island; and make full use of the island's educational and research potential. The staff live on the island and buildings include the main house, three stores, three labourers' cottages and two boatsheds. The staff are in radio contact with nearby Praslin Nature Park and have three boats for transport. Undergrowth is no longer cleared in the coconut plantation to allow the natural regeneration of native vegetation. All domestic animal species have been eliminated and a strict ban on their import is maintained. The numbers of such introduced species as the Indian mynah and barn owl are controlled to avoid competition and predation with the indigenous species. There are regular beach patrols by reserve staff (reinforced by the Curieuse Patrol and Praslin Police) organised to protect the nests and breeding females of hawksbill turtle from poaching. In 1972, I. Robertson briefly surveyed the island.

Zoning There are certain very dense bird colony sites where the visitor access is prohibited; apart from this the island is too small for proper zoning.

Disturbances or Deficiencies Its past history as a well-maintained coconut plantation means that it is only now that the native vegetation is making a comeback. Many exotic species, such as papaya, castor oil and cotton, were introduced in the past. A patch of rangoon creeper is a persistent problem as it continually grows back vigorously despite repeated pruning and applications of weed killers. In an effort to encourage the return of native vegetation all coconuts that fall down are collected and shipped to Praslin. Occasional visits by the introduced African barn owl have to be watched as they prey on the fairy terns and have been responsible for the decline in their numbers on other islands in the Seychelles. Before 1968, the reefs were exploited for shells. Some of the Praslin fishermen have persisted in poaching hawksbill turtles, though numbers taken within the protected area are lower than outside the boundaries (Mortimer, 1981).

Visitor Facilities Tourism is restricted to daytime visitors, who are ferried during the daytime from nearby islands in staff boats, not more than 20 at a time and only on three specified days a week. There is no overnight accommodation.

Scientific Research A fairly intensive research effort covering most of the flora and fauna has been carried out by the successive scientific administrators and is still being continued. Special attention has been given to the ecology, behaviour and population size of the brush warbler. Various ringing programmes have been carried out. Another long-term study has been the tagging of female hawksbill turtles; the hawksbill turtle population is probably the most studied in the world. F.R. Fosberg surveyed the vegetation in 1971. However, the full potential for research on the island has not yet been realised as a few of the research priorities identified in the management plans (Diamond, 1975; 1980) have been achieved.

Special Scientific Facilities A fully-equipped research station with room for two or three visiting scientists was built from a donation by Ciba-Geigy.

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Staff Formerly one expatriate scientific administrator plus five Seychellois workers. In 1982, the staff structure was reorganized, replace the post of scientific administrator by the posts of warden and research officer.

Budget 1981 - expenditure 161,133.44 Rs. (£4,632.02); income 115,110.85 Rs (£5,497.07). The maintainance costs have over the years come from the original capital raised to by the island, grants from WWF and the Fauna and Flora Preservation Society, and income from landing fees and the sale of coconuts. In 1985, funds were becoming harder to raise, possibly at the expense of conservation priorities (Diamond, 1985).

Local Park or Reserve Administration No information

Date June 1983

LA DIGUE VEUVE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 4.16.13 (Seychelles and Amirantes Islands)

Legal Protection The collection of sea shells is prohibited under the Protection of Shells Ordinance (Cap. 138) of 1965.

Date Established Declared a nature reserve in 1982 under the National Parks and Nature Conservancy Act, 1971.

Geographical Location On the western plateau of La Digue, some three hours by boat from Mahé Island. 4°21'S, 55°50'E.

Altitude Up to 20m

Area 8ha

Land Tenure The property belongs to Mrs Rene Payet of La Digue. She has leased the property to Mr Christopher Cadbury of the Royal Society for Nature Conservation who has agreed to let the Forestry and Conservation Division of the Ministry of National Development manage it.

Physical Features A low-lying plateau bordered on two sides by a public dirt road. Part of a large freshwater marsh is contained in the north-western portion of the reserve.

Vegetation The dominant woodland vegetation comprises mature and juvenile trees of takamaka *Callophyllum inophyllum* and badamier *Terminalia catappa*. There are also some old coconut trees *Cocos nucifera* and large *Casuarina equisetifolia*. When specimens of this latter species fall down in the high winds, they open considerable gaps in the closed canopy.

Fauna Seven to nine pairs of the threatened Seychelles black paradise flycatcher *Terpsiphone corvina* (R) survive in the reserve, which is also a good site for the Seychelles pond turtle *Pelusios subniger* and a species of caecilian abundant in the humus layer. The flycatcher, which is endemic to the Seychelles, is only found on La Digue and on neighbouring Praslin. Other indigenous birds to be found here include Seychelles bulbul *Hypsipetes crassirostris* and Seychelles sunbird *Nectarinia dussumieri*.

Conservation Management The draft regulations drawn up in 1979 are being enforced. Visitors are asked to keep to the paths and some care was given to the siting of the paths.

Zoning None

Disturbances or Deficiencies The land still belongs to Mrs Payet, but it has been recommended that the Seychelles Government should buy it. The marsh in the north-west corner is only a part of a larger marsh system, an essential habitat requirement for the paradise flycatcher. This means that the reserve is vulnerable to both marsh drainage and uses of pesticide outside the reserve boundaries. The reserve is the smallest in the Seychelles, and is on one of the most densely populated islands.

Visitor Facilities The reserve is open to the public who are requested to remain on a marked path preferably in groups.

Scientific Research Dr J. Watson has done some work in 1977-1978 on the distribution and ecology of the paradise flycatcher under IUCN/WWF Project 1590.

Special Scientific Facilities None

Principal Reference Material

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IUCN Directory of Afrotropical Protected Areas

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Staff In 1977, ICBP were funding a local Seychellois warden on La Digue (IUCN/WWF Project 1590).

Budget No information

Local Park or Reserve Administration No information

Date June 1983





- Key
- National Park
 - Nature Reserve
 - Forest Reserves

Sierra Leone

SIERRA LEONE

Area 72,326 sq.km

Population 3,350,000 (1982)

Parks and Reserves Legislation The Forestry Department was set up in 1911 to protect the remaining forest in Sierra Leone. However, the basis for conservation legislation was set out in the otherwise ineffectual ordinance for the Preservation of Wild Animals, Birds and Fish to which most colonial powers were signatories in 1900. The Wildlife Conservation Act No. 27 of 1972, provided a more solid framework for species preservation and habitat protection, placing restrictions on hunting and trapping (though these are apparently seldom enforced). In terms of the legal provision of this Act, the primary management goal for nature conservation areas is to conserve the existing flora and fauna for scientific, educational and cultural reasons. Secondary commercial utilisation is only permissible if compatible with the primary management goal. The act identifies National Parks, Strict Nature Reserves and Game Reserves, though definitions of the terms are not specifically made. The Act also lists a number of activities prohibited or controlled in these areas. Definition of each category is made however, in the Wildlife Conservation Act No. 31 of 1967. Article 8 of the 1972 Act provides for buffer zones to nature reserves and national parks where forestry and agriculture are allowed, but no settlement or hunting. Forest Reserves and Protected Forests were originally set up under the Forestry Ordinance (now Act) of 1912 (amended in 1942). Four forest reserves, Western Gola, Loma and Kangari, are also non-hunting areas, though at least Gola has undergone some commercial logging activity. In 1978 the Ministry of Agriculture and Natural Resources commissioned a report on Wildlife Conservation and Management by Phillipson but, although his report was accepted as Government policy by Parliament, few of his recommendations have yet been implemented.

Parks and Reserves Administration The Ministry of Agriculture and Natural Resources is charged with administering the Act and has created a Wildlife Conservation Branch to the Forestry Division. Staff from this office are posted in each of the prospective reserve sites.

Address

* Wildlife Conservation Branch, Forestry Division, Ministry of Agriculture and Natural Resources, Tower Hill, Freetown.

Additional Information The greatest threat to the native flora and fauna of Sierra Leone is environmental degradation through uncontrolled forest clearance and agricultural expansion; in 200 years the country has lost over 97% of its primary forest. Large scale digging for diamond and gold along river courses has also greatly increased soil erosion. Other threats include natural resource depletion by overfishing rivers, and hunting for food and for export, which has led to the disappearance of the lion and threatens the remaining populations of forest elephant, pygmy hippo, leopard, chimpanzee, crocodile and python. A mammal survey carried out in 1979 showed that wildlife distributions and habitat conditions had altered drastically in only a few years, and that all wildlife populations and wilderness areas were now in jeopardy.

The creation of a qualified and efficient administrative unit for National Parks and Wildlife was considered by Roth and Merz (1983) to be a key issue for the improvement of conservation action. Shortages in manpower and finance mean that management and control are currently difficult to implement. Njala University college, a part of the University of Sierra Leone, had planned a programme of wildlife biology and applied ecology for people entering a career in resource management and conservation, but this has been postponed due to lack of staff and finance.

The recently established Sierra Leone Nature Conservation Association undertook a media campaign in 1980 to increase public awareness of conservation problems and priorities. IUCN/WWF Project 1633 has been allotted \$14,825, including a vehicle, to strengthen conservation education but this is limited to a few schools in the capital, Freetown.

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Protected Areas

	(hectares)
<i>National Parks</i>	
Outamba-Kilimi	98,000
<i>Nature Reserves</i>	
Mamunta-Mayoso Swamp	1,500
<i>Forest Reserves</i>	
Gola	75,000
Kangari Hills	12,950
Kuru Hills	
Loma Mountains	
Sankan Biriwa	
Tama	16,200
Tonkoli	43,800
Western	17,870
Subtotal	165,820
<i>Proposed areas</i>	
Tiwai Island Wildlife Sanctuary	1,200

OUTAMBA-KILIMI NATIONAL PARK

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.01.01 (West African Woodland/savanna)

Legal Protection The protection was partial, with very little control of hunting, tree-felling and cultivation. Hopefully establishment of the area as a national park will improve the situation.

Date Established Provisional legislation passed in 1981, but actually designated in January 1986 by Government Notice No. 76 (Kilimi National Park) and Government Notice No. 77 (Outamba National Park).

Geographical Location There are two separate units in the Tambakha Chiefdom of Bombali district in north-west Sierra Leone. The western park boundary is the Great Scarcies River which is the border with Guinea. 9°35'-9°55'N, 11°55'-12°30'W.

Altitude 50-300m

Area 98,000ha

Land Tenure Land donated by Tambakha Chiefdom to the Ministry of Agriculture and Forestry

Physical Features There are broad river plains with large seasonally flooded areas (bolilands) and isolated hills. The park encloses the prime watershed area of the Great Scarcies (Kolenten) and Little Scarcies (Kaba) Rivers which supply irrigation water to 20% of the country's agricultural land. The park lies on Birrimian granites with richer soil along the riverine forest slopes. There is a tropical savanna climate with mean annual rainfall of 2,300mm, 95% falling from June to December. March is the hottest month with mean temperature of 28°C and diurnal range of 22°C. Wet season mean monthly temperatures are about 21°C, with a diurnal range of 14°C.

Vegetation Within the southern guinea savanna is a mosaic of different habitats; short grasses on lateritic hardpans, boli grasses in seasonally flooded areas, sedge grasses on granite outcrops and savanna woodland of *Lophira* and *Daniellia* species on the plains; riverine forest along the Great Scarcies typified by *Parinari*, *Pseudospondias*, *Spondias*, and *Dialium* species; and small remnant forest along streams and on the top of several small hills.

Fauna Primates recorded are: Campbell's monkey *Cercopithecus campbelli*, green monkey *Cercopithecus aethiops*, lesser white-nosed monkey *Cercopithecus petaurista*, sooty mangabey *Cercocebus torquatus*, western black-and-white colobus *Colobus polykomos*, red colobus *Colobus badius*, chimpanzee *Pan troglodytes* (T), and guinea baboon *Papio papio*. Mammals also include: buffalo *Syncerus caffer nanus*, bushpig *Potamochoerus porcus*, bay duiker *Cephalophus dorsalis*, Maxwell's duiker *Cephalophus monticola*, black duiker *Cephalophus niger*, red-flanked duiker *Cephalophus rufilatus*, yellow-backed duiker *Cephalophus silvicultor*, bushbuck *Tragelaphus scriptus*, cape clawless otter *Aonyx capensis*, side-striped jackal *Canis adustus*, african civet *Viverra civetta*, brush-tailed porcupine *Atherurus africanus*, leopard *Panthera pardus* (T), and elephant *Loxodonta africana* (T). Nile crocodile (V) and hippopotamus *Hippopotamus amphibius* have been recorded and it is thought possible that the pygmy hippopotamus *Choeropsis liberiensis* (V) may occur (though there is little or no evidence for this). Over 130 species of birds have been recorded, including wetland species of the bolilands.

Conservation Management A five-year management plan was prepared following a 1980 wildlife survey. Park Headquarters were established at Kaba with access roads under development, and VSO and U.S. Peace Corp volunteers started to train staff in maintenance and conservation management. However, resettlement of 23 villages had not occurred by 1985, due to lack of the necessary legislation to enforce this and lack of money for compensation, so that expatriate staff left.

Zoning None (though the park is split between two sites).

Disturbances or Deficiencies Susu villagers slash and burn and there is commercial exploitation of certain animal species for food. Exploitation for export is now prohibited, but not enforced. Hunters from Liberia cause significant damage to wildlife with their sophisticated weapons, but the government is now attempting to control this cross-border movement.

Scientific Research In 1979/1980 a wildlife survey was sponsored by the New York Zoological Society, Fauna and Flora Preservation Society and WWF. A vegetation map has been prepared from infra-red aerial photographs. In 1982, a botanical and mammal survey was made of the Kilimi area by Njala University College and the University of Pennsylvania. In

1983, local farming techniques and land productivity were surveyed as baseline data for the government resettlement scheme. In 1983/1984, a small mammal survey and fieldguide compilation was attempted by the Smithsonian Institution.

Special Scientific Facilities Camping may be available at Park Headquarters.

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Staff This originally included a park director with 25 permanent staff, four visiting overseas advisors, and 10 temporary labourers, but now only a reduced staff from the Wildlife Department remains.

Budget Solarex Corporation supplied solar power and WWF supported the establishment of Park infrastructure.

Local Park or Reserve Administration The information and business office is in Kamakwie and park headquarters are at Kaba.

Date April 1985

MAMUNTA-MAYOSO SWAMP NATURE RESERVE

Management Category Proposed Nature Reserve

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Protective status given by the local chiefdom council in 1981 but awaiting official government protection.

Date Established Established in 1980 as a chiefdom reserve.

Geographical Location Near Magburaka in central Sierra Leone. 8°40'N, 11°55'W.

Altitude About 70m

Area 1,500ha

Land Tenure Local Chiefdom

Physical Features Much of the area is low-lying swamps (or bolilands), interspersed with slightly higher hills and minor terraces. The area of water varies considerably, many parts being flooded from July to December. About 90% of the annual rainfall of 3000mm-3500mm occurs from April to November and mean daily temperatures vary from 21°C in the wet season to 28°C in the dry season.

Vegetation A varied mosaic includes areas of *Raphia* swamp, *Anadelphia-Rhytachne* grassland, *Lophira*, and other types of savanna forest regrowth and high forest remnants.

Fauna Mammals include: chimpanzee *Pan troglodytes* (V), dwarf galago *Galago demidovii*, potto *Perodicticus potto*, red colobus *Colobus badius*, western black-and-white colobus *Colobus polykomos*, green monkey *Cercopithecus aethiops*, lesser white-nosed monkey *Cercopithecus petaurista*, sooty mangabey *Cercocebus torquatus*, bongo *Tragelaphus euryceros*, and several duiker *Cephalophus* spp.. The swamps are important for frogs (Anura), of which 15 species have been identified, Nile crocodile *Crocodylus niloticus* (V), and broad-nosed crocodile *Osteolaemus tetrapis* (I). Over 240 birds have been recorded, including many wetland species.

Zoning None

Disturbances or Deficiencies There is a Fula encampment inside the reserve with several hundred cattle. The Fulas burn some areas of savanna annually to improve grazing and the cattle pollute the swamps, altering the character of their vegetation. Annual fishing, woodcutting, and shifting cultivation occur on a small scale.

Visitor Facilities None exist in the reserve but there is a small hotel nearby in Magburaka

Scientific Research Faunal surveys have been carried out and the avifauna is well recorded.

Special Scientific Facilities None

Principal Reference Material

- ° Armstrong, G. (1984). An ecological survey of Mamunta-Mayoso Wildlife Reserve Sierra Leone: Lethbridge College, Alberta, Canada.
- ° Phillipson, J.R. (1978). Wildlife Conservation and Management in Sierra Leone. Special report to MAF, Freetown.

Staff Three game guards

Budget Game guards' salaries paid by MAF

Local Park or Reserve Administration Based in Mayoso village

Date April 1985

GOLA FOREST COMPLEX

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Settlement is prohibited and logging is by concession. Hunting is governed by the Wildlife Conservation Act 1972, although not implemented.

Date Established Gola West and East were declared Forest Reserves in 1926 and Gola North in 1930. Increased status was proposed in 1978 and again in 1983 for Gola East and West (National Park) and Gola North (Game Reserve).

Geographical Location Three separate forests near the eastern border with Liberia. 7°13'-7°55'N, 10°35'-11°25'W.

Altitude Up to 472m (Sangie Mountain, Gola North)

Area 75,000ha; Gola North (45,000ha), Gola East (22,800ha), and Gola West (6,200ha).

Land Tenure Government

Physical Features The topography of the Gola Forests varies. Whereas, the Gola West and East Reserves are relatively flat, except for the northern hilly part of Gola East, the Gola North Reserve is undulating. The greater part of this reserve lies above 300m and 9.3% of its total surface comprises steep slopes. Temperature fluctuates more daily than seasonally. Temperatures are highest during the dry season from December to April and lowest during the rainy season from May to November. Average seasonal temperatures 26° and 29°C. Annual rainfall averages between 2,800mm (Gola North) and 3,200mm (Gola East).

Vegetation The reserve constitutes the last large remnant of near primary rain forest in Sierra Leone which extended historically over 70% of the country. In undisturbed forest, the canopy is dominated by the emergent tree species *Heritiera utilis*-*Lophira alata* in Gola North and *Nesogordonia papaverifera*-*Lophira alata* in Gola East and West. Other species include *Tieghemella heckelii*, *Klainedoxa gabonensis* and *Sacoglottis gabonensis*, and the non-emergent *Protomegabaria stapfiana*. There have been at least 180 species of tree recorded in the reserves. The shrub-layer includes *Napoleona hendelotii*, *Memecylon afzelii*, *Diospyros* spp., *Jasminum* sp., *Agelaea trifolia*, *Strychnos* sp., some *Trichilia patens*, and the small bamboo *Guadua oblonga*. The forest is typical of climax upper guinean rainforest, with emergent canopy species of massive size and unusual height (up to 60m). Tree species composition is similar to the rain forests in Congo and the Nigerian Shasha forest. The relatively undisturbed state of the forest is indicated by the high-proportion of large diameter trees of the high degree of stratification. The proportion of rare trees is high and many of the emergents belong to rare families. There is one endemic tree *Didelotia idae*.

Fauna The original diversity of the typical rainforest wildlife is still evident, including at least 78 species of mammal, although many populations have been severely reduced in number. This refers particularly to the primates, such as, sooty mangabey, *Cercocebus torquatus*, chimpanzee *Pan troglodytes* (T) lesser bushbaby *Galago senegalensis*, potto *Perodicticus potto*, three species of *Cercopithecus*, three of *Colobus*, and forest duikers *Cephalophus* spp.. Conservation of the forest elephant *Loxodonta africana cyclotis* (T), in Sierra Leone depends largely on the conservation of the Gola Forest complex, and 90-130 remain in Gola East and North. Gola is also one of the two most valuable lowland primary rain forests for Upper Guinea forest birds. Several threatened species are known to occur: white-breasted guineafowl *Agelastes meleagrides* (E), western wattled cuckoo-shrike *Campephaga lobata* (V), yellow-throated olive greenbul *Criniger olivaceus* (V) and Gola malimbe *Malimbus ballmani* (I), and others almost certainly occur in Gola: rufous fishing owl *Scotopelia ussheri* (R), white-necked picathartes *Picathartes gymnocephalus* (V); Nimba flycatcher *Meleanornis annamarulae* (I) and yellow-footed honeyguide *Melignomon eisentrauti* (K).

Conservation Management Compatibility of forest activities with wildlife conservation relies upon the intensity and control of logging. The Forest Industries Corporation (FIC) log Gola North according to a management plan. The mode and intensity of timbering in Gola West and East was controlled by Sierra Leone Timber Industry and Plantation Company (SILETI) until 1982, but now West German companies have taken over. Reforestation depends on the volume of timber produced and is financed by concession returns. Both Phillipson (1978) and Cole (1980) recommend that at least part of Gola should be made a Biosphere Reserve, partly because of its genetic resources.

Zoning Buffer zones have been proposed

Disturbances or Deficiencies There are plans to dam the Mano and Maro Rivers for HEP with resettling of people around the reserves. The inaccessibility of the area had prevented exploitation, but since the construction of a road in 1950, some 40% of the area has been logged. Timber concessions were granted in 1978 in Gola North (partially logged by FIC in the early 1960s). Logging activity began in 1984 and this exploitation is to include up to 78 different tree species, severely jeopardising the original diversity of the forest. Concessions were granted in Gola West and East in 1977, and although logging has not been extensive, Gola

west has been logged-over once and has the south-western part of Gola east. Timber over-exploitation remains a threat in these areas. All three sites are also affected by shifting cultivation, particularly on boundaries, poaching by professional hunters, and indiscriminate hunting to supply timber labour forces (particularly of monkeys and duiker).

Scientific Research Ecological study was made in 1971 by the University of Sierra Leone (Freetown), of forest enclaves in accessible hills and valleys. Phillipson and Teleki briefly surveyed the area in 1978 and 1981. A survey of elephant in 1982 under IUCN/WWF Project 3039. A faunal survey is currently being conducted (IUCN/WWF and NYZS sponsored).

Special Scientific Facilities None

Principal Reference Material

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Staff No information

Budget No information

Local Park or Reserve Administration District Forest Office, Kenema

Date April 1985

PROPOSED TIWAI ISLAND WILDLIFE SANCTUARY

Management Category Proposed

Biogeographical Province 3.01.01 (Guinean Rain Forest)

Legal Protection Hunting banned by chiefdom authorities. Game Sanctuary status would ban hunting permanently under the terms of the Sierra Leone Wildlife Conservation Act 1972.

Date Established Legislation pending December 1985: paper awaits approval by Cabinet.

Geographical Location An island in the Moa River in Pujehun District, southeastern Sierra Leone, about 15km northeast of the town of Potoru and 60km inland from the Atlantic Ocean. Access by rural road from Potoru (headquarters of Barri Chiefdom) to the village of Kambama on the west bank of the Moa, then by boat across the river. 7°33'N, 11°19'W.

Altitude 80-110m

Area 1,200ha

Land Tenure Local Government (Barri Chiefdom)

Physical Features The sanctuary comprises the entire island of Tiwai, a low-lying river island with sandy soils underlain by schists and lateritic 'duricrust'. The channels of the Moa River on either side of the island are perennial, with abundant rapids produced where the river cuts through the Kambui Schist. Smaller islands downstream may eventually be incorporated into the sanctuary. Ecologically, Tiwai can be regarded as part of the Gola Forest system; the western boundary of the Gola West Forest Reserve lies close to the southern tip of Tiwai, while to the north is the Kambui Hills South Forest Reserve. Mean temperature is 27°C and annual rainfall is around 3,000mm, with most rain falling in a May - October wet season, in which June - September are usually the wettest months. Very little rain falls in December - March. At the end of the dry season it is possible to walk across the eastern branch of the Moa.

Vegetation Original vegetation would have been a mixture of lowland rain forest (similar to that in Gola) and *Raphiapalm* swamp. Tiwai has been extensively farmed, so most of the vegetation (except by the river bank) is of secondary nature. About half the island carries old secondary forest, much of it believed to be 40-60 years old (and with some individual trees almost certainly older). In this forest, many individual trees reach to about 40m in height. More than 150 tree species are present, of which the dominant species (in terms of biomass) are *Piptadeniastrum africanum*, *Pentaclethra macrophylla*, *Uapaca guineensis*, *Funtumia africana* and *Cynometra leonensis*. The rest of the island is a mixture of palm swamp, riverine forest, young secondary forest (farmbush), and active farms (the chief crop is upland rice).

Fauna Tiwai supports the typical forest and river fauna of the area, only notably lacking the largest mammals (there are no elephants, bushcow or bongo). There is a significant population of pygmy hippopotamus *Choeropsis liberiensis*, and a diverse and abundant population of nonhuman primates - 11 species, including the threatened red colobus *Procolobus badius* and diana monkeys *Cercopithecus diana* and the western chimpanzee *Pan troglodytes verus*. 115 bird species have been recorded so far, including the white-breasted guinea fowl *Agelastes meleagrides*.

Conservation Management US Peace Corps have assigned a volunteer to Tiwai to develop an Environmental Education programme focussed on local schools and a Visitor Centre at Tiwai.

Zoning Management plans being developed call for a central area of the island of at least 600ha to be protected from disturbance and used for faunal and floral protection and baseline ecological research. In other areas traditional slash-and-burn farming on a long rotation will be combined with plantation forestry using native tree species. Apart from a small research station there is presently no permanent human settlement on Tiwai and none will be permitted; farmers reside in mainland villages.

Disturbances or Deficiencies There is disturbance by slash-and-burn farming, but the extent of the farming is controlled. This disturbance helps to maintain habitat diversity, and therefore species diversity. The small size of Tiwai makes some of the larger animals potentially vulnerable to extinction as a consequence of small population size in an isolated area. However, most of these species are believed to survive upon the mainland and can cross the Moa River in the dry season. In the long run, the Tiwai sanctuary should be made contiguous with a better-managed Gola West Forest Reserve.

Visitor Facilities None at present. Simple accommodation for small parties planned, and an education centre.

Scientific Research Intensive ecological studies of rain-forest primates have been in progress since 1982, combined with studies of vegetation and soils. These studies have been a collaborative effort between Njala university College of the University of Sierra Leone, the City University of New York (USA), the University of Miami (USA) and the University of Strathclyde (UK).

Special Scientific Facilities The research project maintains a tented base camp on the island, and an extensive trail grid through the protected forest area. In two areas of intensive research, several thousand large trees have been identified, and labelled with numbered tags. A simple laboratory and office building is planned.

Principal Reference Material

- ° None yet available on Tiwai itself. For the area generally see:
- ° Clarke, J.E. (Ed.) (1976). *Sierra Leone in Maps*. Hodder and Stoughton, London.
- ° Cole, N.H.A. (1980). The Gola Forest in Sierra Leone. *Environmental Conservation* 7: 33-40.

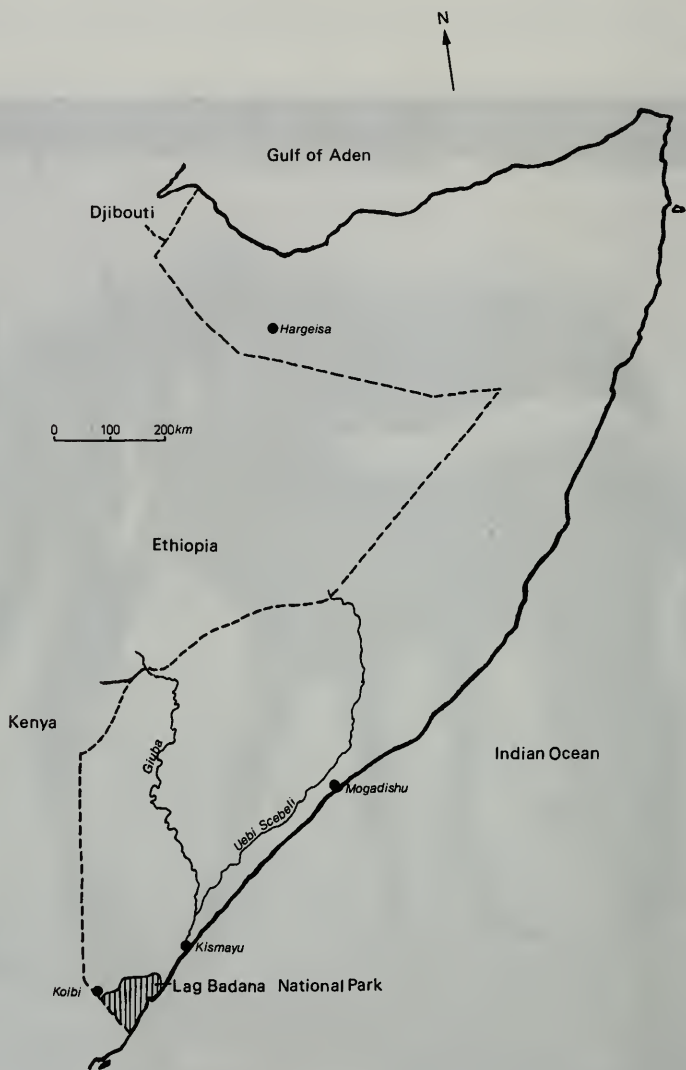
Staff None yet allocated specifically to sanctuary. Manager, maintenance and patrol staff to be recruited. Manager likely to be expatriate volunteer (Peace Corps or VSO)

Budget None yet finalized. Funds needed for laboratory building, visitor centre, vehicle and operating costs (including staff and fuel).

Local Park or Reserve Administration Board of Trustees to be established, to act on behalf of the land owners, Barri Chiefdom.

Date January 1986





Somalia

SOMALIA

Area 637,539 sq.km

Population 3,860,000 (1982) excluding Somali-speaking refugees

Parks and Reserves Legislation Law No. 15 on Fauna (Hunting) and Forest Conservation was decreed 25 January 1969 and amended 31 August 1970. It covers forest conservation, grazing, and mining, as well as establishment and control of protected areas, with the object of protecting natural resources from degradation by regulating their management. Types of area defined in the original legislation include Game Reserves, Controlled Areas, Partial Game Reserves, and Forest Reserves. Marine fisheries legislation is covered in the Maritime Code (Legislative Decree No. 1 of 31 February 1959) as amended by Decree Law No. 7 of 1 November 1966 and Law No. 3 of 7 January 1967. However, the need for a new and comprehensive legislation covering all aspects of wildlife management has been recognised for some time, as present legislation is both obsolete and not fully workable. The proposed law on nature conservation, national parks and wildlife management is modelled on the Wildlife (Conservation Management) Act 1977 of Kenya. Legislation proposed will provide for the establishment of a network of protected areas covering all aspects of Somali wildlife, and will define the role of national parks, wildlife reserves, special reserves, turtle reserves, forest reserves and grazing reserves. Eleven special reserves have been proposed since 1970, eight for the protection of fish and crustacea, two for the protection of endangered plants and one, the petrified forest of Bir Dulhir, is a palaeontological site. Other areas proposed for protection include Lack Dere (Afmedow-Belesgogani), Far Wamo Wildlife Reserve, Arboreweow, Gezira, Awdhegle-Gandershe National Park, Harqan Dalandoole, Qurajo, Far Libah, Eji-Oobale Wildlife Reserve, Jowhar-Warshek National Park, Har Yiblane, Haradere-Awale Rugno, Hobyo, Las Anod-Tateh-El Chebet, Caan Libaax and Paolo Forest. There is little recent information on forest reserves and most of them are reportedly protected on paper only (Simonetta and Simonetta, 1983). Because of the aridity and need to control land use carefully, Somalia also has 136 grazing reserves and 16 range co-operatives covering approximately 7,200,000ha in total. The prime purpose of these areas is not nature conservation as such, but conservation of grazing land.

Parks and Reserves Administration This is primarily the responsibility of the National Range Agency within the Ministry of Livestock, Forestry and Range, however five Ministries or Departments are concerned with species and habitat conservation (though the role of each institution is not clearly defined). The National Range Agency, which basically has responsibility for conservation and development of range, forest and wildlife resources, has recently mounted efforts to seek assistance in building a department and a programme for wildlife conservation and management. Their Department of Wildlife, along with USAID, commissioned a report on wildlife and conservation in 1984 (Toth and Qabile, 1984). The Department has recently formed, by presidential decree, a law enforcement unit independent of the police and under the National Range Agency. This has placed the responsibility for enforcement of wildlife regulations squarely under the Department of Wildlife, with the police now playing a supporting role.

Address

- ° Department of Wildlife, National Range Agency, Ministry of Livestock, Range and Forestry, BP 1759, Mogadiscio.
- ° Department of Forestry, National Range Agency, Ministry of Livestock, Range and Forestry, BP 1759, Mogadiscio.

Additional Information For a number of years Somalia has had assistance in its land-use planning from a FAO/UNDP project - Strengthening of Forestry and Wildlife Management. A report has also been prepared for the National Range Agency under an Italian Cooperation Programme, and included suggestions for a network of national parks and reserves, and revision of other legislation (Simonetta and Simonetta, 1983). Further detailed suggestions on improvement of legislation and organization are also made by Toth and Qabile (1984).

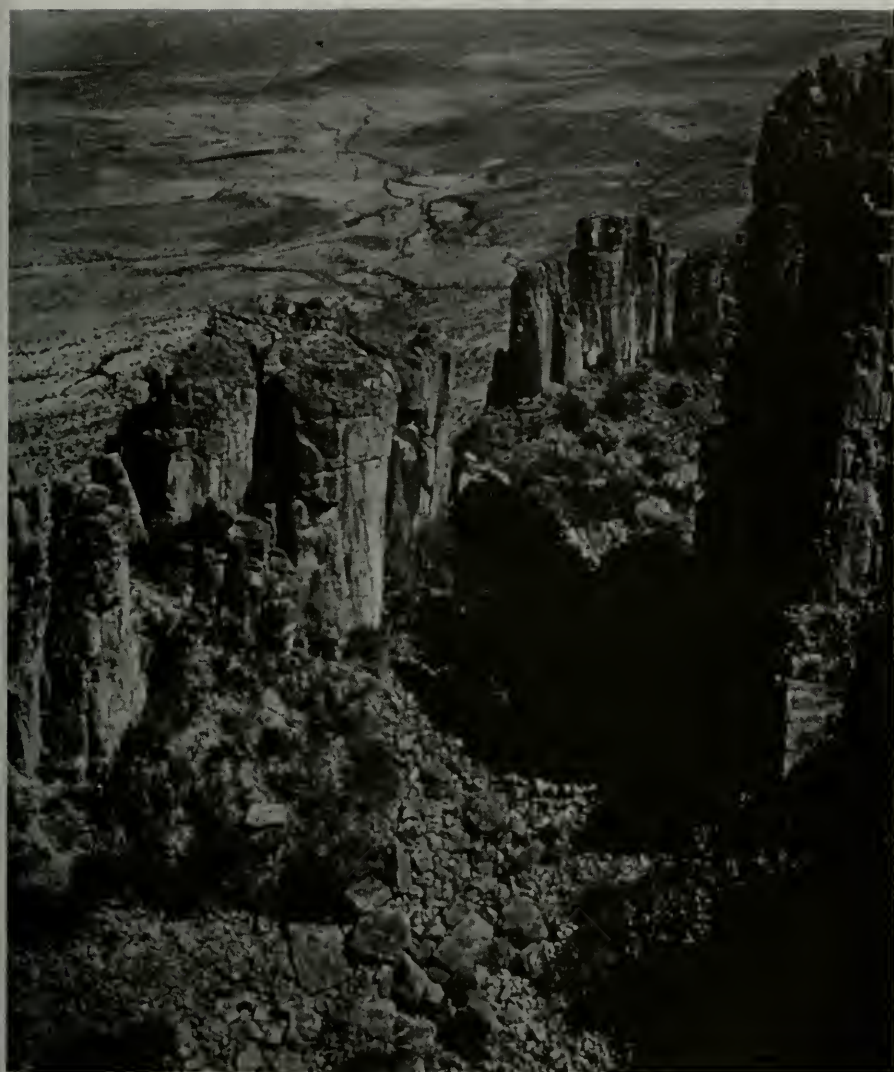
There are problems within the Department of Wildlife, mainly due to lack of funds, continued loss of trained personnel and an unclear programme framework. In addition, the continuing international border dispute has had a profound impact on the natural and economic resources of the country. Wildlife populations have suffered severely as a result of the large numbers of guns freely available. It is unlikely that the Department will be able, on its own, to handle this situation which will take the total cooperation of all agencies, civilian and military.

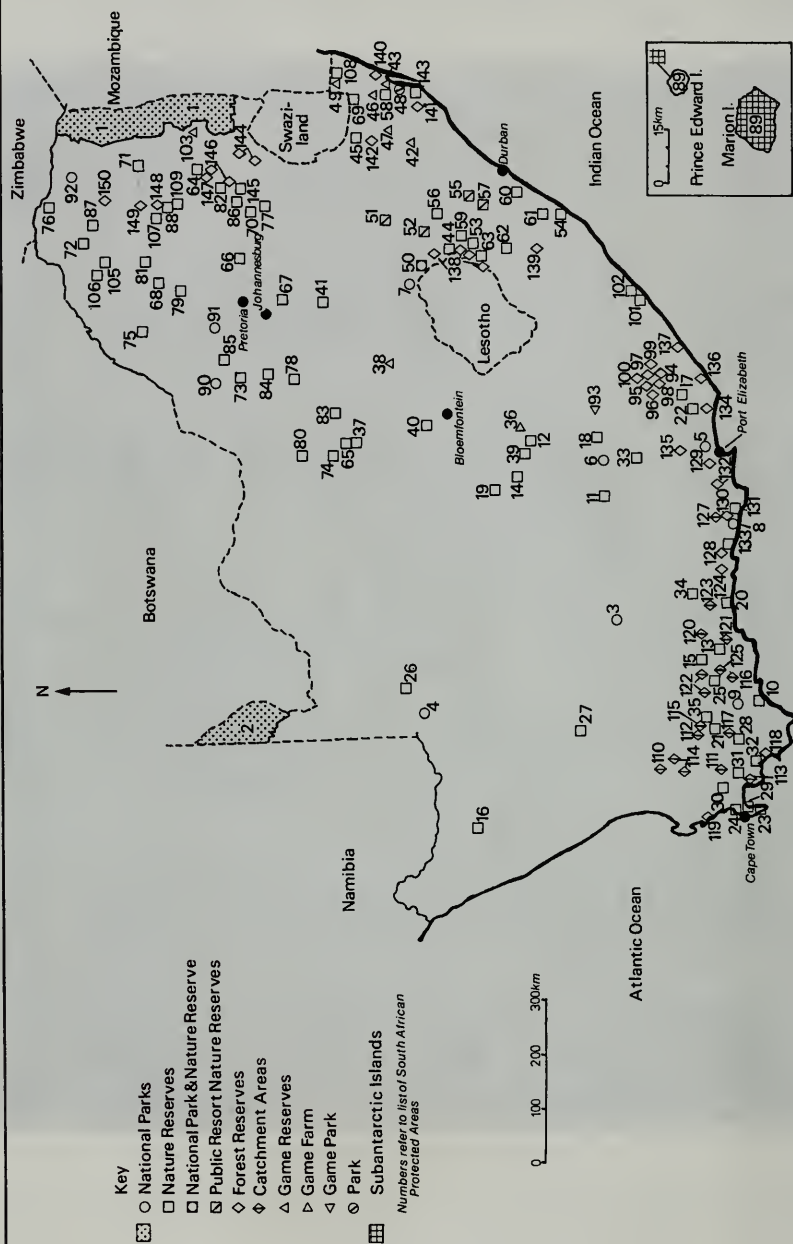
The National Range Agency has established the Afgoye Forestry and Wildlife Training Centre to begin providing trained individuals to fill the organizational needs as well as sending several students to the College of Wildlife Management at Mweka, Tanzania.

More recently the Government has become aware of the fragility of the country's ecosystems, and in particular the hazard of desertification. There has been an increase in the occurrence and scale of such symptoms of desertification as total depletion of forest or pasture cover, soil erosion, instability of irrigated land, and formation of sand dunes. These are largely due to successive droughts and increased pressure of human and livestock populations. In the present National 5-year Development Plan (1982-86) the Government gives increased emphasis to measures to halt and reverse symptoms of desertification (Salah, 1983).

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South Africa

SOUTH AFRICA

Including the Republics of Transkei, Bophuthatswana, Venda and Ciskei

Area 1,225,100 sq.km

Population 26,750,000 (1984)

Parks and Reserves Legislation Legislation pertaining to the establishment of conservation areas in the Republic of South Africa includes the National Parks Act of 1926 (for Kruger National Park and other national parks), the Financial Relations Consolidation and Amendment Act of 1945 (for provincial game and nature reserves) the National States Consolidation Act of 1971 (for game and nature reserves in national states), the Forest Act of 1968 and the Mountain Catchment Areas Act of 1970 (for nature reserves and wilderness areas administered by the Directorate of Forestry). The provisions of these Acts relate to the acquisition of land and the establishment and administration of various management categories of conservation area, the provision of facilities and control and prosecution of those not complying with specific regulations, etc. The numerous revisions and amendments to these acts and to provincial ordinances are reviewed by Fuggle and Rabie (1983).

Parks and Reserves Administration Conservation areas in South Africa are administered by the National Parks Board, the Natal Parks Board, the Directorate of Forestry and the Nature Conservation Divisions of provincial administrations, National States and the Governments of Transkei, Bophuthatswana, Venda and Ciskei. In the Cape Province, some reserves are administered by Divisional Councils. Management objectives vary widely from area to area, but all fall within those of IUCN Management Categories I to V. The terminology used for these areas includes National Park, Nature Reserve, Game Reserve, Mountain Reserve, Public Resort, Nature Reserve, Game Park, State Forest, Mountain Catchment Area, Wilderness Area, etc. Due to the continuum of differing management objectives relating to these areas, it is not possible to place individual areas into rigidly defined IUCN categories - the categories indicated should be regarded as the 'best fit' presently available. The Sub-Antarctic islands of Prince Edward and Marion are administered by the Department of Transport. Visits to the islands are only undertaken by members of the research stations teams on the islands and by other visiting scientists and logistic personnel.

Address

- National Parks Board of Trustees, PO Box 787, Pretoria.
- Natal Parks Game and Fish Board, PO Box 662, Pietermaritzburg.
- Dept. of Agriculture and Forestry, PO Box X5002, Umtata, Transkei.
- Council for Scientific and Industrial Research: CSP, PO Box 395, Pretoria.

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- ° Smithers, R.H.N. (1983). *The mammals of the Southern African sub-region*. University of Pretoria, Pretoria. 736 pp.

Protected Areas (Numbers as per map)

	(hectares)
<i>National Parks</i>	
1 Kruger	1,948,528
2 Kalahari Gemsbok	959,103
3 Karoo	27,011
4 Augrabies Falls	9,415
5 Addo Elephant	8,879
6 Mountain Zebra	6,536
7 Golden Gate Highlands	6,241
8 Tsitsikamma Forest and Coastal	3,318
9 Bontebok (9 areas)	2,786
Subtotal	2,971,817

Cape Nature Reserves (Provincial Reserves)

10 De Hoop	17,846
11 Karoo	14,000
12 Oviston	13,000
13 Gamka Mountain	9,428
14 Dornkloof	8,765
15 Gamkapoort	8,000
16 Hester Malan	6,576
17 Andries Vosloo Kudu Reserve	6,493
18 Commando Drift	5,983
19 Rolfontein	4,749
20 Goukamma	2,230
21 Vrolijkheid	1,827
22 Thomas Baines (13 areas)	1,003
Subtotal	99,900

Cape Nature Reserves (Subsidized Local Reserves)

23 Cape of Good Hope	7,675
24 Table Mountain	2,904
25 Ladismith-Klein Karoo	2,766
26 Spitskop	2,740
27 Akkerendam	2,301
28 Greyton	2,220
29 Silvermine	2,150
30 Paarl Mountain	1,910
31 Mont Rochelle	1,759
32 Fernkloof	1,577
33 Somerset East-Bosberg	1,650
34 Nietgenaamd	1,392
35 Montagu Mountain Reserve (13 areas)	1,200
Subtotal	32,244

Orange Free State Nature Reserves

36	Tussen-die-Riviere Game Farm	22,000
37	Sandveld	14,700
38	Willem Pretorius Game Reserve	12,005
39	Verwoerd Dam	11,237
40	Soetdoring	6,173
41	Koppies Dam	4,325
	Subtotal	70,440

Natal Nature Reserve

42	Umfolozi Game Reserve	47,753
43	St Lucia Game Reserve	36,826
44	Giant's Castle	34,638
45	Itala	25,896
46	Mkuzi Game Reserve	25,091
47	Hluhluwe Game Reserve	23,067
48	St Lucia Park	12,545
49	Ndumu Game Reserve	10,117
50	Royal Natal National Park/Rugged Glen	8,856
51	Chelmsford Public Resort Nature Reserve	6,845
52	Spioenkop Public Resort Nature Reserve	4,562
53	Loteni Nature Park	3,984
54	Umtamvuna	3,137
55	Albert Falls Public Resort Nature Reserve	3,012
56	Weenen	2,929
57	Midmar Public Resort Nature Reserve	2,831
58	False Bay	2,247
59	Kamberg	2,232
60	Vernon Crookes	2,189
61	Oribi Gorge	1,809
62	Coleford	1,272
63	Vergelegen (22 areas)	1,159
	Subtotal	262,997

Transvaal Nature Reserves

64	Blyde River	22,664
65	Bloemhof Dam	22,072
66	Loskop Dam	14,800
67	Suikersbosrand	13,337
68	Doorndraai Dam	7,229
69	Pongola	6,222
70	Verloren Valei	6,055
71	Hans Merensky	5,282
72	Langjan	4,774
73	Rustenberg	4,257
74	S.A. Lombard	3,663
75	Hans Strijdom	3,618
76	Messina	3,571
77	Nooitgedacht Dam	3,420
78	Boskop Dam	3,160
79	Nylsvley	3,121
80	Barberspan	3,068
81	Percy Fyfe	2,985
82	Ohrigstad Dam	2,563
83	Wolwespruit	2,333
84	Abe Bailey	1,888
85	Vaalkop Dam	1,873
86	Sterkspruits	1,600
87	Happy Rest	1,585
88	Wolkberg Caves (25 areas)	1,488
	Subtotal	146,628

IUCN Directory of Afrotropical Protected Areas

Subantarctic Islands

89	Prince Edward Islands	39,000
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Established Reserves in Bophuthatswana, Ciskei, Transkei and Venda

90	Pilanesberg National Park (Bophuthatswana)	50,000
91	Borakalalo National Park (Bophuthatswana)	7,380
92	Nwanedi National Park (Venda)	3,200
93	Tsolwana Game Park (Ciskei)	7,557
94	Pirie Forest (Ciskei)	5,239
95	Rabula Forest (Ciskei)	3,884
96	Zingcuka Forest (Ciskei)	3,731
97	Cwengcwe Forest (Ciskei)	3,276
98	Cata Forest (Ciskei)	1,592
99	Izeleni Forest (Ciskei)	1,330
100	Dontsa Forest (Ciskei)	1,209
101	Dwesa Nature Reserve (Transkei)	3,900
102	Cwebe Nature Reserve (Transkei) (13 areas)	2,140
	Subtotal	94,438

Established Reserves in National States

103	Manyeleti Game Reserve (Gazankulu)	22,772
104	F.C. Erasmus Trust Forest	6,680
105	Blouberg Nature Reserve (East) (Lebowa)	6,848
106	Blouberg Nature Reserve (West) (Lebowa)	4,450
107	Potlake Nature Reserve (Lebowa)	2,928
108	Tembe Elephant Reserve (KwaZulu)	29,878
109	Lekgalameetse Nature Reserve (Transvaal) (7 areas)	18,125
	Subtotal	91,681

Directorate of Forestry - Department of Environment Affairs

Western Cape Forest Region

110	Sederberg Mountain Catchment Area	126,375
111	Hawequas Mountain Catchment Area	115,910
112	Matroosberg Mountain Catchment Area	95,259
113	Hottentots Holland Mountain Catchment Area	84,936
114	Groot Winterhoek Mountain Catchment Area	81,188
115	Langeberg West Mountain Catchment Area	77,096
116	Langeberg East Mountain Catchment Area	71,300
117	Riversonderend Mountain Catchment Area	69,453
118	Walker Bay State Forest	7,118
119	Sandveld State Forest	3,624
	Subtotal	732,259

Southern Cape Forest Region

120	Groot Swartberg/Swartberg E. Mountain Catchment Area	121,002
121	Outeniqua Mountain Catchment Area	158,515
122	Anysberg/Klein Swartberg Mountain Catchment Area	58,785
123	Kammanassie Mountain Catchment Area	45,508
124	Knysna Indigenous Forests	44,230
125	Rooiberg Mountain Catchment Area	25,344
	Subtotal	453,384

Tsitsikamma Forest Region

127	Kouga/Baviaanskloof Mountain Catchment Area	172,208
128	Tsitsikamma Mountains	80,000
129	Groendal Wilderness Area	25,047
130	Tsitsikamma Indigenous Forest	15,615
131	Storms River Nature Reserve	13,700

132	Otterford State Forest	11,467
133	De Vasselot Nature Reserve	2,560
	Subtotal	320,597

Eastern Cape Forest Region

134	Alexandria State Forest	23,566
135	Suurberg State Forest	21,121
136	Bathurst State Forest	5,315
137	East London Coast State Forest	4,369
	Subtotal	54,371

Natal Forest Region

138	Drakensberg State Forests	190,000
139	Portion of Weza State Forest	9,000
	Subtotal	199,000

Zululand Forest Region

140	Sodwana/Cape Vidal State Forests	57,954
141	Portion of Dukuduku State Forest	15,055
142	Ntendeka Wilderness Area	5,230
143	Maphelana Nature Reserve	1,102
	Subtotal	79,341

Southern Transvaal Forest Region

144	Nelshoogte/Berlin State Forest	3,500
145	Uitsoek State Forest	2,270
	Subtotal	5,770

Eastern Transvaal Forest Region

146	Ceylon State Forests	3,500
147	Morgenson State Forest	1,264
	Subtotal	4,764

Northern Transvaal Forest Region

148	Serala State Forest (with Wolkberg Wilderness Area)	21,998
149	Woodbush/De Hoek State Forests	6,626
150	Entabeni State Forest (with Nature Reserves) (41 areas)	1,924
	Subtotal	30,548

Additional areas that are not listed include:

- i Coastal areas under control of Sea Fisheries Research Institute
- ii Long established private nature reserves such as Timbavati, Sabie Sands and others throughout the country
- iii Potential protected areas such as Langeban and the Barkley West national park sites
- iv Conserved areas controlled by the South African Defence Force

KRUGER NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 31 May 1926. Proclamation 197 in Government Gazette 1578 of 1926 and the National Parks Act of 1962.

Geographical Location Bounded by Transvaal Phalaborwa in the north (1.5km) and White River in the south (+/-60km). 22°31'-25°30'S, 30°45'-32°02'E.

Altitude 122m-867m (Kandizwe)

Area 1,948,528ha

Land Tenure Government. Administered by the National Parks Board of Trustees.

Physical Features Geologically, the park is roughly bisected from north to south by a band of Karoo sandstone and Ecce shales. The western half consists mainly of granite and its erosion products, but with extensive dolerite intrusions, whilst the eastern Lebombo flats consist of basalts and the Lebombo Mountains, primarily of rhyolite formations. Two sandveld areas occur in the northern area, one at Punda Maria, which is derived from the Dominion Reef and Waterberg Systems, whilst the other, consisting of aeolian sands overlying cretaceous gravel and waterwashed pebbles, occurs on the eastern boundary south of Pafuri. This latter area, called the Nyandu sandveld, gives rise to a floristic community which is unique in the park (and in South Africa) and also harbours many interesting and unique animal species. There is a wide range of habitat types. Crocodile, Limpopo, Sabie, Olifants, Letaba and Levubu rivers are all perennial. Seasonal rivers flow only for a short while during the rainy season, but normally incorporate a series of permanent and semi-permanent pools along their length. Soils are derived from archaean granites, dolerite intrusions, Karoo-sediments, basalts, weathered sandstone and rhyolites. Soils vary widely from deep sands to clay pans, with gleying and include ferriferous and saline types. Annual average temperature range minimum: 4°C, maximum: 34°C. Annual rainfall 625-750mm in the Pretoriusskop area and 375-600mm in the Pafuri-Shingwedzi-Letaba area, falling mainly in summer (September-March).

Vegetation Vegetation types consist of: 53,779ha Lowveld Sour Bushveld (Veld Type 9); 443,290ha Lowveld (Veld Type 10); 568,191ha Arid Lowveld (Veld Type 11); 850,533ha Mopani Veld (Veld Type 15); and 32,735ha Mixed Bushveld (Veld Type 18). The plant life of the park varies from subtropical to tropical, with some temperate forms occurring at higher altitudes. Four main areas of bushveld (lowveld) are recognized in the park. An area of *Acacia* spp., and *Combretum* spp., lies between the western boundary and roughly the centre of the park south of the Olifants River. *Acacia* spp. are dominant along the rivers and streams. *Sclerocarya caffra* is also abundant. Savanna dominates the area south of the Olifants River in the eastern half of the park, providing important grazing land. *Acacia nigrescens*, *Sclerocarya caffra* and *Combretum imberbe* are common tree species. Grasses such as *Themeda triandra* and *Panicum maximum* predominate. Veld lies in the western half of the park, north of the Olifants River with *Colophospermum mopane*-*Combretum* spp., and an area of shrub mopane veld covers most of the north-western part of the park. There are a number of smaller areas which carry distinctive vegetation such as Pretoriusskop where *Dichrostachys cinerea* ssp., *nyassana*, and *Terminalia sericea* are prominent. The Punda Maria sandveld is equally well defined with a wide variety of unique species, while *Adansonia digitata* is common in the north-eastern Pafuri region of the park. More than 2,000 species of vascular plants have been collected. Endemic species: survey in progress.

Fauna Mammals of arid and semi-arid habitats are well represented and the Kruger National Park offers as many species of wildlife as are found in other African game sanctuaries. Altogether, there are 122 species of mammals, 55 species of fish and 109 species of reptiles. Mammals include lion *Panthera leo* (1,500), spotted hyena *Crocuta crocuta* (2,000), elephant *Loxodonta africana* (T) (7,300), square-lipped rhinoceros *Ceratotherium simum* (740), Burchells' zebra *Equus burchelli* (28,000), hippopotamus *Hippopotamus amphibius* (3,000), warthog *Phacochoerus aethiopicus* (4,000), giraffe *Giraffa camelopardalis* (5,000), buffalo *Syncerus caffer* (32,000), eland *Taurotragus oryx* (700), greater kudu *Tragelaphus strepsiceros* (11,000) and lesser kudu *Tragelaphus imberbis*, nyala *Tragelaphus angasi* (1,000), bushbuck *Tragelaphus scriptus* (1,500+), waterbuck *Kobus ellipsiprymnus* (4,200), reedbuck *Redunca arundinum* (1,500+), mountain reedbuck *Redunca fulvorufula* (300), gray

rhebok *Pelea capreolus* (+/-30), blue wildebeest *Connochaetes taurinus* (11,600) and impala *Aepyceros melampus* (126,750). The following species of larger mammals also occur in the park, but it is not possible to provide an accurate estimate of numbers: steenbok *Raphicerus campestris*, Sharpe's grysbok *Raphicerus sharpei*, klipspringer *Oreotragus oreotragus* and common duiker *Sylvicapra grimmia*. More than 400 species of birds have been recorded in the park, several of which are endemic to the park. Threatened mammals: leopard *Panthera pardus* (T), brown hyena *Hyaena brunnea* (T), honey badger *Mellivora capensis*, oribi *Ourebia ourebi*, red duiker *Cephalophus natalensis*, suni *Neotragus moschatus*, yellow golden mole *Calcochloris obtusirostris*, Juliana's golden mole *Amblysomus julianae*, Damara woolly bat *Kerivoula argentata*, Welwitsch's bat *Myotis welwitschii*, aloe bat *Eptesicus zuluensis*, Sundevall's free tailed bat *Tadarida midas*, thick tailed galago *Galago crassicaudatus*, samango monkey *Cercopithecus mitis pangolin* *Manis temminckii*, Meller's mongoose *Rhynchogale melleri*, cheetah *Acinonyx jubatus* (T), wild dog *Lycaon pictus* (T), black rhinoceros *Diceros bicornis* (T), tsessebe *Damaliscus lunatus*, sable antelope *Hippotragus niger* and roan antelope *Hippotragus equinus*. Threatened birds: pinkbacked pelican *Pelecanus rufescens*, goliath heron *Ardea goliath*, bald ibis *Geronticus calvus*, Cape vulture *Gyps coprotheres*, Egyptian vulture *Neophron percnopterus*, pygmy falcon *Polihierax semitorquatus*, Pel's fishing owl *Scotopelia peli* and spotted creeper *Salpornis spilonotus*. Threatened reptiles: crocodile *Crocodylus niloticus* (V).

Conservation Management A management plan exists for this area.

Zoning Zoned for various different forms of use and development

Disturbances or Deficiencies Pollution, cultivation, and mining on the borders of the park may be cause for concern. Activities in neighbouring areas pose a poaching threat, while the upkeep of fences along the borders of the park requires constant attention. Organized agriculture to the west of the park puts a heavy strain on the availability of water in the perennial rivers and also introduces chemicals (of industrial and agricultural herbicide origin) as a source of pollution. Exotic species such as *Lantana*, *Melia*, *Jacaranda*, *Sesbania*, and *Salvinia* pose a threat to the natural flora.

Visitor Facilities The park has extremely well developed visitor facilities. Almost 6,000 visitors can be accommodated per night in fully equipped, air-conditioned, thatched huts and camp sites. There are 17 rest camps throughout the park. All the main camps have restaurants and shops. There are five information centres and conservation-related film shows are screened regularly at the larger rest camps. Four wilderness trails have been established. Numbers: 400,500 per annum. Potential: approaching its limit.

Scientific Research Research priorities are determined according to ecosystem analysis and interpretation. Vegetation dynamics, fire, soil erosion, ecological studies of elephants and other animals, prey/carnivore relations, and population dynamics are some of the research activities, with veterinary research also being given much attention. An ongoing comprehensive research programme has been undertaken since 1947.

Special Scientific Facilities Fully equipped laboratory, library, and herbarium at Skukuza.

Principal Reference Material

- * Kemp, A.C. (1974). The distribution and status of the birds of the Kruger National Park. *Koedoe Monograph* 2: 1-341.
- * Kloppers, J. and van Son, G. (1978). Butterflies of the Kruger National Park. Pretoria: National Parks Board of Trustees.
- * Pienaar, U. de V. (1961). A supplementary checklist of Decapoda, fresh-water fish, amphibia, reptiles and small mammals recorded in the Kruger National Park. *Koedoe* 4: 167-177.
- * Pienaar, U. de V. (1963). The large mammals of the Kruger National Park - their distribution and present-day status. *Koedoe* 6: 1-37.
- * Pienaar, U. de V. (1964). The small mammals of the Kruger National Park - a systematic list and zoogeography. *Koedoe* 7: 1-25.

- ° Pienaar, U. de V. (1969). Predator-prey relationships amongst the larger mammals of the Kruger National Park. *Koedoe* 12: 108-176.
- ° Pienaar, U. de V. (1978). The freshwater fishes of the Kruger National Park. Pretoria: National Parks Board of Trustees.
- ° Pienaar, U. de V. (1978). The Reptile Fauna of the Kruger National Park. Pretoria: National Parks Board of Trustees.
- ° Pienaar, U. de V., Rautenbach, I.L. and de Graaff, G. (1980). The small mammals of the Kruger National Park. Pretoria: National Parks Board of Trustees.
- ° Van, Wyk P. (1971). A supplementary list of flowering plants occurring in the Kruger National Park. *Koedoe* 14: 111-122.
- ° A complete list of references is available from: The Chief Director, National Parks Board, PO Box 787, Pretoria, 0001, South Africa.

Staff Administrative - 177; Technical Services - 1,271; Nature Conservation - 428; Tourism - 905; and Research and Information - 51. Total - 2,832

Budget R23,000,000 per annum (including salaries)

Local Park or Reserve Administration The Park Warden, Kruger National Park, Private Bag X402, Skukuza, 1350.

Date November 1983

KALAHARI GEMSBOK NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.16.07 (Kalahari)

Legal Protection Total

Date Established 17 June 1931. Proclamation 243 in Government Gazette 1963 of 3 July 1931 and the National Parks Act of 1962.

Geographical Location 320km from Upington in Cape Province. 24°50'-26°29'S, 20°00'-41°E.

Altitude 610-975m (Bayip)

Area 959,103ha. This national park is contiguous to the Gemsbok National Park of the Republic of Botswana.

Land Tenure Government. Administered by the National Parks Board of Trustees.

Physical Features It is a semi-desert region largely covered by long, parallel dunes of red and white sands orientated north-west/south-east. The wide bed of the Nossob River forms the eastern north-eastern boundary over 280km in length, while the Auob River traverses the southern part of the park. Usually, both are dry, only flowing a few times a century. It is geologically composed of a 12-60m thick layer of Kalahari sands overlying blue shales of the Dwyka Series, Karoo System. Pans and calcrete flats occur locally, with well developed red sand dunes in the south. This is a representative sample of the Kalahari as an ecosystem, with red Kalahari sand overlying calcareous substrata. Annual average temperature range minimum: 4°C, maximum: 32°C. Annual rainfall 127mm, falling mainly in summer (January-April).

Vegetation Vegetation types consist of the Kalahari Thornveld (Veld Type 16(a)) and Vryburg Shrub Bushveld (Veld Type 16(b)). The river beds have a marked influence on the vegetation. Between them, in an area known as the inner veld, are the red Kalahari sand dunes. Grasses as well as the dunes are covered with a scattering of trees such as *Terminalia sericea*, *Boscia albitrunca*, and *Acacia haematoxylon*. There is a greater profusion of plant life in and near the river beds where *A. erioloba*, *A. mellifera* ssp. *detinens*, *Grewia* spp., and *Rhigozum trichotomum* grow. Sparse woodland of *A. erioloba*, *A. haematoxylon* and *Lebeckia spinescens* is fairly extensive on loamy sands, with grasses such as *Stipagrostis obtusa*, *S. ciliata*, *Aristida* spp., *Asthenatherum glaucum*, *Themeda triandra*, and *Eragrostis lehmanniana* occurring in the park. Economically important species: several species occur which are utilised mainly by indigenous people such as the Bushmen. Endemic species: survey in progress.

Fauna Mammals: anteater *Orycteropus afer*, gemsbok *Oryx gazella*, red hartebeest *Alcelaphus buselaphus*, common duiker *Sylvicapra grimmia* and steenbok *Raphicerus campestris*. In addition, there are large herds of blue wildebeest *Connochaetes taurinus*, eland *Taurotragus oryx* and springbok *Antidorcas marsupialis*, whilst carnivores include lion *Panthera leo* and the spotted hyena *Crocuta crocuta*. Bird species exceed 215 in number. Threatened mammals: brown hyaena *Hyaena brunnea* (T), wild dog *Lycaon pictus* (T), pangolin *Manis temminckii*, honey badger *Mellivora capensis*, Woosnam's desert rat *Zelotomys woosnami*, cheetah *Acinonyx jubatus* (T), and leopard *Panthera pardus* (T).

Conservation Management A management plan exists for this area.

Zoning Natural and development zones

Disturbances or Deficiencies Poaching on the park's borders creates a problem. Fencing and the maintenance of artificial watering points need constant attention.

Visitor Facilities Facilities consist of three rest camps with huts and ablution blocks (123 beds), and 65 camp sites. Numbers: 10,978 per annum. Potential: maximum almost reached for overnight facilities. Daily visitors are not limited.

Scientific Research All research activities are directed at nature conservation and its related fields. Bi-annual aerial surveys are undertaken, with special attention given to research on lions, leopards, hyenas, ungulates and small mammals, as well as aspects of vegetation concerning dynamics, population structure and plant-animal interaction.

Special Scientific Facilities A small laboratory at Nossob Camp

Principal Reference Material

- ° Barnard, P.J. (1961). The phenomenon of game migration in the Kalahari Gemsbok National Park. *Koedoe* 4: 178-194.
- ° Bolwig, N. (1958). Aspects of animal ecology in the Kalahari. *Koedoe* 1: 115-135.
- ° Leistner, O.A. (1959). Preliminary list of plants found in the Kalahari Gemsbok National Park. *Koedoe* 2: 152-172.
- ° Mills, M.G.L. (1976). A revised check-list of birds in the Kalahari Gemsbok National Park. *Koedoe* 19: 49-62.
- ° Parris, R. du P. Bothma, J., Waanders, E. and Boshoff, A.F. (1977). Preliminary map of the south-western Kalahari desert. *Koedoe* 2: 163-168.
- ° A complete list of references is available from The Chief Director, National Parks Board, PO Box 787, Pretoria, 0001, South Africa.

Staff Administrative one; Technical Services eight; Nature Conservation 15; Tourism 27; and Research and Information one; Total is 52

Budget R700,000 per annum (including salaries)

Local Park or Reserve Administration The Park Warden, Kalahari Gemsbok National Park, Private Bag X5890, Gemsbokpark, 8815.

Date November 1983

KAROO NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.11.07 (Karoo)

Legal Protection Total

Date Established 7 September 1979. Proclamation 201 in Government Gazette 6648 of 7 September 1979 and the National Parks Act of 1962.

Geographical Location 8km from Beaufort West in Cape Province. 32°20'S, 22°30'E.

Altitude 899-1,908m (Bulthoudersbank)

Area 27,011ha

Land Tenure Government. Administered by the National Parks Board of Trustees.

Physical Features The reserve is part of the Karoo System consisting of Dwyka Series, Ecca Series, Beaufort Series and Stormberg Series. The sediments of the Beaufort Series have yielded by far the majority of fossil synapsid reptiles hitherto known to science, with the three reptilian subclasses of importance being the Anapsida, the Synapsida and the Diapsida. They all occur in these Beaufort beds. Rivers in the area include the Gamka, Hoofspruit, Slaz, and Doringhoek. The ground surface is comprised of 60% stony, 16% Glen Rosa, 16% Mispah and Dundee, and 8% Hutton dominant soil forms. The adaptations of fauna and flora to a harsh and hostile environment are strikingly demonstrated in this park. Annual average temperature range minimum: 10°C, maximum: 24°C. Annual rainfall 256mm, falling mainly in summer (September-March).

Vegetation Vegetation types consist of 10,811ha of Karroid Broken Veld (Veld Type 26) and 16,200ha Karroid *Merxmuellera* Mountain Veld replaced by Karoo (Veld Type 42). Dwarf shrubs known as karoo bush are typical of the plains. There is a great variety of perennial grass and bushes forming communities in this low lying, hilly country including *Pentzia spinescens*, *Selago albidia*, *Eriocephalus spinescens*, *Rhus longispina*, *Acacia karroo*, *Rhus erosa*, *Rhus lancea*, *Grewia occidentalis*, *Aristida obtusa*, *Aristida curvata*, *Merxmuellera disticha*, *Zygophyllum* spp., *Salsola* spp., and various *Mesembryanthemum* spp.. Economically important species: *Pentzia spinescens*. Endemic species: survey in progress.

Fauna Species such as black wildebeest *Connochaetes gnou* (28) and springbok *Antidorcas marsupialis* have been reintroduced to the park. A census taken in 1983 yielded the following results: mountain reedbuck *Redunca fulvorufula* (100), steenbok *Raphicerus campestris* (150), gemsbok *Oryx gazella* (7), chacma baboon *Papio ursinus* (50), grey rhebok *Pelea capreolus* (50), springbok *Antidorcas marsupialis* (150), klipspringer *Oreotragus oreotragus* (5), common duiker *Sylvicapra grimmia* (3), red hartebeest *Alcelaphus buselaphus* (8), and greater kudu *Tragelaphus strepsiceros* (130) and lesser kudu *Tragelaphus strepsiceros*. Ostrich *Struthio camelus* also occur. Threatened mammals: Leopard *Panthera pardus* (T), aardwolf *Proteles cristatus*, Lesueur's hairy bat *Myotis lesueuri*, spectacled dormouse *Graphiurus ocularis*, honey badger *Mellivora capensis*, and mountain zebra *Equus zebra zebra* (T).

Conservation Management A management plan exists for this area.

Zoning There are development and natural areas

Disturbances or Deficiencies Disturbances to the park include grazing, mining activities and the proximity of a large railway junction as well as a residential area.

Visitor Facilities There is the Springbok Hiking Trail with two overnight huts to accommodate 12 people each. A rest camp is envisaged for the near future. Numbers: 3,463 per annum. Potential: to be increased considerably.

Scientific Research Herpetological, ornithological, and mammalogical surveys are ongoing programmes, as well as a palaeontological survey with emphasis on Synapsids.

Special Scientific Facilities A small laboratory

Principal Reference Material

- ° A complete list of references is available from The Chief Director, National Parks Board, PO Box 787, Pretoria, 0001, South Africa.
- ° De Graaff, G., Robinson, G.A., van der Walt, P.T., Bryden, B.R. and van der Hoven, E.A. (1979). The Karoo National Park. Pretoria: National Parks Board of Trustees.
- ° De Graaff, G. and Rautenbach, I.L. (in press). A survey of Mammals in the newly proclaimed Karoo National Park, South Africa. *Annales de Museum Royale de la Afrique Central, Tervuren*.

Staff Some 15 staff. Temporary labourers are employed for weed control and removal of fences.

Budget R200,000 per annum (including salaries)

Local Park or Reserve Administration The Park Warden, Karoo National Park, PO Box 316, Beaufort West, 6970.

Date November 1983

AUGRABIES FALLS NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 5 August 1966. Proclamation 216 in Government Gazette 1506 of 5 August 1966 and the National Parks Act of 1962.

Geographical Location 32km from Kakamas in Cape Province. 28°35'S, 20°25'E.

Altitude 503-704m (Swartrandte)

Area 9,415ha

Land Tenure Government. Administered by the National Parks Board of Trustees.

Physical Features Geological formations are reconstituted sedimentous rocks of the Kaaien Series, Kheis System and are part of the Archaean Complex. The most outstanding feature of the reserve is the Augrabies Falls, where the Orange River drops 56m over a granite cliff into a ravine which extends westwards for 18km, and which contains some spectacular rapids. Secondary falls are formed when the river is in flood. Soils are sandy, gravelly, dry and usually very shallow and litholitic, and form a thin compact crust 1-2mm thick, often with a porous layer (Schaumboden) that has a foamlike structure some 5-10mm thick in run-off areas. This structure renders the soil particularly dry and unsuitable for seed germination. Annual average temperature range minimum: 11°C, maximum: 27°C. Annual rainfall 130mm, falling mainly in summer (January-April).

Vegetation Vegetation types consist of the Orange River Broken Veld (Veld Type 32), where a rich variety of plant life has adapted itself to the environment in spite of the meagre rainfall. The quiver tree or kokerboom *Aloe dichotoma*, and many other aloe species are to be seen. Other species include *Rhus lancea*, *Euphorbia avasmontana*, *Rhus viminalis*, *Rhigozum trichotomum*, *Schotia afra* var. *angustifolia*, *Acacia mellifera* subsp. *detinens*, *A. karroo*, *A. erioloba*, *Aristida diffusa* var. *burkei*, *Olea africana*, and *Acacia mellifera*. Economically important species: *Boscia albitrunca* and *Acacia erioloba* (parts eaten by game and cattle). Endemic species: several, including *Aloe dichotoma*.

Fauna Chacma baboon *Papio ursinus*, vervet monkey *Cercopithecus aethiops*, klipspringer *Oreotragus oreotragus*, and aardvark *Orycteropus afer*. Rare birds are the black stork *Ciconia nigra*, pygmy falcon *Polihierax semitorquatus*, and rosyfaced lovebird *Agapornis roseicollis*. Threatened species: dassie rat *Petromus typicus*, brush-tailed hairy-footed gerbil *Gerbillurus vullinus*, leopard *Panthera pardus* (T), and aardwolf *Proteles cristatus*.

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Conservation Management A management plan exists for this area.

Zoning Development and natural areas

Disturbances or Deficiencies Grazing, cultivation and a residential area in close proximity to the park cause some disturbance.

Visitor Facilities Facilities include accommodation (52 beds) with ablution blocks and camping facilities. Numbers: 39,607 per annum. Potential: maximum almost reached for overnight facilities. Daily visitors are not limited.

Scientific Research Aspects of the biology of fish, reptiles, birds and mammals are being investigated. Special attention is given to the dassie rat *Petromus typicus*, yellowfish and the geomorphology of the park.

Special Scientific Facilities None

Principal Reference Material

- ° Werger, M.J.A. and Coetsee, B.J. A phytosociological and phytogeological study of Augrabies Falls National Park, Republic of South Africa. *Koedoe* 20: 11-52.
- ° Pienaar, U. de V. (1977). *Phrynomerus annectus* (Werner), a rare frog in the Augrabies Falls National Park. *Koedoe* 20, 181-182.
- ° Rautenbach, I.L., Schlitter Duane, A. and de Graff, G. (1979). Notes on the mammal fauna of the Augrabies Falls National Park and surrounding areas, with special reference to regional zoogeographical implications. *Koedoe* 22: 157-175.
- ° A complete list of references is available from the Chief Director, National Parks Board, PO Box 787, Pretoria, 0001, South Africa.

Staff Administrative - 11; Tourism - 10; Nature Conservation - eight; and Technical - four; Total is 33

Budget R439,000 per annum (including salaries)

Local Park or Reserve Administration The Warden, Augrabies Falls National Park, PO Box 10, Augrabies, 8874.

Date November 1983

ADDO ELEPHANT NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.11.06 (Cape Sclerophylli)

Legal Protection Total

Date Established 17 June 1931. Proclamation 243 in Government Gazette 1963 of 3 July 1931 and the National Parks Act of 1962.

Geographical Location 72km from Port Elizabeth in Cape Province. 33°13'S, 25°45'E.

Altitude 75-341m (Zuurkop, Kenmore Beacon)

Area 8,879ha

Land Tenure Government. Administered by the National Parks Board of Trustees.

Physical Features The area includes a series of low, undulating hills with a higher ridge to the east, and is geologically composed of sandstones and mudstones of the Upper Cretaceous. Cretaceous fossils such as Ammonites, fossil invertebrates, and fossil wood occur. Annual average temperature range minimum: 5°C maximum: 29°C. Annual rainfall is 478mm, falling throughout the year with peaks in March and a lesser peak in August.

Vegetation The vegetation consists of the Valley Bushveld (Veld Type 23). Some 90% of the area is covered by dense scrub dominated by *Portulacaria afra*, thickly matted and from 1 to 4m high. Other common species are *Schotia afra*, tangled *Euclea undulata*, *Capparis sepiaria* var. *citrifolia*, *Azima tetracantha*, *Sarcostemma viminale*, *Rhoicissus digitata*, and *Ptaeroxylon obliquum*. Other plant associations are coastal bush of *Sideroxylon inerme*, *Schotia afra* and *Pterocelastrus tricuspidatus*; Karoo bushveld with low shrubs such as *Pentzia globosa*, *Lampranthus* spp. and *Ruschia* spp., and a mixed scrub and grassland consisting of scattered clumps of *Maytenus heterophylla*, *Rhus incisa* and *Grewia occidentalis* in grassland of *Themeda triandra*, *Panicum deustum* and *Digitaria eriantha*. Economically important species *Portulacaria afra* is a major fodder plant. Endemic species of plants: survey in progress.

Fauna Mammals include: elephant *Loxodonta africana* (T) (120), buffalo *Syncerus caffer* (300), black rhinoceros *Diceros bicornis* (T) (15), eland *Taurotragus oryx* (100), greater kudu *Tragelaphus strepsiceros* (200) and lesser kudu *Tragelaphus imberbis*, bushbuck *Tragelaphus scriptus* (200), red hartebeest *Alcelaphus buselaphus* (40), grysbok *Raphicerus melanotis*, common duiker *Sylvicapra grimmia* (380), and small mammals are well represented. More than 170 bird species have been recorded; the ostrich *Struthio camelus* is numerous (70). Threatened species: South African hedgehog *Erinaceus frontalis*, straw-coloured fruit bat *Eidolon helvum*, and lesser woolly bat *Kerivoula lanosa*.

Conservation Management A management plan exists for this area. The recruitment rate of the elephant population has been spectacular ever since the erection of the well-known elephant-proof Armstrong fence, rising from some 20 odd individuals in 1953 to 124 individuals in 1983.

Zoning Largely a natural area with tourist development confined to one site.

Disturbances or Deficiencies Poaching occurs irregularly but does not pose a threat and organized agriculture surrounding the park greatly limits the possibility of extension.

Visitor Facilities Facilities include restaurant and accommodation (18 beds) with 15 camp sites. There is a floodlit elephant waterhole in front of restaurant. The majority of visitors do not stay overnight in the park. Numbers: 35,721 per annum. Potential: maximum almost reached for overnight facilities. Daily visitors are not limited.

Scientific Research Research is directed at botanical and zoological aspects of nature conservation with special reference to the density and composition of the herbaceous layer, changes in the structure of the woody plants, and population dynamics of the elephant and research on buffalo.

Special Scientific Facilities Laboratory with reference herbarium

Principal Reference Material

- Branch, W. and Braack, H.H. (in press). Reptiles and amphibians of the Addo Elephant National Park.
- Grobler, J.H. and Hall-Martin, A.J. (1983). A guidebook to the Addo Elephant National Park. National Parks Board, Pretoria.
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- Grobler, J.H. and Braack, H.H. (in press). Additions to the checklist of birds of the Addo Elephant National Park.
- Penzhorn, B.L. (1969). A supplementary checklist of the birds recorded in the Addo Elephant National Park. *Koedoe* 12: 106-107.
- Penzhorn B.L. and van Straaten, P.F. (1976). Additions to the checklist of birds of the Addo Elephant National Park. *Koedoe* 19: 177-178.
- Penzhorn B.L., and Olivier, M.C. (1974). A systematic checklist of flowering plants of the Addo Elephant National Park. *Koedoe* 17: 121-136.
- Penzhorn, B.L., Robbertse, P.J. and Olivier, M.C. (1973). The influence of the African elephant on the vegetation of the Addo Elephant National Park. *Koedoe* 17: 137-158.
- Swanepoel, P. (1975). Small mammals of the Addo Elephant National Park. *Koedoe* 18: 103-130.
- Toerien, D.K. (1972). Geologie van die Addo-Olifant Nasionale Park. *Koedoe* 15: 67-76.

Staff Administrative - three; Technical Services - four; Nature Conservation - seven; Tourism - 16. Total - 30. Temporary staff are employed for the erecting and removal of fences.

Budget R550,000 per annum (including salaries)

Local Park or Reserve Administration The Park Warden, Addo Elephant National Park, Private Bag X6027, Port Elizabeth, 6000.

Date November 1983

MOUNTAIN ZEBRA NATIONAL PARK**Management Category** II (National Park)**Biogeographical Province** 3.17.07 (Karoo)**Legal Protection** Total**Date Established** 14 June 1937. Proclamation 112 in Government Gazette 2452 of 2 July 1937 and the National Parks Act of 1962.**Geographical Location** 24km from Cradock in Cape Province. 32°15'S, 25°41'E.**Altitude** 1,200–1,957m (Bankenkop)**Area** 6,536ha**Land Tenure** Government. Administered by the National Parks Board of Trustees.

Physical Features The rock formations are sandstone, siltstone and mudstone from the lower stage Beaufort Series of the Karoo System and post-Karoo dolerite intrusions. A natural amphitheatre occurs on the northern slopes of the Bankberg, bisected by the Wilgerboom River which is perennial and there are rock paintings and panoramic views of the Karoo landscape on hiking trails. Wilgerboom River is the main river within the area and a number of springs occur in the area. Soils comprise the Beaufort Series of the Karoo System with dolerite intrusions. Annual average temperature range minimum: -0.6°C, maximum: 30°C. Annual rainfall 400mm, falling mainly in summer (October–March).

Vegetation Vegetation types consist of the Karroid Broken Veld (Veld Type 37) and Karroid *Merxmuellera* Mountain Veld replaced by Karoo (Veld Type 42). This is a unique vegetation with thick patches of *Acacia karroo* occurring together with various *Rhus* spp., particularly along the Wilgerboom River and streams. High up in the ravines dense groves of *Olea africana* are present. Mainly dry grassland with plentiful scattered dwarf shrubs and forbs. Dense stands of trees and taller shrubs composed mainly of *Acacia karroo*, *Celtis africana*, *Cussonia paniculata*, *Rhus* spp., and *Maytenus heterophylla* occur along watercourses and in sheltered areas. Aloes of note include *Aloe broommii*, *A. ferox*, and *A. striata*. Economically important species: none. Endemic species: survey in progress.

Fauna The park was established to protect the Cape mountain zebra *Equus zebra zebra* (which number 214 at present) but herds of other species are also found: eland *Taurotragus oryx* (140), black wildebeest *Connochaetes gnou* (O) (70), red hartebeest *Alcelaphus buselaphus* (70), blesbok *Damaliscus dorcas phillipsi* (85), springbok *Antidorcas marsupialis* (400), greater kudu *Tragelaphus strepsiceros* (20) and lesser kudu *Tragelaphus imberbis*, mountain reedbuck *Redunca fulvorufula* (400), grey rhebok *Pelea capreolus*, klipspringer *Oreotragus oreotragus*, common duiker *Sylvicapra grimmia* and steenbok *Raphicerus campestris*. A total of 170 bird species has been recorded. The only known protected breeding pair of booted eagles *Hieraaetus pennatus* in South Africa occur in the park; there is also a breeding population of the black eagle *Aquila verreauxii*. Threatened mammals: Cape mountain zebra *Equus zebra zebra*, South African hedgehog *Erinaceus frontalis*, straw-coloured fruit bat *Eidolon helvum*, striped weasel *Poecilogale albinucha*, honey badger *Mellivora capensis*, and spectacled dormouse *Graphiurus ocularis*; birds: Cape eagle owl *Bubo capensis*, black stork *Ciconia nigra*, Cape vulture *Gyps coprotheres* (periodically), yellowbilled stork *Mycteria ibis*, and blue korhaan *Eupodotis caerulescens*; and reptiles: veld monitor *Varanus exanthematicus albigularis*.

Conservation Management A management plan exists for this area.**Zoning** Development, natural and wilderness zones

Disturbances or Deficiencies Grazing and cultivation along the park's borders may jeopardise the natural extensive views.

Visitor Facilities There is comfortable accommodation (78 beds) with ablution blocks and camping facilities (20 sites), and a hiking trail. Numbers: 13,584 per annum. Potential: maximum reached. Hiking trails take the tourist through ravines and up mountain ridges.

Scientific Research Research is directed at the botanical and zoological aspects of nature conservation with special attention to the Cape mountain zebra (population dynamics, etc.), bird distribution, baboons, reptiles and the rock dassie *Procavia capensis*.

Special Scientific Facilities A small laboratory, herbarium and museum

Principal Reference Material

- ° Brooker, M. (1977). The archaeology of the Mountain Zebra National Park. *Koedoe* 20: 77-94.
- ° Grobler, J.H. and Bronkhorst, P.J. (1981). A preliminary check list of reptiles and amphibians in the Mountain Zebra National Park. *Koedoe* 24: 193-197.
- ° Grobler, J.H. and Bronkhorst, P.J. (1981). Additions and amendments to the bird and mammal list of the Mountain Zebra National Park. *Koedoe* 24: 199-203.
- ° Grobler, J.H. and Hall-Martin, A.J. (1982). A guide to the Mountain Zebra National Park. Publication of the National Parks Board of Trustees, Pretoria.
- ° Nel, J.A.J. and Pretorius, J.J.L. (1971). A note on the smaller mammals of the Mountain Zebra National Park. *Koedoe* 14: 99-110.
- ° Penzhorn, B.L. (1970). A check list of the flowering plants in the herbarium of the Mountain Zebra National Park. *Koedoe* 13, 131-146.
- ° Skead, C.J. (1965). Report on the bird-life in the Mountain Zebra National Park, Cradock, C.P. (1962-1964). *Koedoe* 8: 1-40.
- ° Toerien, D.K. (1972). Geologie van die Bergkwagga Nasionale Park. *Koedoe* 15: 67-82.
- ° Van, der Walt, P.T. (1980). A phytosociological reconnaissance of the Mountain Zebra National Park. *Koedoe* 23: 1-32.
- ° A complete list of references is available from The Chief Director, National Parks Board, PO Box 787, Pretoria, 0001, South Africa.

Staff Administrative - five; Technical Services - two; Nature Conservation - 10; Tourism, 18; and Research and Information - two. Total - 37

Budget R750,000 per annum (including salaries)

Local Park or Reserve Administration The Park Warden, Mountain Zebra National Park, Private Bag X66, Cradock, 5880.

Date November 1983

GOLDEN GATE HIGHLANDS NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 13 September 1963. Proclamation 259 in Government Gazette 599 of 13 September 1963 and the National Parks Act of 1962.

Geographical Location 60km from Bethlehem in Orange Free State. 28°25'S, 28°30'E.

Altitude 1,892-2,770m (Ribbokkop)

Area 6,241ha

Land Tenure Government. Administered by the National Parks Board of Trustees.

Physical Features The park lies amongst the foothills of the Maluti Mountains and is surrounded by massive outcrops of Red Beds and Cave Sandstone cliffs, and the Stormberg Series of the Karoo System. Outstanding features include Cathedral cave, rock paintings, and vertebrate fossils. Klein Caledon River flows through the area. Alluvium and river gravel, sandstone and mudstone. Annual average temperature range minimum: 4°C, maximum: 22°C. Annual rainfall 765mm, falling mainly in summer (September-April).

Vegetation Vegetation types consist of 3,751ha Highland Sourveld (Veld Type 44(A)) and 2,490ha Highland Sourveld to *Cymbopogon-Themeda* Veld Transition (Veld Type 56) (Acocks 1975). The typical highland vegetation of the area is dominated by grassland with an abundance of bulbous plants (geophytes) indicating the importance of fire as an environmental factor. Some 65 species of grasses have been identified, among them the following genera: *Agrostis*, *Andropogon*, *Merxmuellera*, *Eragrostis*, *Helictotrichon*, also *Paspalum dilatatum*, and *Rhynchelytrum setifolium*. Woody plants include: *Protea roupelliae*, *Cussonia paniculata*, *Rhus* spp., *Diospyros* spp., and *Asparagus* spp. A wide variety of attractive flowering plants occur, including *Kniphofia triangularis* *Eucomis bicolor*., and *Zantedeschia oculata* and species from the following genera *Agapanthus*, *Bulbine*, *Gladiolus*, *Hypoxis* spp.,. Succulents include *Aloe ecklonis*, *Crassula* spp., and *Euphorbia* spp. Plants with temperate affinities include *Stoebe vulgaris*, *Erica* spp., and *Cliffortia* spp.. *Leucosidea sericea* is the dominant tree species in ravines. Over 200 flowering plants occur as well as some 14 Pteridophytes. Economically important species: none. Endemic species: survey in progress.

Fauna Large mammals are plentiful and include black wildebeest *Connochaetes gnou* (180), blesbok *Damaliscus dorcas phillipsi* (440), springbok *Antidorcas marsupialis* (80), mountain reedbuck *Redunca fulvorufula* (approximately 150), grey rhebuck *Pelea capreolus* (approximately 150), eland *Taurotragus oryx* (60), and Burchell's zebra *Equus burchelli* (80). Some 123 species of birds have been recorded. An important and spectacular raptor is the bearded vulture *Gypaetus barbatus*. Threatened mammals: South African hedgehog *Erinaceus frontalis* and oribi *Ourebia ourebi*; and reptiles: water monitor *Varanus niloticus* and giant girdled lizard *Cordylus giganteus*.

Conservation Management A management plan exists for this area.

Zoning High density zone, lower density zone with hiking trails, natural zone and a wilderness zone

Disturbances or Deficiencies Grazing, cultivation and development in neighbouring areas may result in disturbance to the park with soil erosion and maintenance of roads being reasons for concern. The national road through the park is a major disturbance factor.

Visitor Facilities Facilities include two rest camps with huts and ablution blocks (270 beds), a restaurant and camping (55 sites). Hiking trails have been established and guided tours, educational films and courses are frequently presented. Numbers: 54,000 per annum. Potential: maximum almost reached for overnight facilities. Daily visitors are not limited.

Scientific Research Research is directed at botanical, zoological and palaeontological aspects which include studies on the oribi *Ourebia ourebi* and habitat utilisation by larger mammals.

Special Scientific Facilities A small laboratory, herbarium and museum.

Principal Reference Material

- Liebenberg, L.C. (1964). Die groter soogdiere wat vroe[13]r dae voorgekom het in die omgewing van die Golden Gate Hooglandpark. *Koedoe* 7: 99-104.
- Rautenbach, I.L. (1976). A survey of the mammals occurring in the Golden Gate Highlands National Park. *Koedoe* 19: 133-144.
- Roberts, B.R. (1969). The vegetation of the Golden Gate Highlands National Park. *Koedoe* 12: 15-28.
- Spies, J.J. (1969). Die geologiese en geomorfologiese geskiedenis van Golden Gate Hoogland Nasionale Park. *Koedoe* 12: 184-198.
- Van Rensburg, A.P.J. (1968). Golden Gate - die geskiedenis van twee plase wat 'n Nasionale Park geword het. *Koedoe* 11: 83-138

Staff Administrative - four; Technical Services - 31; Nature Conservation - 13; Tourism - 88; Research and Information - four; Total - 140

Budget R900,000 per annum (including salaries)

Local Park or Reserve Administration The Park Warden, Golden Gate Highlands National Park, PO Golden Gate, 9708.

Date November 1983

TSITSIKAMMA FOREST AND COASTAL NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.11.6 (Cape Sclerophyll)

Legal Protection Total

Date Established 4 December 1964. Proclamation 324 in Government Gazette 936 of 4 December 1964 and the National Parks Act of 1962.

Geographical Location 85km from Humansdorp in Cape Province, 34°00'-34°10'S 23°30'-24°20'E

Altitude 35m below sea level-220m (Kaalkop)

Area 3,318ha (2,840ha coastal section and 478ha forest section)

Land Tenure Government owned, administered by the National Parks Board of Trustees.

Physical Features The Reserve is situated on a plateau, the southern edge of which falls, abruptly, 120m to the rocky almost beachless shoreline. The plateau consists largely of Table Mountain Sandstone of Palaeozoic age and has been incised by several rivers. Other rocks include shales and tillites of the same series. The most outstanding features of the area are the Tsitsikamma indigenous forest, Storms River Mouth, intertidal marine life and Strandloper middens which are of archaeological interest. Storms, Groot, Elands, Elandsbos, Lottering and Bloukrans Rivers flow through the reserve. Soils are derivatives of sandstone, quartzite and tillite. Annual average temperature range minimum: 11°C, maximum: 19°C. Annual rainfall 1,000mm falling throughout the year with lower rainfall during April - August.

Vegetation The Knysna Forest (Veld Type 4) and Macchia (Veld Type 69). The forest represents a section of the largest southern outlier of the Afro-montane forest belt, surrounded

and partly invaded by typical Cape fynbos. The dominant forest species include: *Podocarpus latifolius*, *P. falcatus*, *Cassine crocea*, *Celtis africana*, *Ocotea bullata*, *Pterocelastrus tricuspidatus*, *Curtisia dentata*, *Olea capensis* subspecies *macrocarpa*, *Platylophus trifolius*, *Ficus capensis* and *Sideroxylon inerme*. Many Iridaceae occur including buggie-lily *Watsonia* spp. and *Gladiolus* spp. The marine fauna includes both warm and cold water species. Economically important species: *Podocarpus latifolius*, *P. falcatus* and *Ocotea bullata*. Endemic species: The park is situated in the fynbos biome, which includes several hundred species of plants which are endemic to South Africa.

Fauna Mammals include: vervet monkey *Cercopithecus aethiops*, Cape clawless otter *Aonyx capensis*, bushbuck *Tragelaphus scriptus*, blue duiker *Cephalophus monticola*, rock dassie *Procavia capensis* and bushpig *Potamochoerus porcus*. Marine mammals are visitors to the bays and coves and include pygmy sperm whale *Kogia breviceps*, dwarf sperm whale *Kogia simus*, Blainville's beaked whale *Mesoplodon densirostris*, crabeater seal *Lobodon carcinophagus*, common dolphin *Delphinus delphis*, India Ocean bottlenosed dolphin *Tursiops truncatus* and southern right whale *Eubalaena glacialis* (E). Over 400 species of marine fish occur, almost 50% of which are endemic due to the location of the park between two major current systems. In addition there are over 210 species of birds. Snakes are common, the most dangerous being the boomslang *Dispholidus typus*. Endangered species: Honey badger *Mellivora capensis* and leopard *Panthera pardus* (V).

Conservation Management A management plan exists for this area.

Zoning A high density area, buffered by a 5km area of limited utilization, including the Blouduiker and Loerie hiking trails and Storms River mouth. Low density area with the 46km Otter hiking trail. Wilderness area, to the east of the Storms River Mouth, for a distance of some 35km.

Disturbances or Deficiencies Cultivation, organized forestry and residential areas on the borders of the park are potential causes of disturbance. Alien invasive plants are a problem but are being systematically eradicated.

Visitor Facilities Vehicles admitted to coastal park daily or on accommodation permit. Accommodation with ablution blocks and camping facilities available, including 100 camping sites. Hiking trail along coast, underwater trail and canoe trips. Hiking trails in the area are a main attraction to the public. Film shows and lectures are presented regularly. Open-air museum. Numbers: 93,000 per annum. Potential: Maximum almost reached for overnight facilities. Daily visitors not limited.

Scientific Research Research is focused on various aspects of marine biology, resulting in surveys of littoral and pelagic fish, as well as invertebrate and botanical surveys.

Special Scientific Facilities A laboratory, small reference herbarium and museum. Also small research vessel.

Principal Reference Material A complete list of references is available from: The Chief Director, National Parks Board, PO Box 787, Pretoria, 0001.

- * Carruthers, V.C. and Robinson, G.A. (1977). Notes on amphibia in the Tsitsikamma National Park. *Koedoe* 20: 115-124.
- * De Graaff, G. and Nel, J.A.J. (1970). Notes on the smaller mammals of the Eastern Cape National Parks. *Koedoe* 30: 147-150.
- * Tietz, R.M. and Robinson, G.A. (1974). Tsitsikamma Shore. Pretoria: National Parks Board of Trustees.
- * Toerien, D.K. (1976). Geologie van die Tsitsikammakusstrook. *Koedoe* 19: 31-42.
- * Robinson, G.A. (Undated). A guide to the Tsitsikamma Forest National Parks Board of Trustees.
- * Seagrave, S.C. (1967). The seaweeds of the Tsitsikamma Coastal National Park. Pretoria: National Parks Board of Trustees.

- ° Skead, C.J. and Liversidge, R. (1967). Birds of the Tsitsikamma Forest and Coastal National Park, 1966. *Koedoe* 10: 43-62.
- ° Smith, J.L.B. and Smith, M.M. (1966). Fishes of the Tsitsikamma Coastal National Park. Pretoria: National Parks Board of Trustees.

Staff Administrative - 2; Technical services - 15; Nature Conservation - 21; Tourism - 91; Research and Information - 4. Total - 133.

Budget R1,000,000 per annum (including salaries)

Local Park or Reserve Administration The Park Warden, Tsitsikamma Coastal and Forest National Park, PO Stormsriver, 3608.

Date November 1983

BONTEBOK NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1931 at Bredasdorp, moved to Swellendam during 1960. Proclamation 86 in Government Gazette 6653 of 24 March 1961 and the National Parks Act of 1962.

Geographical Location 6km from Swellendam in Cape Province. 34°02'S, 20°25'E.

Altitude 60-200m

Area 2,786ha

Land Tenure Government. Administered by the National Parks Board of Trustees.

Physical Features A series of gently undulating gravel terraces descending from a rocky plateau through sand and boulders to an alluvial plain. The flats in the south-east are surrounded by low hills and the perennial Breede River, which forms the south-western boundary and provides the only water supply. 90% of the surface is gravel and alluvium, but the cliffs along the river belong to the Witteberg Series of the Cape systems. Waterbodies comprise pools in river beds, permanent and semi-permanent dams. Marshy areas and pans form during the rains in the eastern sandveld of the park. Soils are immature brown earth and podzols, shallow lithosols and deep alluvial sand. Annual average temperature range minimum: 6°C, maximum: 32°C. Annual rainfall 511mm, 59% of which falls during the winter months between April and October.

Vegetation Vegetation types consist of the Coastal Rhenosterbosveld (Veld Type 46). The south-western Cape flora capensis region has been described as one of the richest floristic areas in the world. Over 470 plant species have been identified in the National Park, including 52 grass species. Vegetation primarily consists of *Leucadendron* spp., and *Elytropappus rhinocerotis* bush, about a metre high, with *Themeda triandra* the most abundant grass. Trees are largely confined to the banks of the Breede River where *Podocarpus elongatus* is the most important. Elsewhere there are scattered clumps of *Acacia karroo*. Dominant species

include: *Podocarpus elongatus*, *Carissa haematocarpa*, *Olea africana*, *Euclea racemosa*, *Sideroxylon inerme*, *Relbania squarrosa*, *Acacia karroo*, *Selago corymbosa*, *Cussonia spicata*, *Ehrharta calycina*, *Buddleja salviifolia*, *Lasiochloa longifolia*, *Rhus lucida*, *Merxmüllera disticha*, and *Aloe ferox*. Economically important species: Proteaceae for the cut flower industry and *Podocarpus elongatus*. Endemic species: the park is situated in the fynbos biome, which comprises several hundred species of plants which are endemic to South Africa.

Fauna The park was established to protect the bontebok *Damaliscus dorcas dorcas*, which now number 279. Many other species, some rare, are present including grey rhebok *Pelea capreolus* (180), springbok *Antidorcas marsupialis* (16) and Sharpe's grysbok *Raphicerus sharpei* (10). 186 bird species have been recorded in the park. The fish *Barbus burchelli* (R), is found in the tributaries of the Breede River. Threatened species: mammals: aardwolf *Proteles cristatus*, straw-coloured fruit bat *Eidolon helvum*, honey badger *Mellivora capensis*, spectacled dormouse *Graphiurus ocularis* and Verreaux's mouse *Praomys verreauxii*; and birds: black stork *Ciconia nigra* and Cape vulture *Gyps coprotheres* (V).

Conservation Management A management plan exists for this area.

Zoning Wilderness, natural and development zones

Disturbances or Deficiencies Grazing and cultivation on the park's borders may cause disturbances. Some alien invasives, *Opuntia* spp., *Acacia saligna* and *Acacia mearnsii* are present and efforts are constantly exerted to control these alien species. As a result of a burning programme initiated during 1975, the park is reverting from Macchia (fynbos) to grassland.

Visitor Facilities Facilities include 15 camp sites and an information centre, with a possibility for a future rest camp. Numbers: 10,559 per annum. Potential: future increase.

Scientific Research Research is undertaken by Universities (post-graduate students) and museums, especially on the grey rhebok *Pelea capreolus* and the bontebok *Damaliscus dorcas dorcas*. Veterinary research on parasites is also undertaken.

Special Scientific Facilities Small laboratory and herbarium

Principal Reference Material

- * Braack, H.H. (1981). Lower vertebrates of the Bontebok National Park. *Koedoe* 24: 67-77.
- * Baron, S.T. (1981). An updated list of birds of the Bontebok National Park. *Koedoe* 24: 79-98.
- * Braack, H.H. (1981). A guide to the Bontebok National Park. Pretoria: National Parks Board of Trustees.
- * Braack, H.H. (1981). Vertebrates of the Bontebok National Park. *Koedoe* 24: 67-77.
- * G. de Graaff, P.T. van der Walt and van Zyl, L.J. (n.d.). Populasie samestelling van die bontebok *Damaliscus dorcas dorcas* in die Bontebok Nasionale Park, gedurende Januarie 1974. *Koedoe* 19: 67-74.
- * Grobler, P.J. and Marais, J. (1967). Die Plantegroei van die Bontebok Nasionale Park, Swellendam (Deel I). *Koedoe* 10: 132-146.
- * Stuart, C.T. and Braack, H.H. (1978). Preliminary notes on the mammals of the Bontebok National Park. *Koedoe* 21: 111-117.
- * Van der Walt, P.T., van Zyl, L.J. and de Graaff, G. (1976). Lewensloop van 'n Kaapse buffelbevolking *Syncerus caffer* in die Bontebok Nasionale Park. *Koedoe* 19: 189-199.
- * A complete list of references is available from The Chief Director, National Parks Board, PO Box 787, Pretoria, 0001. South Africa.

Staff Nature Conservation - six; Tourism - four; Total - 10

Budget R100,000 per annum (including salaries)

Local Park or Reserve Administration The Park Warden, Bontebok National Park, PO Box 149, Swellendam, 6740.

Date November 1983

DE HOOP NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1956

Geographical Location 60km from Bredasdorp in Cape Province. 34°21'–31'S, 20°19'–38'E.

Altitude Minimum 611m

Area 17,846ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features The reserve is characterised by a varied geology and physiography and includes the highest part (611m) of the low, isolated Potberg mountain range which consists of siliceous quartzites of Palaeozoic age (Ordovician - Silurian); a range of low calcareous sandstone (cf limestone) hills up to 200m high of Mio-Pliocene age and marine/aeolian origin and a coastal plain of low, undulating limestone pavements and ridges interspersed with sandy flats. A broad zone of low vegetated dunes is present along the coast, but a 1,000ha area consists of shifting dunes. Notable features are a 12km long coastline with a zone of shifting sand dunes and low limestone cliffs. Along the coast area, there are a number of deep caves in the limestone, one of which seasonally contains a breeding colony of more than 100,000 bats. All streams are temporary and flow only after heavy rains. Drainage over much of the plain and limestone hills is subterranean and numerous depressions with internal drainage are present. A large shallow lake, De Hoopvlei of 1,000ha when full, lies partly within the reserve and is fed by a river which originates outside the reserve as well as springs along the edge of the lake. Soils are predominately sandy and of aeolian origin (sand dunes along the coast) or derived from in situ weathering of sandstones and quartzites and sandy limestones. They are generally nutrient-poor and acid over sandstones and quartzites and base-rich (calcareous) over limestones. Annual average temperature range: minimum 13°C, maximum 19°C., annual rainfall: 400mm, falling mainly in winter (March to August).

Vegetation Vegetation types consist of Coastal Rhenosterbosveld (Veld Type 46), Coastal Macchia (Veld Type 47), and Macchia (Veld Type 69). Economically important species: thatching reed (*Thamnochortus* spp.) and numerous species of flowering plants especially Proteaceae which are utilised commercially on surrounding farmland as cut flowers, but no harvesting of flora is allowed in the reserve. Endemic species: a number of plant species are endemic or near-endemic, for example *Brachysiphon mundii*, *Erica uysii*, *Aspalathus potbergensis*, *Protea aurea* ssp. *potbergensis*, *Osteospermum elsiae*, and some as yet undescribed species. Numerous other species are regarded as threatened.

Fauna There is a good variety of large mammals including the eland *Tragelaphus oryx* (60), springbok *Antidorcas marsupialis* (125), grey rhebok *Pelea capreolus*, Cape grysbok *Raphicerus melanotis*, steenbok *Raphicerus campestris*, common duiker *Sylvicapra grimmia*, klipspringer *Oreotragus oreotragus*, and 39 smaller mammal species. There are also 210 bird, 20 reptile, two fish, and six amphibian species. De Hoopvlei supports a varied avifauna with particularly large populations of ducks, geese, coot (the latter number tens of thousands at times), flamingos (both lesser and greater), and piscivorous bird species, which includes three breeding pairs of the fish eagle *Haliaeetus vocifer*. Threatened species: Cape mountain zebra *Equus zebra zebra* (T) and bontebok *Damaliscus dorcas dorcas* (O), Cape vulture *Gyps coprotheres* (V) (50). The southernmost breeding-colony of the Cape vulture *Gyps coprotheres* (V), is situated in the Potberg mountain range. Caves in the limestone hills support five bat species; *Rhinolophus clivosus*, *R. capensis*, *Myotis tricolor*, *Miniopterus schreibersi*, and *Myotis thebaica*.

Conservation Management The management plan is being updated following a recent (1980) major extension of the reserve.

Zoning A zoning scheme is being devised as part of the management plan revision.

Disturbances or Deficiencies Exotic woody plant invaders especially *Acacia* spp. from Australia present a major problem and threat to the reserve's ecosystems. Veld fires, which originate on adjacent farmland, are a further problem which is compounded by unsatisfactory boundary alignments. A small area of formerly ploughed fields is included in the reserve. The use of parts of the reserve for a missile testing range had been the subject of a Commission of Enquiry and will be subject to rigorous controls.

Visitor Facilities The reserve is at present open to the public for one day a week only, but an education centre is under construction. A hiking trail has been developed. Numbers: 10,000 per annum (mainly day visitors). Potential: maximum almost reached.

Scientific Research Departmental surveys and monitoring programmes are undertaken as well as ecological research by universities. A complete fauna list (vertebrates) is available, a floristic list is being compiled, and studies and classification of the vegetation have been completed or are in progress. Detailed studies of the biology of the bontebok *Damaliscus dorcas dorcas*, Cape zebra *Equus zebra zebra*, Cape vulture *Gyps coprotheres* and cave-dwelling bats have been undertaken. Detailed ecological studies of the fynbos ecosystems and De Hoopvlei are envisaged.

Special Scientific Facilities No special research facilities are available, although there is accommodation for visiting scientists.

Principal Reference Material Various unpublished internal reports

Staff One senior reserve manager, three reserve managers and 30 labourers

Budget R150,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, De Hoop Nature Reserve, Private Bag X16, Bredasdorp 7280.

Date May 1982

KAROO NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 24 August 1979. Proclamation 192 of 1983. Includes the Valley of Desolation, which is a National Monument.

Geographical Location 1km from Graaff-Reinet in Cape Province. 32°10'-32°20'S, 24°20'-24°40'E.

Altitude 740-1,710m (Drie Koppe)

Area Approximately 14,000ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features Typical of Karoo landscape with dolerite sills capping steeply sloping sandstone koppies. Deep, alluvial soils are subject to erosion on the valley floors. Outstanding features of the area are the Valley of Desolation (exposed dolerite dyke) and Spandaukop (classic Karoo mesa). Sondags and Pienaars Rivers flow through the reserve, with sandy soils of sandstone and dolerite origin. Annual average temperature range minimum: 11°C, maximum: 24°C. Annual rainfall 320mm falling mainly in summer (October-March).

Vegetation Vegetation types consist of Succulent Mountain Scrub (Veld Type 25), Karroid *Merxmuellera* Mountain Veld (Veld Type 60), False Central Lower Karoo (Veld Type 38), and False Karroid Broken Veld (Veld Type 37). Original vegetation of the Karoo - mountain veld consists of *Portulacaria afra*, *Rhus* spp., *Maytenus* spp., *Themeda triandra*, *Heteropogon contortus* and *Eragrostis* spp., which is physiognomically, a bush-clump savanna. The lower slopes and plains are characterised by karroid species: *Pentzia*, *Mestoklema*, *Eberlanzia*, *Chrysocoma*, *Eragrostis* and *Aristida* spp.. Economically important species: none. Endemic species: *Dioscorea elephantipes*.

Fauna Greater kudu *Tragelaphus strepsiceros* (approximately 240) and lesser kudu *Tragelaphus imberbis*, common duiker *Sylvicapra grimmia* (45), klipspringer *Oreotragus oreotragus* (18), mountain reedbuck *Redunca fulvorufula* (42), black wildebeest *Connochaetes gnou* (O) (20), blesbok *Damaliscus dorcas phillipsi* (17), and springbok *Antidorcas marsupialis* (32). There is also a large waterfowl population. Threatened mammals: Cape mountain zebra *Equus zebra zebra* (T) (20 individuals introduced in 1981, population 24 in 1984).

Conservation Management A management plan exists for this area.

Zoning 10,000ha natural area and 4,000ha recreation area

Disturbances or Deficiencies There is a man-made dam covering about 500ha. A fluctuation zone and flooding pose problems.

Visitor Facilities Facilities are situated around the historical town of Graaff-Reinet where tourist amenities are provided. Numbers: 8,000 per annum. Potential: 12,000 per annum.

Scientific Research Total floristic survey being conducted

Special Scientific Facilities Herbarium with about 400 specimens

Principal Reference Material

- ° Van Riet, W.F. and J.P. Minnaar, (1977). Graaff-Reinet 2000. Samevattende tussentydse verslag, Department of Architecture, University of Pretoria.
- ° Various internal departmental reports.

Staff Two senior staff and 20 labourers

Budget R18,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Karoo Nature Reserve, PO Box 349, Graaff-Reinet, 6280.

Date June 1982

OVI STON NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 1968. Proclamation 276 of 1981

Geographical Location 10km from Venterstad in Cape Province. 30°38'-30°45'S, 25°30'-26°05'E.

Altitude 1,320-1,530m

Area Approximately 13,000ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features The area is generally flat, and sloping to the north-west. In the west are numerous dolerite hills of 30 to 160m in height. The reserve is situated on the banks of the H.F. Verwoerd Dam. Orange River flows through the area. Soils include shallow lithosols of dolerite and sandstone origin. Annual average temperature range minimum: 10°C, maximum: 23°C. Annual rainfall 400mm, falling mainly in summer.

Vegetation Vegetation types consist of the False Upper Karoo (Veld Type 36). Grasses: *Cymbopogon* spp., *Themeda triandra*, *Heteropogon contortus*, *Eragrostis* spp. and *Aristida* spp.. Herbs: *Chrysocoma tenuifolia*, *Pentzia* spp., and *Eriocephalus* spp.. Shrubs: *Acacia karroo*, *Rhus* spp., and *Diospyros* spp..

Fauna Springbok *Antidorcas marsupialis* (4,000), steenbok *Raphicerus campestris* (300), Burchell's zebra *Equus burchelli* (30), mountain reedbuck *Redunca fulvorufula* (1,000), red hartebeest *Alcelaphus buselaphus* (30), and black wildebeest *Connochaetes gnou* (O) (400). This reserve is an important breeding area for all the above species.

Conservation Management A management plan exists for this area.

Zoning Tourism, natural area and game breeding area

Disturbances or Deficiencies There is excessive disturbance along the dam fluctuation zone; invasive plants etc. Erosion of drainage lines is a major disturbing factor.

Visitor Facilities Facilities include angling on a limited scale. Numbers: 7,300 per annum. Potential: 7,300 per annum.

Scientific Research Total floristic survey as well as vegetation utilisation research

Special Scientific Facilities None

Principal Reference Material Various internal departmental reports

Staff Two senior staff and 15 labourers

Budget R20,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Oviston Nature Reserve, PO Box 7, Venterstad, 5990.

Date June 1982

GAMKA MOUNTAIN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1970, in process of being proclaimed

Geographical Location 35km from Oudtshoorn in Cape Province, 33°40'-46'S, 21°48'-59'E

Altitude 300-1,100m (Bakenskop)

Area 9,428ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features The reserve lies astride the eastern end of the Gamkaberg-Rooiberg mountain range, a semi-isolated east-west orientated range which forms part of the Cape Folded Belt. The mountain is formed by an anticline in the quartzites of the Table Mountain Group of Palaeozoic age (Silurian-Devonian). The Gamkaberg is rounded with fairly gentle slopes at the top but the northern slopes are deeply dissected by steep-sided ravines. Three major ravines drain to the north but all are temporary water courses. Soils are predominately sandy, shallow and skeletal and developed over quartzites of the Table Mountain Group. Annual average temperature range minimum: 5°C, maximum: 25°C. Annual rainfall 400-500mm on summit falling mainly in winter (May - October); some summer precipitation.

Vegetation Vegetation types consist of False Macchia (Veld Type 70) which covers 70% of the reserve, but Succulent Mountain Scrub (Spekboomveld) (Veld Type 25) and Mountain Rhinosterbosveld (Veld Type 43) are also present on the lower northern and southern slopes respectively. Succulent Karoo (Veld Type 31) occurs in a small area on the northern plain.

Vegetation is characterized by sparse canopy cover, usually less than 70% and poorly discernable stratification. Many species of Proteaceae, Ericaceae and Restionaceae occur, as well as *Elytropappus* spp. and *Portulacaria afra*. Economically important species: None known except flowering plants, especially Proteaceae, which are utilized as cut flowers elsewhere but no harvesting of flora is allowed in the reserve. Endemic species: No species are known to be endemic to the reserve itself but a few species are thought to be endemic to the Rooiberg-Gamkaberg range as a whole. A few species which are regarded as threatened have been recorded in the reserve (such as *Leucospermum pluridens*).

Fauna Smaller antelope such as klipspringer *Oreotragus oreotragus* and grey rhebok *Pelea capreolus* are common, as are chacma baboon *Papio ursinus* and rock dassie *Procavia capensis*. Smaller carnivores include caracal *Felis caracal* and Cape grey mongoose *Herpestes pulverulentus*. Black eagle *Aquila verreauxii* are seen regularly and breed in the reserve. Twenty-five mammal, 90 bird, 24 reptile (12 snake, ten lizard and two tortoise species) and eight amphibian species have been recorded in the reserve and immediate vicinity. Threatened species: Mountain zebra *Equus zebra* (14) and leopard *Panthera pardus* (T). One breeding site of the booted eagle *Hieraetus pennatus*.

Conservation Management A management plan is in preparation.

Zoning No zoning scheme has been implemented but the greater part of the reserve is managed as a primitive area (without roads) or as a natural area (with tracks only).

Disturbances or Deficiencies Before establishment of the reserve the top of the mountain had been burnt frequently (every 5 years or so) to promote a grass cover which resulted in *Elytropappus rhinocerotis* invasion in places and an increase in unpalatable grass species. The alignment of boundaries is not ideal and creates problems in management especially with respect to fire control and increased management costs.

Visitor Facilities There are no visitor facilities available. Visitors are allowed but access is on foot only and visitors are not encouraged. Guided walks are undertaken on request. Numbers: 100 per annum. Potential: Visitors not encouraged.

Scientific Research A study of the behaviour and habitat preferences of the klipspringer *Oreotragus oreotragus* has been completed, and a classification and description of the vegetation is nearing completion. An annotated checklist of the mammals has been published and a herbarium collection of the flora is being undertaken.

Special Scientific Facilities A small herbarium which is being extended at present.

Principal Reference Material

- ° Various unpublished department reports.
- ° Lawson, A.B. (1982). Notes on the mammals of the Gamka Mountain Reserve, Cape Province. *Bontebok* 2(2):1-8.

Staff One ranger and seven labourers, who also have responsibility for the Gamkapoort Nature Reserve.

Budget R16,400 per annum (excluding salaries, transport and major capital works)

Local Park or Reserve Administration The Officer-in-Charge, Gamka Mountain Nature Reserve, Private Bag X21, Oudtshoorn, 6620.

Date May 1982

DOORNKLOOF NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 1 April 1981, Proclamation 276 of 1981

Geographical Location 50km from Petrusville in Cape Province. 30°13'-30°24'S, 24°55'-25°03'E.

Altitude 1,260-1,480m (Pense Berg)

Area 8,765ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features Features include numerous dolerite hills and ridges, divided by grassy plains. The reserve is situated on the banks of the P.K. le Roux Dam. The Orange River flows through the area. Shallow lithosols of dolerite and sandstone origin. Annual average temperature range minimum: 10°C, maximum: 23°C. Annual rainfall 400mm, falling mainly in summer (October-February).

Vegetation Vegetation types consist of the False Karroid Broken Veld (Veld Type 37). Grasses: *Cymbopogon* spp., *Themeda triandra*, *Heteropogon contortus*, *Eragrostis* spp. and *Aristida* spp.. Herbs: *Pentzia* spp., *Chrysocoma tenuifolia*, *Ericephalus* spp., and *Felicia* spp.. Shrubs: *Acacia karroo*, *Rhus* spp., and *Diospyros* spp..

Fauna Fauna include mountain reedbuck *Redunca fulvorufula* (500) and common duiker *Sylvicapra grimmia* (50). There is also a large waterfowl population. Threatened species: none.

Conservation Management No management plan exists for this area.

Zoning All a natural area

Disturbances or Deficiencies Water level fluctuation zone and invasive plants pose a problem

Visitor Facilities Facilities include picnic sites. Numbers: 500 per annum; potential 1,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various internal departmental reports

Staff One senior and ten junior staff

Budget R10,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Doornkloof Nature Reserve, PO Box 23, Vanderkloof, 8771.

Date June 1982

GAMKAPOORT NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 1980, not yet formally proclaimed as a nature reserve

Geographical Location 35km from Prince Albert in Cape Province. 33°13'-33°18'S, 21°31'-21°46'E.

Altitude 430-1,280m (Elandsberg)

Area 8,000ha (6,950ha land and 1,050ha water)

Land Tenure State. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features The reserve lies at the northern side of the 1,500-2,000m high Great Swartberg Mountains at the southern edge of the Great Karoo. A prominent east-west trending ridge (600m high in the east, to 1,200m in the west), which is capped by erosion resistant quartzites of the Witteberg Group, runs through the reserve. It is separated from the Swartberg Mountains by a valley cut into the softer shale rocks of the Bokkeveld and Witteberg Groups (both Cape Supergroups: early to late Devonian period). To the north lie the plains of the Great Karoo which are underlain by rocks of the Karoo Sequence (mainly tillites of the Dwyka Formation and shales of the Ecce and Beaufort Groups: late Carboniferous to Triassic periods). Fossils of trilobites, brachiopods and molluscs are common in rocks of the Bokkeveld Groups (Devonian: 395-345 ma). The Dwyka and Gamka, two large rivers, which drain a large part of the Great Karoo, have their confluence at the northern side of the Swartberg Mountains and then flow southwards through a spectacular gorge. The Gamka Dam at the entrance to the gorge floods an area of 1,050ha within the reserve. All other smaller streams are seasonal. The greater part of the area is underlain by shales and the soils are generally clayey. More sandy soils occur on quartzite outcrops. Annual average temperature range minimum: 10°C, maximum: 22°C. Annual rainfall 150-250mm, falling all year round.

Vegetation Vegetation types consist of the Karroid Broken Veld (Veld Type 26), Spekboomveld (Veld Type 25), and Succulent Karoo (Veld Type 31) with some Mountain Rhenosterbosveld (Veld Type 43) and False Macchia (Veld Type 70). Dwarf succulent shrublands with succulent mesems and small-leaved shrubs occur on the low-lying areas. *Acacia karroo* forms dense stands along watercourses and occasional tall shrubs such as *Rhigozum obovatum*, *Euclea undulata* and *Pappea capensis* occur on the hillsides. Spekboomveld with *Portulacaria afra* as dominant, occurs on north facing slopes of the Swartberg Mountains. On higher lying ridges of the Witteberg Group, small-leaved rhenosterbosveld shrublands occur with *Elytropappus rhinocerotis* and *Eriocephalus* spp.. Dry Mountain Fynbos is also present on the highest quartzite ridges. Economically important species: none. Endemic species: none.

Fauna Greater kudu *Tragelaphus strepsiceros* and lesser kudu *Tragelaphus imberbis* (15), grey rhebok *Pelea capreolus*, steenbok *Raphicerus campestris*, common duiker *Sylvicapra grimmia* and klipspringer *Oreotragus oreotragus* are the only antelope present. Threatened species: Aardwolf *Proteles cristatus* occurs and African fish eagle *Haliaeetus vocifer* breed in the vicinity of Gamkapoort Dam.

Conservation Management No management plan exists for this area.

Zoning The greater part of the reserve will be managed as a natural area with limited public access. Only Gamkapoort Dam is open to the public for recreation (angling and boating).

Disturbances or Deficiencies There is limited poaching as a result of inadequate control. Severe grazing in the recent past has caused deterioration of the veld and total removal of farm stock could only be effected from January 1983.

Visitor Facilities None, but the public have access to Gamkapoort Dam for angling and boating. Numbers: unknown. Potential: unknown.

Scientific Research A collection of the flora is being undertaken

Special Scientific Facilities A herbarium is being developed

Principal Reference Material None available

Staff No full-time staff at present. Irregular visits by a Nature Conservator and six labourers from Gamka Mountain Reserve 150km away.

Budget R2,600 per annum (salaries, transport, and major capital work excluded)

Local Park or Reserve Administration The Nature Conservator, Gamka Mountain Nature Reserve, Private Bag X21, Oudtshoorn, 6620.

Date September 1983

HESTER MALAN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.07 (Karoo)

Legal Protection Total

Date Established 1966. Decree number: not yet formally proclaimed as a nature reserve

Geographical Location 16km from Springbok in Cape Province. 29°35'-29°42'S, 17°55'-18°03'E.

Altitude 884m-1,354m (Carolusberg)

Area 6,576ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features Prominent dome-shaped and rugged rocky hills with large boulders with sandy plains in between. The hills merge into a rugged plateau to the north, with prominent rocky hills and shallow, medium to coarse loam soils derived from weathering of granitic-gneiss. Annual average temperature range minimum: 11°C, maximum: 23°C. Annual rainfall 162mm, falling mainly in winter (May-September).

Vegetation Vegetation types consist of the Namaqualand Broken Veld (Veld Type 33). The most striking features of the Namaqualand vegetation are the seasonal variations in the ephemeral plant population densities and composition. The ephemerals, such as *Dimorphotheca polyptera*, *Osteospermum amplexans*, *O. hyoseroides*, and *Arctotis fastuosa* form an important part of the vegetation cover in the winter. On the plains, the sparse ground

cover is dominated by succulent mesems and *Zygophyllum retrofractum* shrublets. On the plateaux the ground cover is more dense and the vegetation consists of *Ruschia robusta*, *Leipoldtia pauciflora*, *Eriocephalus ericoides*, *Galenia africana*, and *Osteospermum sinuatum*. Taller shrubs such as *Diospyros ramulosa* and *Rhus undulata* also occur. Trees, which formerly occurred on the hillsides, have been largely eliminated, but occasional specimens of *Pappea capensis* may still be found and *Aloe dichotoma* is common on some of the hills. Economically important species: A number of succulents occur which are sought by collectors but no removal of flora is allowed. Endemic species: *Gladiolus salteri* and a *Spiloxene* sp. nov.

Fauna Springbok *Antidorcas marsupialis* (49) and gemsbok *Oryx gazella* (47) have been reintroduced. Klipspringer *Oreotragus oreotragus* (21), chacma baboon *Papio ursinus*, bat-eared fox *Otocyon megalotis*, Cape fox *Vulpes chama*, rock dassie *Procavia capensis*, common duiker *Sylvicapra grimmia* and steenbok *Raphicerus campestris* occur naturally. Thirty-one species of mammal have been recorded in the reserve. Ostrich *Struthio camelus*, black eagle *Aquila verreauxii*, karoo korhaan *Eupodotis virgorsii*, spotted dikkop *Burhinus capensis*, and ground woodpecker *Geocolaptes olivaceus* are some of the birds that are frequently seen. Forty-seven bird species have been recorded. At least 26 species (eight snake, 15 lizard and three tortoise species) are known to occur in the reserve, along with three amphibians e.g. armadillo lizard *Cordylus cataphractus* (V), rock agama *Agama atra*, and Namaqualand padloper *Homopus signatus*. Threatened species: Hartmann's mountain zebra *Equus zebra hartmannae* (T)(16), aardwolf *Proteles cristatus*, and honey badger *Mellivora capensis*.

Conservation Management No management plan exists for this area.

Zoning The greater part of the reserve is managed as a natural area.

Disturbances or Deficiencies The Okiep Copper Company retain the right to mine for copper on the reserve and the veld has not yet fully recovered from severe overgrazing in the past. Trees, which formerly occurred on the hillsides, were removed years ago.

Visitor Facilities Facilities are open for day use only. There are hiking trails and nursery for succulents is open to the public. Numbers: unknown. Potential: unknown.

Scientific Research Studies on the habitat selection and feeding ecology of klipspringer *Oreotragus oreotragus* and ecology and breeding biology of the gemsbok *Oryx gazella* have been completed. A detailed study of the phenology of the flora and classifications of the plant communities have also been completed. Monitoring of vegetation succession and recovery is an ongoing programme and comprehensive checklists of the mammals and flora are available.

Special Scientific Facilities A comprehensive herbarium collection

Principal Reference Material

- * Dieckmann, R.C. (1979). Notes on the smaller mammals of the Hester Malan Nature Reserve, Springbok, Namaqualand. *South African Journal of Zoology* 14(2): 85-89.
- * Dieckmann, R.C. (1980). Ecology and breeding biology of the gemsbok *Oryx gazella* (Linneus, 1758) in the Hester Malan Nature Reserve. M.Sc. Thesis, University of Pretoria.
- * Le Roux, A. (1984). Fito sosilogiese studie van die Hester malan- natuureservaat. M.Sc. Thesis, Universty of Pretoria.
- * Norton, P.M. (1980). The habitat and feeding ecology of the klipspringer *Oreotragus oreotragus* (Zimmernan, 1783) in two areas of the Cape Province. M.Sc. Thesis, University of Pretoria.
- * Van Rooyen, M.W., Grobbelaar, N. and Theron, G.K. (1979a). Phenology of the vegetation of the Hester Malan Nature Reserve in the Namaqualand Broken Veld, South Africa. 1. General observations. *Journal of South Africa Botany* 45: 279-294.
- * Van Rooyen, M.W., Grobbelaar, N. and Theron, G.K. (1979b). Phenology of the vegetation in the Hester Malan Nature Reserve in the Namaqualand Broken Veld, South Africa. 2. The therophyte population. *Journal of South African Botany* 45(3): 433-452.

Staff One reserve manager and one pupil nature conservator

Budget R15,200 per annum (excluding salaries, transport, and major capital works)

Local Park or Reserve Administration The Officer-in-Charge, Hester Malan Nature Reserve, Private Bag X1, Springbok, 8240.

Date July 1983

ANDRIES VOSLOO KUDU RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1973. Proclamation 409 of 1976

Geographical Location 32km from Grahamstown in Cape Province. 33°04'-33°09'S, 26°37'-26°49'E.

Altitude 182-548m (Graskop)

Area 6,493ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features The eastern section is traversed by numerous thickly wooded riverine valleys. The western section is flatter, with some examples of exposed Ecca shales. Outstanding physical features include views of the meandering Fish River Valley and isolated dolerite sills within the boundaries, which are limited to a 500m stretch of the Great Fish River, with non-perennial streams within the reserve boundaries. Clay soils of shale origin. Annual average temperature range minimum: 10°C, maximum: 23°C. Annual rainfall 434mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of the Fish River Scrub variation of the Valley Bushveld (Veld Type 23), and includes species from five biogeographical regions: Capensis (*Helichrysum* spp., *Selago* spp.); Karoo-Namib (*Felicia* spp., *Chrysocoma* spp.); Pondoland-Tongaland (*Portulacaria afra*, *Euclea undulata*); Sudano-Zambezian (*Themeda triandra*, *Eragrostis* spp.) and Afro-Montane (*Hippobromus* spp.). Endemic species: *Pachypodium bispinosum*, *P. succulentum* and *Encephalartos trispinosus*.

Fauna Greater kudu *Tragelaphus strepsiceros* (approximately 1,000) and lesser kudu *Tragelaphus imberbis*, common duiker *Sylvicapra grimmia* (approximately 400) and buffalo *Syncerus caffer* (approximately 50), have been introduced. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning All a natural area

Disturbances or Deficiencies Exotic species *Opuntia aurantiaca* and *O. ficus-indica*.

Visitor Facilities There are no visitor facilities; the reserve is not open to the public.
Numbers: nil. **Potential:** unknown.

Scientific Research Studies of the ecology of the kudu and small mammals, studies of vegetation and soils

Special Scientific Facilities Herbarium (500 specimens)

Principal Reference Material

- ° Allen-Rowlandson, T.S. (n.d.). The spatial organization of the greater kudu (*Tragelaphus strepsiceros*) in the Andries Vosloo Kudu Reserve. M.Sc. Thesis, Rhodes University.
- ° Palmer, A.R. (1981). A study of the vegetation of the Andries Vosloo Kudu Reserve. M.Sc. Thesis, Rhodes University.

Staff Three senior staff and 27 labourers

Budget R44,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Andries Vosloo Kudu Reserve, Private Bag 1006, Grahamstown, 6140.

Date May 1982

COMMANDO DRIFT NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1978. Decree number: Proclamation 172 of 1980

Geographical Location 50km from Cradock in Cape Province. 32°02'-32°12'S, 25°59'-26°05'E.

Altitude 1,010-1,384m (Rooiberg)

Area 5,983ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features The reserve is comprised of a large dolerite massif, grassy plains, low dolerite ridges, Tarka River and Commando Drift Dam. Soils are shallow lithosols and deep structureless alluvia. Annual average temperature range minimum: 10°C, maximum: 24°C. Annual rainfall 343mm falling mainly in summer (October-March).

Vegetation Vegetation types consist of the False Karroid Broken Veld (Veld Type 37).
Grasses: *Enneapogon scoparius*, *Aristida congesta*, *Merxmuellera disticha*, *Cymbopogon* spp., *Themeda triandra*, *Eragrostis* spp. Herbs include the following genera: *Pentzia*, *Eriocephalus*, *Chrysocoma* and *Felicia*. Shrubs include the genera: *Rhus*, *Diospyros* and *Acacia karroo*.

IUCN Directory of Afrotropical Protected Areas

Fauna Black wildebeest *Connochaetes gnou* (O)(7), springbok *Antidorcas marsupialis* (20), and also a large waterfowl population. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning 50ha recreation area and 5,933ha natural area

Disturbances or Deficiencies Water level fluctuation zone and invasive weeds pose a problem.

Visitor Facilities Facilities include ablution blocks and camp sites, some angling is permitted. Numbers: 1,000 per annum. Potential: 13,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various internal departmental reports

Staff One senior staff and 10 labourers

Budget R10,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Commando Drift Nature Reserve, PO Box 459, Cradock, 5880.

Date June 1982

ROLFONTEIN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 1970. In the process of being proclaimed

Geographical Location 14km from Petrusville in Cape Province. 30°00'-30°05'S, 24°42'-24°48'E

Altitude 1,160-1,370m (Renosterberg)

Area 4,749ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features There are numerous dolerite hills, interspersed with grassy plains. The reserve is situated on the banks of the P.K. le Roux Dam. The Orange River flows through the area. Soils consist of shallow lithosols of dolerite and sandstone origin. Annual average temperature range minimum: 10°C, maximum: 23°C. Annual rainfall 440mm, falling mainly in summer (October-February).

Vegetation Vegetation types consist of the False Upper Karoo (Veld Type 36).
Grasses: *Cymbopogon* spp., *Themeda triandra*, *Heteropogon contortus*, *Eragrostis* spp.,
and *Aristida* spp..
Herbs: *Pentzia* spp., *Chrysocoma tenuifolia*, and *Eriocephalus* spp.
Shrubs: *Rhus* spp., *Acacia karroo*, and *Diospyros* spp..

Fauna Red hartebeest *Alcelaphus buselaphus* (50), black wildebeest *Connochaetes gnou* (O)
(200), mountain reedbuck *Redunca fulvorufula* (600), Burchell's zebra *Equus burchelli* (50),
gemsbok *Oryx gazella* (50), and eland *Taurotragus oryx* (200). Threatened species:
cheetah *Acinonyx jubatus* (T) and brown hyena *Hyaena brunnea* (T), both introduced.

Conservation Management A management plan exists for this area.

Zoning All a natural area

Disturbances or Deficiencies Water level fluctuation zone and invasive plants pose a problem

Visitor Facilities Facilities include day trips and hiking trails. Numbers: 3,650 per annum.

Scientific Research Total floristic survey, small mammal survey, and fisheries research

Special Scientific Facilities Douglas Hey Limnological Research Station

Principal Reference Material

° Jooste, J.F. (1980). A study of the phytosociology and small mammals of the Rolfontein
Nature Reserve, Cape Province. M.Sc. thesis. Stellenbosch University.

Staff Two senior staff and 15 labourers

Budget R20,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Rolfontein Nature Reserve, PO
Box 23, Vanderkloof, 8771.

Date June 1982

GOUKAMMA NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1960. Not yet formally proclaimed as a nature reserve

Geographical Location 20km from Knysna in Cape Province, 34°01'-34°05'S, 22°50'-22°59'E

Altitude 0-205m

Area 2,230ha

Land Tenure Government. Administered by the Department of Nature and Environmental
Conservation, Cape Provincial Administration.

Physical Features High undulating coastal sand dunes cover the greater part of the reserve and reach a height of 205m above sea level. The reserve borders on the sea over a distance of 12km, but the intertidal zone (a sandy beach with some limestone outcrops and low cliffs) is not yet included in the reserve. Groenvlei, a coastal lake 3.7km long and 0.9km wide with a surface area of 250ha, is almost entirely included in the reserve. It has no outlet to the sea and the water is brackish. The lake margin is fringed by dense *Phragmites* and *Typha* beds. The small Goukamma estuary (20ha) and the lower portion of the Goukamma River is also included in the reserve. Annual average temperature range minimum: 13°C, maximum: 20°C. Annual rainfall around 700mm, falling all year round.

Vegetation Vegetation types consist of Coastal Macchia (Veld Type 47). Dune fynbos is the dominant vegetation in the reserve and various (from mid-high 1-2m) to low (less than 50cm)) sclerophyllous shrublands can be found on an old stabilized dune field. Dominants include small-leaved shrubs such as *Agathosma muirii*, *Metalsia muricata*, *Erica fourcadei*, and *Passerina vulgaris* as well as broad-leaved shrubs such as *Pterocelastrus tricuspidatus*, *Cassine aethiopica*, *C. peragua*, *Rhus* spp. and *Olea exasperata*. Other smaller shrublets include: *Erica imbricata*, *Phyllica* spp., *Muraltia* spp., *Anthospermum aethiopicum*, *Helichrysum ericaefolium*, *Erica* spp., and *Disparago kraussii*. A herb layer of *Ficinia* spp., *Restio eleocharis*, *Tetraria* spp., and grasses is also present. Various communities have been recognized in this vegetation including a *Helichrysum teretifolium*-*Metalsia muricata* community and *Tetraria cuspidata*-*Restio eleocharis* community. Closed evergreen sclerophyllous forest (3-6m) tall with dominant *Sideroxylon inerme* also occurs. Other co-dominant shrubs and trees include *Euclea racemosa*, *Cassine aethiopica* and *Chionanthus foveolatus* together with smaller shrubs such as *Olea exasperata*, *Diospyros whyteana* and *Carissa bispinosa*, and climbers such as *Rhoicissus digitata*. On the littoral dunes grow *Ammophila arenaria* (an introduced alien), *Arctotheca populifolia* and *Scaevola plumieri*. Extensive marshlands occur along the Groenvlei with a community along the edges in which the sedge *Cladium mariscus* is dominant to a dense *Typha capensis*-*Phragmites australis* community in deeper water and *Scirpus littoralis* in still deeper water. Submerged aquatic plants include *Potamogeton pectinatus* and *Chara* spp.. Economically important species: none. Endemic species: none.

Fauna Eland *Taurotragus oryx* have been re-introduced and grysbok *Raphicerus melanotis*, bushbuck *Tragelaphus scriptus*, bushpig *Potamochoerus porcus*, and vervet monkey *Cercopithecus aethiops* occur naturally. More than 117 bird species have been recorded. At least 27 reptile species (one tortoise, one terrapin, 10 lizard and 15 snake species) and eight amphibians occur. Ten estuarine fish species have been recorded in Goukamma Estuary and six species in Groenvlei of which four species are introduced aliens. A feasibility study has been conducted on the possible reintroduction of hippopotamus *Hippopotamus amphibius*. Threatened species: Blue duiker *Cephalophus monticola* and bontebok *Damaliscus dorcas dorcas* (introduced outside its natural range).

Conservation Management A management plan exists for this area.

Zoning The greater part of the reserve is zoned as a natural area and facilities are provided only at the Groenvlei Estuary. Powerboats are not permitted on Groenvlei, but angling is permitted in all waters.

Disturbances or Deficiencies There is limited control over access to Groenvlei by guests at the caravan park and hotel, which border on the lake. Littering is a problem at Groenvlei, Goukamma River and along the beach. Infestation of alien plant invaders, particularly *Acacia cyclops* occurs.

Visitor Facilities Facilities include picnic sites and fire places at Goukamma Estuary, 48km of footpaths, and angling in the sea, Goukamma River and Groenvlei. The reserve is open for day use only. Numbers: 3,000 per annum. Potential: maximum attained.

Scientific Research A detailed study of the plant communities has been completed and studies of the bird life of Groenvlei is ongoing.

Special Scientific Facilities Herbarium collection

Principal Reference Material

° Van der Merwe, C.V. (1976). Plantekologiese aspekte en bestuurs probleme van die Goukammannatuurreservaat. Unpublished M.Sc. Thesis, University of Pretoria.

Staff Two nature conservators and 18 labourers

Budget R30,800 per annum (excluding salaries, transport and major capital works)

Local Park or Reserve Administration Department of Nature and Environmental Conservation, Southern Cape Regional Office, Private Bag 6546, George, 6530.

Date September 1983

VROLIJKHEID NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.07 (Karoo)

Legal Protection Total

Date Established 1957. Decree number: Proclamation 409 of 10 December 1976

Geographical Location 14km from Robertson in Cape Province. 33°54'-33°57'S, 19°52'-19°57'E.

Altitude 200m-635m (Elandsberg)

Area 1,827ha

Land Tenure Government. Administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features Topography is rugged and hilly, with only small seasonal watercourses. The Kiesies River flows along the western boundary of the reserve over a distance of 1.5km. Soils derived from weathering of shales of the Bokkeveld Group. Annual average temperature range minimum: 12°C, maximum: 21°C. Annual rainfall +/-250mm, falling mainly in winter (March-September).

Vegetation Vegetation types consist of the Karroid Broken Veld (Veld Type 26) and Mountain Rhenosterbosveld (Veld Type 43). Karroid vegetation occurs over the greater part of the reserve with rhenosterbosveld communities on some of the higher hills. The karroid communities are low (less than 50cm high) open to sparse shrublands with a high proportion of shrubby succulents and dominated by *Euphorbia mauritanica*, *Pentzia incana* and various mesems, e.g. *Ruschia* and *Drosanthemum* species with scattered taller shrubs such as *Rhus undulata*. *Acacia karroo* grows along the seasonal water courses. Economically important species: none. Endemic species: none.

Fauna The fauna of the reserve has been surveyed intensively. Forty species of mammals, 140 bird species, 21 reptile species (11 snakes, seven lizards, two tortoise, and one terrapin species) and eight amphibian species have been recorded. Springbok *Antidorcas marsupialis* and gemsbok *Oryx gazella* have been introduced but are outside their historic natural range.

Smaller antelope are steenbok *Raphicerus campestris*, grysbok *Raphicerus melanotis*, common duiker *Sylvicapra grimmia*, klipspringer *Oreotragus oreotragus*, and grey rhebok *Pelea capreolus*. The fish *Barbus burchelli* (R) occurs in the Kiesies River. Threatened species: antbear *Orycteropus afer* and honey badger *Mellivora capensis* are occasional visitors.

Conservation Management No management plan exists for this area.

Zoning The greater part of the area (1,700ha) is managed as a natural area

Disturbances or Deficiencies Eroded areas are being reclaimed

Visitor Facilities Facilities include accommodation with sleeping quarters, kitchen and ablution facilities available for groups. Reserve open for day use only. Numbers: 150 per annum. Potential: undetermined.

Scientific Research None in the reserve. Research is undertaken on problem animal control at the Vrolijkheid Research Station.

Special Scientific Facilities Laboratory and cages for laboratory animals at Vrolijkheid Research Station. Herbarium collection of plants of the reserve.

Principal Reference Material

- ° Stuart, C.T., Palmer, N.G. and Munnik, B.M. (1978). A preliminary report on the vertebrate fauna of the Cape Provincial Reserves. Cape Department of Nature and Environmental Conservation Research Report 1978: Mammals.
- ° Van der Merwe, C.V. (1977). Plantegroei-beskrywing van die Vrolijkheid-natuur-bewaringstasie. Unpublished report, Department of Nature and Environmental Conservation.

Staff Staff of the Vrolijkheid Research Station periodically undertake work in the reserve

Budget No separate budget for the reserve

Local Park or Reserve Administration The Officer-in-Charge, Vrolijkheid Problem Animal Control Research Station, Private Bag 614, Robertson, 6705.

Date July 1984

THOMAS BAINES NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total. 753ha government-owned and 250ha rented from the Grahamstown municipality. Whole area proclaimed.

Date Established 1963. Proclamation 294 of 1980

Geographical Location 12km from Grahamstown in Cape Province. 33°22'-33°25'S, 26°29'-26°31'E

Altitude 300-500m

Area 1,003ha

Land Tenure 753ha Government and 250ha Local Government, but both administered by the Department of Nature and Environmental Conservation, Cape Provincial Administration.

Physical Features The reserve is the immediate catchment area of the two water storage reservoirs supplying the town of Grahamstown with domestic water. The relief is gently undulating hills, well covered with vegetation. Water surfaces of Settlers and Howisons Poort reservoirs are included in the reserve as well as Kariega and Palmiet Rivers. The clay soils are derived from Bokkeveld shales and quartzitic soils from Witteberg quartzites. Annual average temperature range minimum: 12°C, maximum: 21°C. Annual rainfall 740mm, falling mainly in summer (August-October and February-March).

Vegetation Vegetation types consist of the Valley Bushveld (Veld Type 23). The vegetation of the reserve can be divided into four distinct units: (a) Sclerophyllus scrub with *Restio* spp. and *Erica* spp.; (b) Pockets of forest with *Podocarpus latifolius* and *Schotia latifolia*; (c) Bushveld dominated by *Scutia myrtina*, and (d) Riparian vegetation. Economically important species: *Podocarpus latifolius*. Endemic species: *Oldenburgia arbuscula*.

Fauna Eland *Taurotragus oryx* (20), buffalo *Syncerus caffer* (20), bushbuck *Tragelaphus scriptus* (30), common duiker *Sylvicapra grimmia* (35), mountain reedbuck *Redunca fulvorufula* (20), black wildebeest *Connochaetes gnou* (O) (5), and square-lipped rhinoceros *Ceratotherium simum* (3). Threatened species: bontebok *Damaliscus dorcas dorcas* (O) (17).

Conservation Management A management plan exists for this area. There are *ad hoc* environmental education programmes for school children run by the Albany Museum.

Zoning 20ha recreation and 977ha natural area

Disturbances or Deficiencies Control of invasives *Opuntia aurantiaca* and *Acacia longifolia*.

Visitor Facilities Facilities include boating, picnicking and toilets. Numbers: 3,600 per annum. Potential: 4,800 per annum.

Scientific Research Biocontrol of alien invasive *Opuntia aurantiaca*

Special Scientific Facilities None

Principal Reference Material

- * Jessop, J.P. and Jacot-Guillarmod, A. (1969). The vegetation of the Thomas Baines Nature Reserve. *Journal of South African Botany* 35: 367-392.
- * Various unpublished departmental reports.

Staff Two nature conservators and ten labourers

Budget R20,000 per annum (excluding salaries)

Local Park or Reserve Administration The Officer-in-Charge, Thomas Baines Nature Reserve, Private Bag 1006, Grahamstown, 6140.

Date October 1983

CAPE OF GOOD HOPE NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1939. Administrator's Notice 86

Geographical Location 11km from Simonstown in Cape Province. 34°12'–34°22'S, 18°22'–18°30'E

Altitude Sea level–366m (Paulsberg – 366m and Vasco da Gama Peak – 266m)

Area 7,675ha

Land Tenure Owned and administered by the Cape Divisional Council

Physical Features The reserve occupies the extreme tip of the Cape Peninsula, with 250m sea cliffs at Cape Point. The east and north is hilly and there is a central plateau sloping from east to west. The shore is rocky with sandy beaches and some dunes. The reserve extends only to the high water mark at present, but the varied 40km coastline is of such conservation importance that the creation of a marine reserve along the coast should be regarded as being of the highest priority. A small lake in the north and a brackish lagoon running parallel to the coast. The lake is fed by a spring and is permanent. The reserve borders on a 40km coastline, which is generally rocky with few sandy beaches. Spectacular cliffs are present on the False Bay coast and at Cape Point. The soils are nutrient poor, acid, sandy lithosols, with an average pH of 3.5 to 5. Stabilized and calcified dunes occur in small localized areas. These support a specialized fynbos community. Annual average temperature range minimum: 10°C, maximum: 20°C. Annual rainfall 300–700mm, falling mainly in winter (April–September), but some rain recorded every month.

Vegetation Vegetation types consist of Strandveld (Veld Type 34) and Macchia (Veld Type 69). It falls into four main groups: (a) Coastal fynbos consisting of an open coast-shelf kapok-bush *Eriocephalus* type (260ha), a scrubby dune type of *Metalasia muricata*, *Leucadendron coniferum*, *Olea exasperata* and *Thamnochortus erectus* (800ha), the *Coleonema* type (97ha), and the marshy *Helichrysum-Scirpus* type (22ha); (b) Inland fynbos comprising an upland mixed type of open dwarf scrub dominated by *Aspalathus*, *Metalasia*, *Elegia*, *Salaxis*, *Leucospermum* and *Passerina* sp. (2,544ha), a tall type mostly of *Protea lepidocarpodendron* (285ha), a *P. nitida* pseudo-savanna type (23ha), a plateau type of Restionaceae and *Leucadendron laeololum* (1,260ha), another restionaceous tussock-marsh type (1,275ha), a *Berzelia-Osmitopsis* seepage steppe type (113ha), and a *Psoralea* pseudo-savanna type (7ha); (c) Tall sclerophyllous scrub of *Sideroxylon* (165ha) and a *Maurocenia-Chionanthus* spp., association; and (d) Thickets of introduced *Acacia* and *Pinus* spp.. Economically important species: numerous species occur which are of importance for the cut flower trade but no utilisation of flora is allowed in the reserve. The wood of exotic plant invaders such as *Acacia cyclops* is sold for fire wood. Endemic species: at least 12 plant species and a number of subspecies and varieties are endemic to the reserve: *Pterygodium connivens*, *Gladiolus vigilans*, *Homoglossum merianellum* var. *aureum*, *Bobartia gladiata* major, *Restio dodii* var. *dodii*, *Heliophila cinerea*, *Ruschia promontorii*, *Staavia dodii*, *Erica blanchiana*, *E. capensis*, *E. clavispala*, *E. eburnea*, *E. fontana*, *Leucadendron floridum* and *L. macowanii*. Many other Cape Peninsula endemics occur in the reserve as well as other rare plant species such as *Mimetus hirta*, *Witsenia maura* and *Audouinia capitata*.

Fauna Fauna include eland *Taurotragus oryx* (33) and red hartebeest *Alcelaphus buselaphus* (30) have been reintroduced and a number of other herbivores, which probably did not occur in the area originally, have also been introduced, notably Hartmann's mountain zebra *Equus zebra hartmannae* (T) (33), bontebok *Damaliscus dorcas dorcas* (O) (110), and

springbok *Antidorcas marsupialis* (12). Smaller antelope such as grey rhebok *Pelea capreolus*, steenbok *Raphicerus campestris*, and grysbok *R. melanotis* also occur in small numbers as well as 50 to 60 ostriches *Struthio camelus*. About 15 species of amphibians and 38 species of reptiles (19 snake, 15 lizard and three tortoise species) are known to occur on the Cape Peninsula and the majority of these occur on the reserve. Threatened species: bontebok *Damaliscus dorcas dorcas* and Cape platanna *Xenopus gilli* (V).

Conservation Management A management plan exists for this area.

Zoning The greater part of the reserve is managed as a Natural Area and sites for high density recreational use have been developed at five areas along the coast.

Disturbances or Deficiencies Extensive thickets of alien woody plant invaders are present in the reserve, particularly *Acacia cyclops*, *A. longifolia*, and *A. saligna*. A costly programme to eradicate these invaders has been in progress for more than ten years.

Visitor Facilities Day use only is permitted. Picnic sites with ablution blocks and fire places have been provided at five sites along the coast and Cape Point is a popular look-out point. There is a restaurant and small visitor centre in the reserve. Visitors are allowed to walk over most the reserve and natural trails are under consideration. Facilities for launching boats are available and angling and skindiving are permitted. Numbers: 350,000 per annum. Potential: undetermined.

Scientific Research Research projects have been completed on habitat utilisation and feeding preferences of bontebok *Damaliscus dorcas dorcas* and studies are in progress on threatened plant species, the platanna *Xenopus gilli* and the utilisation of fynbos plant species by birds.

Special Scientific Facilities A field study centre has been established for use by the University of Cape Town.

Principal Reference Material

- ° Millar, J.C.F. (1970). The Cape of Good Hope Nature Reserve: A Report and Management Plan. Cyclostyled.
- ° Taylor, H.C. (1969). A vegetation survey of the Cape of Good Hope Nature Reserve. M.Sc. thesis, University of Cape Town.
- ° Taylor, H.C. (1970). Recommendations for the Cape of Good Hope Nature Reserve. Typed manuscript.

Staff Chief Warden, senior ranger, three rangers, receptionist/secretary, and 96 labourers

Budget R400,000 per annum (including salaries)

Local Park or Reserve Administration The Chief Warden, Cape of Good Hope Nature Reserve, PO Box 62, Simonstown, 7995.

Date May 1982

TABLE MOUNTAIN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1963. Notice No. 24 dated 3 July 1964 in Provincial Gazette 3246

Geographical Location In the immediate vicinity of Cape Town, Cape Province. 33°55'-34°01'S, 18°21'-18°27'E.

Altitude 100-1,087m (Table Mountain, with the highest point at Maclear's Beacon)

Area 2,904ha

Land Tenure Owned and administered by the Cape Town Municipality

Physical Features The reserve includes much of Table Mountain, which forms the northern part of the Cape Peninsula mountain chain. The flat summit region of the mountain, known as the Upper Plateau, is bounded on the northern edge by almost sheer cliffs. On the southern side of the summit, the terrain slopes down gradually to form the Lower Plateau, directly south of which is a broad valley. Devil's Peak and Lion's Head, two peaks north of the summit, and Signal Hill are also included in the reserve. An interlinking cave system on the southern part of the Lower Plateau is of particular interest. Disa Stream feeds a number of reservoirs on the Lower Plateau; no other streams of importance. Mainly shallow, nutrient-poor, acidic soils derived from sandstone soils of the Table Mountain Series. There are also soils derived from granitic outcrops and shale bands. Annual average temperature range minimum: 7°C, maximum: 23°C. Annual rainfall 475-1,985mm, depending on the locality since mist from the south-easterly winds provides appreciable additional moisture on the summit plateau in summer. Rainfall is mainly in winter (May-September).

Vegetation Vegetation types consist of the Macchia (Veld Type 69); fynbos vegetation of the Cape Floral Kingdom occurs over most of the reserve. Patches of relict forest are found in the deeper valleys and gorges. Fynbos: relatively low, dense, drought-resistant sclerophyllous vegetation, typically lacking in dominant species and showing great diversity and richness. Some 1,470 plant species are known from the Table Mountain area. Certain families of plants are characteristic - Ericaceae, Proteaceae (broad-leaved) and Restionaceae (in tussocks). Typical fynbos species include *Protea nitida*, *P. lepidocarpodendron*, *Leucadendron salignum*, *Erica baccans*, *E. plukenetii*, *E. hispidula*, *Metasias muricata*, and *Thamnochortus dichotomus*. Forest: 12-25m in height, broad-leaved, evergreen. Important species include *Kiggelaria africana*, *Rapanea melanophloeos*, *Diospyros whyteana*, *Virgilia oroboides*, *Curtisia dentata*, *Podocarpus latifolius*, *Hartogia schinoides*, and *Olea capensis*. Economically important species: None of significance. Endemic species: more than 100 plant species are endemic to the Cape Peninsula and at least three species, *Erica pilulifera*, *E. abietina*, and *Staavia glutinosa*, are endemic to Table Mountain. More than 50 rare and threatened plants also occur in the reserve. These include *Staavia dregeana*, *Leucadendron argenteum*, *Thamnochortus nutans*, and *Satyrium foliosum*. Conservation action has been taken to safeguard these species.

Fauna Because much of the reserve's original fauna has been exterminated, the species diversity (especially larger mammals) is today rather poor. However, there are still rock dassie *Procavia capensis*, chacma baboon *Papio ursinus*, grysbok *Raphicerus melanotis*, caracal *Felis caracal*, genets *Genetta genetta*, mongoose, porcupines and rodents, many reptiles and birds, including the black eagle *Aquila verreauxii*. The Wynberg Caves have an interesting and unique fauna of their own, including the rare *Peripatopsis alba*, certain arachnida, myriopoda, frogs, bats, pseudoscorpions, and cave crickets. Threatened species: the ghost frog *Heleophryne rosei* is endemic to Table Mountain. *Peripatopsis alba* is only known from caves on the mountain and *P. leonina* has only been recorded from the slopes of Signal Hill and may be extinct.

Conservation Management A management plan exists for this area.

Zoning Areas of high and low density tourism

Disturbances or Deficiencies As the reserve borders on the city of Cape Town, tremendous human pressure in recent years has resulted in degradation and erosion in the more heavily utilised areas of the mountain. Uncontrolled fires have greatly modified the vegetation

structure and composition. Invasion by introduced alien plant species presents a serious threat to the reserve ecosystems, and eradication programmes to control these invaders account for a large part of the annual budget. Overgrazing by the alien Himalayan tahr *Hemitragus jemlahicus*, introduced accidentally 50 years ago, caused severe erosion. A culling programme has drastically reduced numbers.

Visitor Facilities 2,065,000 people visit per annum. Table Mountain can be considered among South Africa's foremost tourist attractions. A spectacular aerial cableway operates from the 350m level to the summit, where a restaurant, toilets and viewing areas are provided. Only recreational activities such as hiking, rock climbing and picnicking are permitted and there is an extensive path network throughout the reserve. No overnight camping is allowed. There are magnificent views from the summit of the City of Cape Town and its suburbs, the Cape Peninsula (471 sq.km in extent), the Cape Flats and the mountains of the south-western Cape and scenic drives encircle the Table Mountain complex.

Scientific Research Extensive research has been carried out on natural flora with regard to fire control, invasive plants, natural regeneration, population biology, natural succession and plant communities.

Special Scientific Facilities None

Principal Reference Material

- ° Adamson, R.S. and Salter, T.M. (1950). *Flora of the Cape Peninsula*. Juta and Co., Cape Town.
- ° Hall, A.V. and Ashton, E.R. (1983). Threatened plants of the Cape Peninsula. Bolus Herbarium, University of Cape Town.
- ° Hey, D. (1978). Report on the Future Control and Management of the Table Mountain and Southern Peninsula Mountain Chain. Pretoria, Government Printer.
- ° Moll, E.J. and Campbell, B.M. (1976). Table Mountain - A Conservation and Management Report. Department of Botany, University of Cape Town.

Staff Staff of the Parks and Forests Branch: One Principal Parks and Forests Officer, one Senior Parks and Forests Officer, two foresters, three law enforcement officers, six foremen and a number of radio operators, clerks, gangers, drivers, handymen, attendants, and labourers

Budget R644,330 per annum (including salaries)

Local Park or Reserve Administration The Director: Parks and Forests, City Engineer's Department, PO Box 1694, Cape Town, 8000.

Date December 1983

LADISMITH-KLEIN KAROO NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.6 (Cape Sclerophyll)

Legal Protection Total

Date Established 2 April 1974. Decree number: Provincial Notice 111 of 1974 and name changed by Provincial Notice 697 of 1983 (formerly known as Noukloof Nature Reserve)

Geographical Location 3km from Ladismith in Cape Province, 33°30'-33°34'S, 21°11'-21°16'E.

Altitude 394-760m (Ladismith Hill)

Area 2,766ha

Land Tenure Owned and administered by the Municipality of Ladismith

Physical Features Topography is hilly with prominent east-west trending ridges of quartzites of the Witteberg Group and a level plain over shales of the Bokkeveld Group in the southern part of the reserve. There are only small seasonal watercourses and shallow, stony soils on the hills and deeper clayey soils on the flats. Annual average temperature range minimum: 12°C, maximum: 24°C. Annual rainfall about 250mm, falling mainly in spring and autumn (March-April and August-September).

Vegetation Vegetation types consist of Succulent Mountain Scrub (Veld Type 25) and very limited areas of Karroid Broken Veld (Veld Type 26) and Mountain Rhenosterbosveld (Veld Type 43). Succulent Mountain Scrub, a 1-2m high, open succulent shrubland with a 20-50cm high sparse to mid-dense shrub understorey, occurs on the lower northern and southern slopes. Dominant species include *Portulacaria afra*, *Euclea undulata*, *Carissa haematocarpa*, *Rhigozum obovatum*, *Rhus lucida* and *Nymania capensis*, with smaller shrublets such as *Euphorbia mauritanica*, *Zygophyllum morskana*, *Pteronia incana* and succulent shrubby mesems, such as *Ruschia* spp.. Mountain Rhenosterbosveld occurs on the higher ridge tops on both the southerly and northern aspects. It is typically a 1m tall, closed, small-leaved shrubland with *Elytropappus rhinocerotis*, *Relhania squarrosa*, *Pentzia incana*, *Passerina obtusifolia*, *Cliffortia micrantha*, *Restio fruticosus*, *Eriocephalus africanus*, *Euryops rehmannii*, and *Polygala bracteolata*. Karroid Broken Veld communities, typically 50cm high, mid-dense succulent shrublands, occur on the lower lying flat areas. Dominant species include *Pteronia pallens*, *Galenia africana* and succulent shrubby mesems, such as *Ruschia* and *Drosanthemum* spp..

Fauna Eland *Taurotragus oryx* (27) and springbok *Antidorcas marsupialis* (40) have been reintroduced. The only other smaller antelope are common duiker *Sylvicapra grimmia* and steenbok *Raphicerus campestris*. Threatened species: none.

Conservation Management No management plan exists for this area.

Zoning The entire reserve is managed as a natural area.

Disturbances or Deficiencies None, except that a major public road passes through the reserve.

Visitor Facilities None. Numbers: 600 per annum. Potential: unknown.

Scientific Research A study of the vegetation, which will result in a classification of the plant communities, is being undertaken

Special Scientific Facilities None

Principal Reference Material

* Levyns, M.R. (1950). The relations of the Cape and Karoo floras near Ladismith, Cape. *Transactions of the Royal Society of South Africa* 32: 235-246.

Staff No permanent staff. Municipal personnel periodically undertake work in the reserve

Budget R10,000 per annum (including salaries)

Local Park or Reserve Administration The Town Clerk, Municipality of Ladismith, PO Box 30, Ladismith, 6885.

Date July 1984

SPITSKOP NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 30 October 1967. Provincial Notice 211

Geographical Location 12km from Upington in Cape Province. 28°19'-28°24'S, 21°08'-21°12'E.

Altitude 850-923m (There are only two prominent hills on a level plain.)

Area 2,740ha

Land Tenure Owned and administered by the Municipality of Upington.

Physical Features A level featureless plain with two small hills, with stony soils. Annual rainfall around 180mm, falling mainly in summer, with a peak in February-March. Minimum: 11°C, maximum: 27°C.

Vegetation Vegetation types consist of the Orange River Broken Veld (Veld Type 32). *Rhigozum trichotomum* veld, typically a 1m tall sparse shrubland with *Boscia albitrunca*, *Acacia mellifera* ssp. *detinens*, and *Parkinsonia africana* with smaller karroid shrublets and a sparse cover of grasses, e.g. *Stipagrostis obtusa* and *S. ciliata*.

Fauna Gemsbok *Oryx gazella* (27), springbok *Antidorcas marsupialis* (270), eland *Taurotragus oryx* (12), and Burchell's zebra *Equus burchelli* (10) have been reintroduced. Also present are steenbok *Raphicerus campestris*, antbear *Orycteropus afer*, and ostrich *Struthio camelus*. Endemic species: none. Threatened species: none

Conservation Management No management plan exists for this area.

Zoning The greater part of the reserve is managed as a natural area (2,300ha).

Disturbances or Deficiencies None

Visitor Facilities The reserve is open for day use only. Picnic sites and 30km of gravel road for game viewing. There is a look-out point with a telescope on the top of Spitskop. Numbers: 3,600 per annum. Potential: undetermined.

Scientific Research None

Special Scientific Facilities None

Prncipal Reference Material None of great significance

Staff One nature conservator and two gate guards

Budget R76,500 per annum (including salaries)

Local Park or Reserve Administration The Town Clerk, Municipality of Upington, Private Bag X6003, Upington, 8800.

Date July 1984

AKKERENDAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 12 September 1962 by Provincial Notice 153 of 1962

Geographical Location In Cape Province two km from Calvinia. 31°23'-31°28'S, 19°44'-19°48'E.

Altitude 1,000-1,580m (Hantamsberg Plateau)

Area 2,301ha

Land Tenure Owned and administered by the Calvinia Municipality

Physical Features The Hantamsberg is a flat-topped inselberg 100km in extent which forms a northern outlier of the Great Escarpment. The flat top of the mountain is formed by a thick sill of dolerite which lies on top of the more erodable shales in the Ecce Group. Vertical cliffs are formed by the dolerite around the edge of the mountain. The flat-topped form of the mountain and vertical cliffs is a striking landform type. The reserve lies at the southern side of the mountain and extends from the edge of the plateau to the level plain at the base. There are only small streams and a reservoir. Soils are derived from shales of the Ecce Group (Karoo System). Annual rainfall is 100-300mm traditionally between summer and winter, and the annual average temperature between 10°C-23°C.

Vegetation Vegetation types comprise Western Mountain Karoo (Veld Type 28) and Mountain Rhenosterbosveld (Veld Type 43)(Acocks 1975). A form of Mountain Rhenosterbosveld with *Elytropappus rhinocerotis* occurs in the plateaux and upper slopes on dolerite. Low shrublands with *Merxmüllera arundinacea*, *Pteronia incana*, *Euphorbia mauritanica*, *Eriocephalus* spp., and *Pentzia incana* occur on the mountain slopes. On the plains, dwarf succulent shrublands occur with *Eberlanzia ferox* dominant and some *Ruschia muricata*, *Cephalophyllum* spp., and *Galenia africana*. Small trees such as *Rhus lancea* and *Cliffortia arborea* also occur in small numbers. There are no economically important species of plants. Available records for endemic species of plants indicate that the Hantamsberg is an important centre of endemism. The following species have only been recorded from the Hantamsberg: *Hesperantha hantamensis*, *H. karrooica*, *H. oligantha*, *H. quadrangula*, *Diascia nitans*, *D. macrophylla*, *Sutera divaricata*, *S. stenopetala*, *Nemesia chrysolopha*, and *Zaluzianskya nemesioides*. A number of other rare plant species occur. The Hantamsberg is of great phytogeographical interest since it is an outlier with elements of the floras of the Roggeveld Mountains as well as of the Nieuwoudtville-Cedarberg area.

Fauna Mammals include: springbok *Antidorcas marsupialis* (approximately 200), and gemsbok *Oryx gazella* (approximately 16) which have been reintroduced to the reserve, and Hartmann's mountain zebra *Equus zebra hartmannae* (T) (approximately 4), black wildebeest *Connochaetes gnou* (O) (approximately 16), and blesbok *Damaliscus dorcas phillipsi* (6) have also been introduced although the reserve lies outside their historic natural range. Smaller antelope include grey rhebok *Pelea capreolus*, steenbok *Raphicerus campestris* and common duiker *Sylvicapra grimmia*. At least 25 reptile species (13 snakes, nine lizards and three tortoise species), and six frog species occur in this area, for example, the tent tortoise *Psammobates tentorius* and the south-western black spitting cobra *Naja nigricollis woodii*.

Conservation Management There is a management plan for the area.

Zoning The reserve is managed as a game park and serves as a catchment area for the water supply of Calvinia. A small area at Karee Dam has been developed as a picnic site.

Disturbances or Deficiencies The reserve is overstocked with larger herbivores and is grossly overgrazed to the extent that privately owned veld in the district is in a much better condition. Problems are encountered with poaching.

Visitor Facilities There are picnic sites for day use only, nature trails in the Hantam Mountains, and hotels and a caravan park in Calvinia. Numbers: approximately 6,000 per annum. Potential: unknown.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various internal departmental reports.

Staff One supervisor (part-time) and one labourer

Budget R19,200,00 per annum (including salaries)

Local Park or Reserve Administration The Town Clerk, Municipality of Calvinia, PO Box 28, Calvinia 8190.

Date 1984

GREYTON NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 13 May 1977. Provincial Notice 616

Geographical Location 1km from Greyton in Cape Province. 34°00'–34°03'S, 19°35'–19°41'E

Altitude 240–1,465m (Uitkykkop, Perdekop and Abdolskop, peaks of the Riviersonderend Mountains).

Area 2,220ha. Within the Riviersonderend Mountain Catchment Area (69,453ha).

Land Tenure Owned and administered by the Greyton Municipality.

Physical Features The reserve lies on the steep southern slopes of the Riviersonderend Mountains which form part of the Cape Folded Belt, an anticline of siliceous quartzites of the Table Mountain Group of Ordovician-Silurian age. Rugged peaks and deep ravines are present. Two small perennial streams originate in the reserve and flow in deep ravines. Soils are derived from weathering of sandstones and quartzites of the Table Mountain Group and are generally shallow, sandy, acid and low in nutrients. Annual average temperature range minimum: 8°C, maximum: 20°C. Annual rainfall 600–900mm, falling mainly in winter (April–September).

Vegetation Vegetation types consist of the Macchia (Veld Type 69); mountain fynbos communities, predominantly of a low restioid type occur over the greater part of the reserve. Taller Proteaceae such as *Protea repens*, *P. neriifolia* and *Protea nitida* occur mainly on the lower slopes. Other Proteaceae include *P. lorifolia* on the upper slopes, *P. nitida*, *P. coronata*, *P. cynaroides*, *Leucadendron microcephalum*, *L. salignum*, *L. laureolum* and *Leucospermum cuneiforme*. Economically important species: a number of species occur which are utilised as cut flowers in the wild flower trade, but no harvesting of flora is allowed in the reserve. Endemic species: no species of plants are known to be endemic to the reserve itself, but many species are endemic to the Riviersonderend Mountains, for example, *Endonema retzioides* and *E. lateriflora* of the endemic Cape family Penaeaceae.

Fauna Only smaller mammals occur, such as klipspringer *Oreotragus oreotragus*, grysbok *Raphicerus melanotis*, and grey rhebok *Pelea capreolus*. At least 25 reptile species (one tortoise, eight lizard and 16 snake species) and nine frog species are found in this area. Threatened species: none known.

Conservation Management No management plan exists for this area.

Zoning The greater part of the reserve is natural veld, which falls within a proclaimed Mountain Catchment Area. Only a small area has been disturbed and developed as a wild flower garden.

Disturbances or Deficiencies Severe infestations of alien plant invaders particularly *Hakea sericea* and *Pinus pinaster* occur, but clearing operations by the Directorate of Forestry are progressing well.

Visitor Facilities A hiking trail crosses the mountain between the villages of MacGregor and Greyton. No other facilities have been provided, but there is a municipal camping site near the boundary of the reserve. A mountain hut is being planned. Numbers: unknown. Potential: unknown.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None specific

Staff Municipal workers periodically undertake work in the reserve.

Budget R3,000 per annum by the Municipality, but thousands of Rands are spent by the Directorate of Forestry to control alien plant invaders.

Local Park or Reserve Administration The Town Clerk, Municipality of Greyton, PO Box 4, Greyton, 7233.

Date July 1984

SILVERMINE NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1965. Provincial Gazette 3291 and Provincial Notice 634 dated 5 July 1965

Geographical Location 30km from Cape Town in Cape Province. 34°03'–34°08'S, 18°22'–18°28'E.

Altitude 50–754m (Noordhoek Peak)

Area 2,150ha

Land Tenure Owned and administered by the Cape Town Municipality

Physical Features The reserve encompasses mountain peaks, slopes, extensive plateaux, and valleys. The Silvermine River flows in a small forested gorge through the central part of the reserve; it is joined by a tributary which has an impressive waterfall. The mountains in the eastern part include a number of caves, some of which penetrate deep into the mountainside. Magnificent views of the Cape Peninsula and the Atlantic and Indian Oceans can be obtained from many of the higher parts of the reserve. The soils are mainly shallow, nutrient-poor, and acidic. Annual average temperature range minimum: 5°C, maximum: 25°C. Annual rainfall 875–1,294mm falling mainly in winter (May–September).

Vegetation Vegetation types consist of the Macchia (Veld Type 69). Low forest vegetation is found in isolated patches, but mainly fynbos: a relatively low, diverse, dense, drought-resistant sclerophyllous vegetation. Certain plant families are characteristic – Ericaceae, Compositae, Proteaceae and Restionaceae. Typical species are *Erica imbricata*, *Mimetes fimbriifolius*, *Leucadendron conocarpodendron*, and *Thamnochortus dichotomus*. Low Forest: evergreen broad-leaved, includes *Phylla buxifolia*, *Podocarpus latifolius*, *Cunonia capensis*, *Rapanea melanophloeos* and *Tarchonanthus camphoratus*. Economically important species: None of significance. Endemic species: *E. limosa*, *Restio communis*, *E. urna-viridis*, *E. paludicola*, and *E. sociorum* are endemic to the Silvermine area. A number of threatened plants occur within the reserve such as *Witsenia maura*, *Homoglossum merianellum* var. *merianellum*, *Mimetes hirta*, and *Erica annectens*. Management plans have been drawn up to ensure the continued survival of such species.

Fauna Not many species of the original Cape Peninsula fauna are left, but there are still grey rhebok *Pelea capreolus*, grysbok *Raphicerus melanotis*, porcupine *Hystrix africaeustralis*, caracal *Felis caracal*.

Also a number of small mammals, reptiles, and amphibians. Threatened species: none known within the reserve.

Conservation Management A management plan exists for this area.

Zoning Areas of high and low density tourism

Disturbances or Deficiencies Minor alien plant infestations are present, but these are being rigorously controlled.

Visitor Facilities Picnic areas are accessible by a number of good roads. An extensive network of paths exists throughout the reserve. No overnight camping is permitted. Numbers: 80,000 per annum. Potential: 100,000 per annum.

Scientific Research Extensive research on the indigenous flora is carried out, especially with regard to fire control, population studies, control of invasive alien plants, natural regeneration and succession, and threatened species.

Special Scientific Facilities None

Principal Reference Material Nothing specifically on the Silvermine Reserve, but publications on the whole Cape Peninsula are applicable

Staff Staff of the Parks and Forests Branch, Cape Town Municipality: one Principal Parks and Forests Officer, one Senior Parks and Forests Officer, one forester, one law enforcement officer, two foremen, one clerk and a number of gangers, drivers, handymen, attendants, and labourers.

Budget R318,400 per annum (including salaries)

Local Park or Reserve Administration The Director of Parks and Forests, City Engineer's Department, PO Box 1694, Cape Town, 8000.

Date December 1983

PAARL MOUNTAIN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.6 (Cape Sclerophyll)

Legal Protection Total

Date Established On the 25 October 1963 the reserve was established as a National Monument by Government Notice 1616 under National Monuments Act, and on 13 May 1977 as a Local Nature Reserve by Provincial Notice 617 under Cape Nature Conservation Ordinance 19 of 1974.

Geographical Location 10km from Paarl in Cape Province. 33°41'–33°46'S, 18°54'–18°58'E.

Altitude 260–730m (Paarl Mountain)

Area 1,910ha

Land Tenure Owned and administered by the Municipality of Paarl

Physical Features Paarl mountain is a low dome-shaped granite inselberg 4,000ha in extent, which is completely surrounded by cultivated lands and urban areas. Numerous granite outcrops and rounded boulders are scattered over the reserve and the three large granite domes, Paarl Rock, Bretagne and Gordon's Rock, are prominent landscape features. All streams which drain the mountain are temporary, and the three larger streams have been dammed. The soils are derived from *in situ* weathering of granite and are generally clayey and low in nutrients. Annual average temperature range minimum: 12°C, maximum: 22°C. Annual rainfall about 1,000mm (range: 600 to 1,700mm/year) falling mainly in winter (May–August, with a peak in July).

Vegetation Vegetation types consist of the Macchia (Veld Type 68). A dense form of Cape fynbos about 2m tall with scattered small trees up to 4m tall as emergents. Small patches of evergreen forest occur in sheltered places and small trees are locally dominant on granite outcrops. Proteaceae, broad-leaved sclerophyllous shrubs, such as *Protea repens*, *P. burchellii* and *Leucadendron rubrum*, and a variety of fine-leaved shrubs form dense stands up to 2m tall over most of the reserve. An open forest of the rare silver tree, *Leucadendron argenteum*, is present in a local 10ha area. Small evergreen trees, which include *Protea nitida*, *Olea europaea africana* and *Maytenus oleoides*, occur predominately on granite outcrops. Economically important species: A *Cyclopia* sp. which is used for brewing tea, and *Restio* spp. used for making brooms. Some flowering plants, especially Proteaceae, occur and are utilised

commercially as cut flowers outside conservation areas. Harvesting of flora is prohibited in the reserve. Endemic species: *Leucospermum grandiflorum* and *Conophytum turrigerum* are near endemics, and other rare plants include *Leucadendron argenteum* and *Schizodium longipetalum*.

Fauna Most of the larger mammals which formerly occurred in this region have been exterminated, but smaller mammals are still present such as rock dassie *Procavia capensis*, grysbok *Raphicerus melanotis*, porcupine *Hystrix africaeaustralis*, and a few caracal *Felis caracal*. Re-introduction of certain species, such as grey rhebok *Pelea capreolus* will be considered in the future. A pair of black eagles *Aquila verreauxii* nest regularly in the reserve and occasional nesting by spotted dikkop *Burhinus capensis* has been reported. Threatened species: none.

Conservation Management Management guidelines have been drawn up but a formal management plan has only been partially completed.

Zoning Three zones are distinguished: the greater part of the reserve is zoned as a Natural Environment Area, (ca 1,800ha), the area around the granite domes is a General Outdoor Recreation Area and limited areas have been set aside as a wild flower garden and picnic areas.

Disturbances or Deficiencies The reserve is not fenced and vagrant dogs are a problem. Maintenance of existing waterworks results in some disturbance. Infestations of alien woody plant invaders, particularly Australian *Acacia* species, *Hakea sericea* and *Pinus pinaster*, presents a serious threat, but much success has been achieved with a programme of control. Problems have also been experienced with illegal establishment of vineyards on the Commonage adjoining the reserve, which is also part of a proclaimed National Monument. In spite of strong recommendations by the Reserve Advisory Council that this land should be incorporated into the reserve as a buffer zone, an Act of Parliament, the Paarl Mountain Amendment Act of 1984, has been passed which has localized the use of this land by farmers for agricultural purposes. The establishment of vineyards up to the boundary of the reserve would present a serious threat to the integrity of the natural ecosystems in the reserve, would mar the presently natural landscape, and would interfere with the management of the reserve.

Visitor Facilities The reserve is essentially for day-use only and no overnight accommodation is available. Limited overnight camping is allowed at a site on the periphery. Sport fishing is allowed in the reservoirs and picnic sites are provided. Numbers: about 4,200 vehicles per annum. Potential: undetermined.

Scientific Research Some studies have been done on fire ecology but there are no ongoing research projects.

Special Scientific Facilities None

Principal Reference Material A brochure and map of the reserve is available from the Municipality.

Staff One reserve manager, one horticulturist, and 18 labourers

Budget R134,000 per annum (including salaries)

Local Park or Reserve Administration The Town Clerk, Municipality of Paarl, PO Box 12, Paarl, 7622.

Date May 1982

MONT ROCHELLE NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 12 November 1982. Provincial Notice 671

Geographical Location 3km from Franschhoek in Cape Province. 33°52'–33°56'S, 19°08'–19°12'E.

Altitude 360–1,575m (Du Toitskop and Perdekop)

Area 1,759ha. The reserve borders on the Hottentotsholland Nature Reserve and falls within a proclaimed Mountain Catchment Area.

Land Tenure Owned and administered by the Franschhoek Municipality.

Physical Features The reserve lies in the mountains of the Cape Folded Belt which consists of sandstones and quartzites of the Table Mountain Group of Ordovician age. High mountain peaks and deep ravines characterise the area. The spectacular rugged mountain scenery is one of the reserve's most noteworthy features. The Du Toits River has its origin in the reserve and flows in a spectacular gorge. The soils are generally shallow, sandy, acid and low in nutrients, and derived from weathering of sandstones and quartzites, except locally on the lower slopes, where clayey soils occur over granite and shales. Annual average temperature range minimum: 8°C, maximum: 20°C. Annual rainfall 900–1,500mm falling mainly in winter (May–August).

Vegetation Vegetation types consist of the Macchia (Veld Type 69). Due to the rugged topography, a large number of habitats and a corresponding variety of mountain fynbos communities occur. The vegetation is typically less than 1m tall and dominated by small-leaved shrubs of the Ericaceae, Compositae and Leguminosae and grasslike Restionaceae, with tall emergent broad-leaved shrubs such as *Protea repens*, *P. laurifolia*, *Leucadendron rubrum*, *Leucospermum conocarpodendron*, and other Proteaceae. *Protea nitida* occur on rocky slopes and small trees such as *Maytenus oleoides* occur on rocky outcrops. Trees are, however, rare and occur mainly in sheltered situations such as along streams and in ravines where well-grown specimens of *Cunonia capensis*, *Ilex mitis*, and *Brabeium stellatifolium* may be found. The flora is exceptionally rich in species as is indicated by the fact that more than 1,500 species have been recorded in the adjoining 25,000ha Hottentotsholland Nature Reserve. Economically important species: many plant species occur which are utilised as cut flowers by the wild flower industry, particularly Proteaceae and Ericaceae but no harvesting of flora is allowed in the reserve. Endemic species: none known to be endemic to the reserve, but a number of species are endemic to the surrounding mountains and a number of rare species occur, for example *Serruria zeyheri*.

Fauna The mountains of the western Cape do not harbour a large variety of wildlife. All the larger antelope that formerly occurred in this region have disappeared, but smaller antelope such as klipspringer *Oreotragus oreotragus* and grysbok *Raphicerus melanotis* are commonly seen and grey rhebok *Pelea capreolus* occur. Chacma baboon *Papio ursinus* and rock dassie *Procavia capensis* are common. Smaller mammals, such as porcupine *Hystrix africaeaustralis* and Cape clawless otter *Aonyx capensis*, occur but are rarely seen. At least 28 reptile species (one tortoise, 15 snakes and 12 lizards), and 11 frog species occur in this area. Threatened species: leopard *Panthera pardus* (T) and honey badger *Mellivora capensis*.

Conservation Management No management plan exists for this area.

Zoning No management or zoning plan has yet been completed, but the greater part of the reserve is managed as a natural area as part of the Mountain Catchment Area.

Disturbances or Deficiencies Extensive infestations of alien plant invaders especially *Hakea sericea* and *Pinus pinaster*, occur but these are being eradicated. The public road through the reserve results in problems with littering and accidental fires.

Visitor Facilities A tarred road over the Franschhoek Pass passes through the middle of the reserve, but there are no facilities for visitors. Numbers: unknown. Potential: unknown.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material A brochure on the Boland Hiking Trail covers part of the reserve and is available from the National Hiking Way Board, Private Bag X447, Pretoria, 0001 South Africa.

Staff No staff have yet been appointed by the Municipality, but management (control of alien plant invaders and fire control) is undertaken by the Directorate of Forestry since the reserve forms part of a proclaimed Mountain Catchment Area.

Budget Several thousand Rand is spent per annum by the Directorate of Forestry on control of alien invaders and fire control.

Local Park or Reserve Administration The Town Clerk, Municipality of Franschhoek, PO Box 18, Franschhoek, 7690.

Date July 1984

FERNKLOOF NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 14 September 1971, Provincial Notice 391

Geographical Location Adjacent to Hermanus in Cape Province. 34°22'-34°25'S, 19°13'-19°18'E.

Altitude 60-823m (Aasvoëlkop and Platberg)

Area 1,577ha

Land Tenure Owned and administered by the Municipality of Hermanus

Physical Features The reserve lies at the eastern end of the Klein River Mountains, a coastal range formed by quartzites of the Table Mountain Group, and extends from the upper to the lower slopes. The lower southern slopes are steep and deep ravines are present. Only small streams occur of which the Mossel River is perennial. A small reservoir has been built in the latter kloof. Sandy soils derived from the weathering of quartzites of the Table Mountain Group are acid and have a low nutrient status. Podzols are common with peaty soils occurring in seepage areas. Annual average temperature range minimum: 12°C, maximum: 20°C. Annual rainfall 400-900mm, falling mainly in winter (April-September).

Vegetation Vegetation types consist of the Macchia (Veld Type 69). A great variety of mountain fynbos communities and a rich flora occur in the reserve with the families Proteaceae, Ericaceae and Restionaceae well represented. Six of the seven endemic Cape families occur in the reserve and are even dominant locally in seepage fynbos communities with species such as *Brunia alopecuroides* (Bruniaceae), *Roridula gorgonias* (Roridulaceae), *Grubbia rosmarinifolia* (Grubbiaceae) together with *Erica fastigiata* and *Osmitopsis asteriscoides*. *Stilbe rupestris* (Stilbaceae), *Sonderothamnus speciosus* (Penaeaceae) and *Retzia capensis* (Retziaceae) also occur. Proteaceae are well represented and *Protea compacta*, *P. longifolia*, *Aulax umbellata* and *Leucadendron microcephalum* occur as dominants in some communities. Thirty-five *Erica* species occur in the reserve, such as the rare *E. aristata*. Small patches of forest occur in some of the ravines with *Cunonia capensis*, *Rapanea melanophloeos*, *Olinia ventosa*, and *Curtisia dentata*. Economically important species: many species which occur are utilised as cut flowers in the wild flower trade such as *Protea cynaroides*, *P. compacta*, *Phaenocoma prolifera*, *Helichrysum vestitum*, *Brunia lanuginosa*, *B. nodiflora*, *Staavia radiata*, and various *Erica* species, but no harvesting of flora is allowed in the reserve. Endemic species: a number of plant species are endemic to the Klein River Mountains of which the following occur in the reserve: *Leucospermum gracile*, *Mimetus palustris*, *Erica lanuginosa*, *E. aristata*, *E. foliacea* var. *galpinii*, *Brachysiphon rupestris*, *Thaminophyllum latifolium*, and *Moraea vallisavium*.

Fauna Smaller antelope, such as klipspringer *Oreotragus oreotragus*, grysbok *Raphicerus melanotis*, and grey rhebok *Pelea capreolus*, occur in small numbers. More than 75 bird species have been recorded including black eagle *Aquila verreauxii*, African fish eagle *Haliaeetus vocifer*, and Cape sugarbird *Promerops cafer*. At least 10 species of reptile (four snakes, five lizards and one tortoise) and five species of amphibians are known to occur in the reserve. Threatened species: none known.

Conservation Management A management plan exists for this area.

Zoning The greater part of the reserve is natural veld and is managed as a natural zone.

Disturbances or Deficiencies Extensive thickets of alien plant invaders, particularly *Acacia longifolia*, *Leptospermum laevigatum*, *Pinus pinaster*, and *Acacia saligna* occur on the lower southern slopes. Most of the management work is directed at eradicating these plant invaders. The reserve is not fenced and vagrant dogs enter.

Visitor Facilities A 5km mountain road has been constructed along the ridge of the western part of the reserve with magnificent panoramic views across Hermanus and the sea. The rest of the reserve is accessible on foot by means of a 50km long system of nature trails. A visitor and interpretive centre has been constructed. The curator provides guided tours on request and a single hut with accommodation for two persons has been built on the upper slopes of the mountain; there are many day visitors.

Scientific Research Checklists of the fauna and flora are being compiled.

Special Scientific Facilities A herbarium, which already includes specimens of 650 species

Principal Reference Material

* Rourke, J.P. (1976). Fernkloof Nature Reserve - a sanctuary for montane fynbos. *Veld and Flora*, September 1976.

Staff Curator and eight labourers

Budget R27,000 per annum (including salaries)

Local Park or Reserve Administration The Town Clerk, Municipality of Hermanus, PO Box 20, Hermanus, 7200.

Date July 1984

SOMERSET EAST-BOSBERG NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 2 October 1967 and enlarged on 8 October 1982, Provincial Notice 182 of 1967 and Provincial Notice 573 of 1982

Geographical Location Adjacent to Somerset East in Cape Province. 32°41'–32°43'S, 25°32'–25°37'E.

Altitude 790–1,600m (Bosberg)

Area 1,650ha

Land Tenure Owned and administered by the Municipality of Somerset East.

Physical Features The reserve lies along the southern slopes of the Bosberg, a low mountain with steep slopes on the southern side. It consists of shale of the Bokkeveld Group and karoo dolerite. The Rooikrantz hill, 80 to 100m high in the north-eastern part of the reserve reflects the setting sun, hence the name (red rockface). There are only small streams flowing through the area, with loamey and clayey soils. Annual average temperature range minimum: 14°C, maximum: 28°C. Annual rainfall 700–1,000mm, falling mainly in summer (October–March).

Vegetation Vegetation types consist of the Dohne Sourveld (Veld Type 44b), with Dohne Sourveld forest on southern slopes and grassland on plateau. Forest species such as *Olea europaea africana*, *Kiggelaria africana*, *Cassine aethiopica*, *Cussonia spicata*, *Celtis africana* and *Podocarpus falcatus*. Fynbos patches occur on rocky outcrops on the grassy mountain top with *Protea subvestita*. Economically important species: none known. Endemic species: none known.

Fauna Hartmann's mountain zebra *Equus zebra hartmannae* (12) have been introduced (outside their natural range) and steenbok *Raphicerus campestris*, bushbuck *Tragelaphus scriptus*, chacma baboon *Papio ursinus*, bushpig *Potamochoerus porcus*, and vervet monkey *Cercopithecus aethiops* occur. More than 60 bird species have been recorded. At least 25 reptile species (three tortoise, one terrapin, 12 snake and 10 lizard species) and seven frog species occur here. Threatened species: none known.

Conservation Management No management plan exists for this area.

Zoning The greater part of the reserve is managed as a natural area

Disturbances or Deficiencies These include illegal cutting of trees for firewood, accidental fires, and infestations of *Stipa trichotoma*, an alien grass.

Visitor Facilities Facilities include a nature trail, picnic sites and a caravan park just outside the boundary of the reserve. Numbers: unknown. Potential: unknown.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None specified

Staff One ranger and four labourers on a part-time basis

Budget R8,000 per annum (including salaries, but excluding major capital works, e.g. fencing)

Local Park or Reserve Administration The Town Clerk, Municipality of Somerset East, PO Box 21, Somerset East, 5850.

Date July 1984

NIETGENAAMD NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll) and 3.17.07 (Karoo)

Legal Protection Total

Date Established 14 April 1978, Provincial Notice 352 of 1978

Geographical Location 42km from Uniondale in Cape Province. 33°23'-33°27'S, 23°09'-23°12'E.

Altitude 640-1,367m (Slypsteenberg)

Area 1,392ha

Land Tenure Owned and administered by the Klein Karoo-Langkloof Divisional Council.

Physical Features The northern part of the reserve lies against the southern slopes of a low mountain, the Slypsteenberg, which consists of quartzites of the Table Mountain Group. The rest of the reserve is a gently undulating plain with low hills underlain by conglomerates and shales of the Uitenhage and Bokkeveld Groups which erode to form striking rock formations with interesting features that include a 135m high hill of conglomerate with Bushmen artefacts and rock paintings in caves; a hot spring with mineralized water at 42°C also exists with seasonal watercourses flowing through the area. Sandy soils are derived from quartzites on the Slypsteenberg, and more clayey soils with calcrete on red conglomerates shales on the hills and flats. Annual average temperature range minimum: 12°C, maximum: 23°C. Annual rainfall 250-400mm, with no distinct rainy seasons.

Vegetation Vegetation types consist of the Karroid Broken Veld (Veld Type 26), False Macchia (Veld Type 70), Mountain Rhenosterbosveld (Veld Type 43), and Spekboomveld (Veld Type 25). A dry form of mountain fynbos occurs on the Slypsteenberg with 14 species of Proteaceae. Extensive communities of *Elytropappus rhinocerotis* occur in the foothills with small trees, notably *Euclea undulata*. The rest of the reserve is karroid veld with low karroid shrubs such as *Eriocephalus ericoides*, *Pentzia incana*, *Chrysocoma tenuifolia*, and shrubby succulents such as *Delosperma pageanum*, *Drosanthemum delicatulum*, *Ruschia* spp. and *Crassula* spp., . *Aloe ferox*, *Euclea undulata* and *Acacia karroo* occur as dominants in places. Economically important species: the sap of *Aloe ferox* is used for medicinal purposes, but no utilisation is allowed in the reserve. *Osteospermum sinuatum*, which occurs naturally on the reserve is also propagated for distribution of seed to farmers, since the plant is valued for its high potential as a fodder plant. Endemic species: none.

Fauna Grey rhebok *Pelea capreolus* (20), steenbok *Raphicerus campestris* (150), common duiker *Sylvicapra grimmia* (120), grysbok *Raphicerus melanotis* (70), and klipspringer *Oreotragus oreotragus* (40) are the only antelope. Chacma baboon *Papio ursinus*,

rock dassie *Procavia capensis*, black eagle *Aquila verreauxii*, and blue crane *Anthropoides paradisea* occur. At least 33 reptile species (18 snake, 10 lizard, four tortoise and one terrapin) and six frog species have been recorded including the mountain tortoise *Geochelone pardalis*. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning The greater part of the reserve is zoned for medium intensity use with service roads and hiking trails in a natural environment. The mountain catchment area is zoned for low-intensity use as a wilderness area, while the high intensity use area is restricted to the vicinity of the hot springs at the edge of the reserve.

Disturbances or Deficiencies Erosion caused by previous farming practises

Visitor Facilities Accommodation is available at the hot springs comprising six rooms in one building with bedding and a kitchen. There is a caravan and picnic area with facilities available for organized groups, catering for 12 to 50 people. Educational programmes for school and youth groups are run on request in conjunction with the Department of Education. An existing building at the hot springs is being converted into a dormitory to house up to 140 and provide children with an interpretive display centre. Hiking trails have been constructed. Numbers: approximately 14,000 per annum. Potential: approximately 40,000 per annum.

Scientific Research None yet, but studies are envisaged on fire ecology and veld utilisation by antelope

Special Scientific Facilities None

Principal Reference Material None specified

Staff One Senior District Nature Conservation Officer, one reserve manager, and six labourers

Budget R30,000 per annum (including salaries)

Local Park or Reserve Administration The Secretary, Klein Karoo-Langkloof Divisional Council, PO Box 127, Oudtshoorn, 6620.

Date August 1983

MONTAGU MOUNTAIN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 5 December 1972, Provincial Notice 470

Geographical Location Adjacent to Montagu in Cape Province. 33°46'-33°49'S, 20°04'-20°08'E.

Altitude 200-800m. Peaks of the Langeberg

Area 1,200ha

Land Tenure Owned and administered by the Municipality of Montagu.

Physical Features The reserve lies on the northern side of the Langeberg Mountain Range which is formed by an anticline of the Cape Folded Belt of mountains. The sandstones and quartzites of the Table Mountain Group, which form the range, have undergone marked folding and overfolding. In the narrow Kogmansklouf Gorge, which cuts through the mountain range in the centre of the reserve, the folded strata are spectacularly exposed as high cliffs, particularly in the centre of the range. The remainder of the reserve is also dissected by spectacular ravines with a hot mineral spring occurring in the Badskloof at the northern boundary of the reserve. A major river, which drains part of the Little Karoo, flows through the Langeberg Mountain Range in the spectacular Kogmansklouf Gorge, while a smaller tributary, the Kiesies River, flows through another 2km long gorge, the Badskloof, in the north-eastern part of the reserve. Soils are shallow, sandy and low in nutrients. Annual average temperature range minimum: 10°C, maximum: 23°C. Annual rainfall 400-700mm varying with altitude, falling mainly in winter (April-August).

Vegetation Vegetation types consist of Macchia (Veld Type 69). Dry mountain fynbos forms on the lower northern slopes and more mesic fynbos forms on the upper slopes with Proteaceae such as *Protea nitida*, *P. lorifolia* and *P. repens*. On steep north-facing cliff faces on the lower slopes, succulents such as *Aloe mitriformis* and *Crassula* spp., are dominant. Various species of Proteaceae occur which are utilised as cut flowers in the wild flower trade but no utilisation is allowed in the reserve. Endemic species of plants: *Gladiolus stephaniae*, *Hermannia disticha*, and *Aspalathus joubertiana* ssp. *glabripetala* have only been recorded in the reserve.

Fauna Only smaller antelope occur in the reserve and include klipspringer *Oreotragus oreotragus*, grey rhebok *Pelea capreolus* and grysbok *Raphicerus melanotis*. Rock dassie *Procavia capensis* and chacma baboon *Papio ursinus* are frequently seen. Eighty species of birds have been recorded to date and at least 21 reptile species (two tortoises, 12 snakes and seven lizards) and nine frog species are known to occur in the area. The crag lizard *Pseudocordylus microlepidotus* and rock agama *Agama agama* are most frequently seen. The high cliffs provide nesting sites for birds of prey such as the black eagle *Aquila verreauxii*. *Barbus burchelli* (R) occurs in the Kogmansklouf River. Threatened species: leopard *Panthera pardus* (T) still occur in this mountain range.

Conservation Management A management plan exists for this area.

Zoning The greater part of the reserve is undisturbed natural veld (Natural Zone) and only small areas have been developed for recreational use. The entire reserve also falls within a proclaimed Mountain Catchment Area.

Disturbances or Deficiencies A major public road passes through Kogmansklouf in the centre of the reserve and littering is a problem. Utilities, which include a powerline, telephone lines and a pipeline, have also been routed through the Kogmansklouf Gorge. Invasion by alien plants is not a problem except along the Kogmansklouf River which carries seed of various alien species from the town of Montagu and from farmland in the catchment area. The extraction of water for the town from the only two perennial streams in the reserve, Donkerklouf and Keurklouf, has resulted in the drying up of the lower reaches of these streams.

Visitor Facilities Facilities include a resort with bungalows and caravan sites have been developed at the hot mineral spring just outside the boundary of the reserve. Picnic sites have been provided at Keurklouf in the Kogmansklouf Gorge for day-use only, and a recreation area at the boundary of the reserve within the town of Montagu. A 2km trail through the Badskloof is a very popular walk and other trails to the top of the mountain are being planned. Numbers: around 8,000 per annum. Potential: unknown.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various internal departmental reports

Staff One nature conservation officer and six labourers

Budget R32,000 per annum (including salaries)

Local Park or Reserve Administration The Town Clerk, Montagu Municipality, PO Box 24, Montagu, 6720.

Date July 1984

TUSSEN-DIE-RIVIERE GAME FARM

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 17 November 1972, Administrator's Notice 224

Geographical Location 18km from Bethulie in Orange Free State. 30°30'S, 26°15'E.

Altitude 1,250-1,520m (Heuningkop)

Area 22,000ha

Land Tenure Government. Administered by the Nature Conservation Division, Orange Free State Provincial Administration.

Physical Features Flat areas interrupted by low hills with the Orange and Caledon Rivers run through the area, with the confluence of the above mentioned rivers being found on the reserve. Mainly clay soils. Annual average temperature range minimum: 0°C, maximum: 31°C. Annual rainfall 450mm falling mainly in summer (January-March).

Vegetation Vegetation types consist of the False Upper Karoo (Veld Type 36). Karroid veld dominated by *Pentzia globosa*, *Chrysocoma tenuifolia*, *Eragrostis lehmanniana*, and *Cynodon hirsutus*. Koppie scrub dominated by *Rhus erosa* and *Euclea crispa*.

Fauna Mammals include: eland *Taurotragus oryx* (420), black wildebeest *Connochaetes gnou* (O) (800), blesbok *Damaliscus dorcas phillipsi* (1,730), mountain reedbuck *Redunca fulvorufula* (320), springbok *Antidorcas marsupialis* (2,550), Hartmann's mountain zebra *Equus zebra hartmannae* (T) (13), Burchell's zebra *Equus burchelli* (180), gemsbok *Oryx gazella* (220), impala *Aepyceros melampus* (720), red hartebeest *Alcelaphus buselaphus* (270), kudu *Tragelaphus strepsiceros* (160), blue wildebeest *Connochaetes taurinus* (170), square-lipped rhinoceros *Ceratotherium simum* (8), and steenbok *Raphiceros campestris* (240). Ostrich *Struthio camelus* (220) also occur on the reserve. Threatened species: Hartmann's Mountain zebra *Equus zebra hartmannae*.

Conservation Management No management plan exists for this area.

Zoning No information

Disturbances or Deficiencies Previously a farming area with associated disturbances to the natural communities remaining in some areas.

Visitor Facilities Facilities include sport hunting and game viewing. Hunting opportunities are offered on the Game Farm where the public is allowed to undertake controlled hunting of surplus game. Numbers: 500 per annum. Potential: 10,000 per annum.

Scientific Research Ecological survey, population study of black wildebeest *Connochaetes gnou* and porcupine *Hystrix africae australis*.

Special Scientific Facilities Laboratory

Principal Reference Material

- ° Werger, M.J.A. (1973). An account of the plant communities of Tussen-die-Riviere Game Farm OFS, *Bothalia* 11: 165-176.
- ° Provincial Administration of the Orange Free State. Nature Conservation, Annual Report 1975/1976.

Staff Management - one senior staff, three junior staff, and 30 labourers

Budget R61,500 per annum (excluding salaries)

Local Park or Reserve Administration The Senior Nature Conservator, PO Box 16, Bethulie, 9992.

Date June 1982

SANDVELD NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.16.07 (Kalahari)

Legal Protection Total

Date Established 9 May 1980, Administrator's Notice 71 of 9 May 1980

Geographical Location 10km from Bloemhof in Orange Free State. 27°40'S, 25°45'E.

Altitude 1,232-1,248m

Area 14,700ha

Land Tenure Government. Administered by the Nature Conservation Division, Orange Free State Provincial Administration.

Physical Features The reserve comprises flat plains borders the Bloemhof Dam (which consists of 23,000ha open water and serves as a reservoir for the Vaalhartz Irrigation Scheme) on the Vaal River. Sandy soils. Annual average temperature range minimum: 0°C, maximum: 32°C. Annual rainfall 480mm, falling mainly in summer (January-March).

Vegetation Vegetation types consist of the Kalahari Thornveld (Veld Type 16); thorn savanna dominated by *Acacia erioloba*, with *Brachiaria nigropedata*, *Themeda triandra* and *Stipagrostis uniplumis*; open grassveld dominated by *Stipagrostis uniplumis*, *Aristida meridionalis*, *Panicum kalaharensense*, *Eragrostis gummiflua*, *Urelytrum squarrosum*, and *Eragrostis lehmanniana*.

Fauna Mammals: eland *Taurotragus oryx* (80), red hartebeest *Alcelaphus buselaphus* (80), springbok *Antidorcas marsupialis* (210), Burchell's zebra *Equus burchelli* (6), gemsbok *Oryx gazella* (40), and giraffe *Giraffa camelopardalis* (2). Ostrich *Struthio camelus* also occur on the reserve. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning No information

Disturbances or Deficiencies The area was previously a farming area with associated disturbances to the natural communities remaining in some areas.

Visitor Facilities Facilities include angling, boating and camping. Numbers: 8,000 per annum. Potential: 20,000 per annum.

Scientific Research Plant ecological surveys

Special Scientific Facilities Laboratory

Principal Reference Material

* Viljoen, A.J. (1979). Die plantekologie van die Sandveld-natuur[03] reservaat. Hoopstad. M.Sc. Thesis, University of the Orange Free State, 98 pp.

Staff Management - one senior staff, three junior staff, and 21 labourers

Budget R47,300 per annum (excluding salaries)

Local Park or Reserve Administration The Senior Nature Conservator, PO Box 414, Bloemhof, 2660.

Date June 1982

WILLEM PRETORIUS GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 18 December 1970, Administrator's Notice 227 of 18 December 1970

Geographical Location 30km from Winburg in Orange Free State. 28°20'S, 27°15'E.

Altitude 1,375-1,510m (Doringberg)

Area 12,005ha

Land Tenure Government. Administered by the Nature Conservation Division, Orange Free State Provincial Administration.

Physical Features Flat areas stretch from sand river banks interrupted by low koppies and hills. The reserve is situated around on the Allemanskraal Dam, which is 2,771ha in extent.

The dam is used for open-air recreational activities such as angling and boating. Soils are mainly clay. Annual average temperature range minimum: -0.4°C, maximum: 30.6°C. Annual rainfall 575mm, falling mainly in summer (January-March).

Vegetation Vegetation types consist of: transitional *Cymbopogon-Themeda* Veld (Veld Type 49); grassveld dominated by *Cymbopogon plurinodis*, *Themeda triandra* and *Eragrostis chloromelas*, and Thornveld dominated by *Acacia karroo*. Koppie scrub is dominated by *Olea africana*, *Rhus erosa*, *Celtis africana*, and *Grewia occidentalis*.

Fauna Mammals: black wildebeest *Connochaetes gnou* (O) (590), eland *Taurotragus oryx* (120), blesbok *Damaliscus dorcas phillipsi* (420), red hartebeest *Alcelaphus buselaphus* (90), springbok *Antidorcas marsupialis* (1,200), Burchell's zebra *Equus burchelli* (50), gemsbok *Oryx gazella* (60), mountain reedbuck *Redunca fulvorufula* (190), buffalo *Syncerus caffer* (67), kudu *Tragelaphus strepsiceros* (40), giraffe *Giraffa camelopardalis* (30), bushbuck *Tragelaphus scriptus* (4), square-lipped rhinoceros *Ceratotherium simum* (30), and impala *Aepyceros melampus* (120). Ostrich *Struthio camelus* (260) also occur on the reserve. Threatened species: mountain zebra *Equus zebra hartmannae* (T).

Cultural Heritage Ghoya Ruins: the Ghoya were among the first Bantu to settle in the Orange Free State. Ruins of Ghoya settlements are to be seen on nearly all the hill tops in the game reserve; one such settlement on Bekkersberg has been restored, with a settlement consisting of several huts, which are loosely linked.

Conservation Management A management plan exists for this area.

Zoning No information

Disturbances or Deficiencies Reserve situated in an old farming area. Some of the old farmlands are still distinct.

Visitor Facilities Facilities include a public resort and recreation amenities. Numbers: 60,000 per annum. Potential: 80,000 per annum.

Scientific Research Plant ecological survey, population studies of black wildebeest *Connochaetes gnou* and Cape hare *Lepus capensis*

Special Scientific Facilities Laboratory available

Principal Reference Material

- ° Bourquin, O. (1973). Utilisation and aspects of Management of the Willem Pretorius Game Reserve. *Journal of the Southern African Wildlife Management Association*, 3(2): 65-73.
- ° Roberts, B.R. (1963). Onderzoek in die plantegroei van die Willem Pretorius Wildtuin. *Koedoe* 6: 137-166.

Staff Management: one senior staff, four junior staff, and 28 labourers

Budget R65,585 per annum (excluding salaries)

Local Park or Reserve Administration The Senior Nature Conservator, PO Willem Pretorius Game Reserve, 9451.

Date June 1982

VERWOERD DAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 6 July 1979. Administrator's Notice 96 of July 1979.

Geographical Location 40km from Springfontein in Orange Free State. 30°40'S, 25°45'E.

Altitude 1,265-1,369m

Area 11,237ha

Land Tenure Government. Administered by the Nature Conservation Division, Orange Free State Provincial Administration.

Physical Features The reserve borders on the flat areas adjacent to the H.F. Verwoerd Dam, a major impoundment on the Orange River which has created a man-made lake of 35,960ha, which is used for angling, boating, and yachting. Soils are clay. Annual average temperature range minimum: -0°C, maximum: 31°C. Annual rainfall 450mm, falling mainly in summer (January-March).

Vegetation Vegetation types consist of the False Upper Karroo (Veld Type 36). Karroid veld dominated by *Pentzia globosa*, *Chrysocoma tenuifolia*, and *Eragrostis lehmanniana*. Koppie scrub is dominated by *Rhus erosa*.

Fauna Mammals: black wildebeest *Connochaetes gnou* (O) (195), blesbok *Damaliscus dorcas phillipsi* (240), red hartebeest *Alcelaphus buselaphus* (8), springbok *Antidorcas marsupialis* (1,430), and mountain reedbuck *Redunca fulvorufula* (390). A small number of ostrich *Struthio camelus* are also present. Threatened species: none.

Conservation Management No management plan exists for this area.

Zoning Both natural and recreation areas

Disturbances or Deficiencies Previously a farming area with associated disturbances to the natural communities remaining in some areas. A fish hatchery is under construction on the bank of the Orange River approximately 3km below the Hendrik Verwoerd Dam. Active fish culture will be started in the near future. It is expected that there will be a good demand for the fingerlings that can be produced here.

Visitor Facilities Facilities include the Hendrik Verwoerd Dam Holiday Resort which borders on the Hendrik Verwoerd Dam. Accommodation consists of modern two and three-bedroomed rondavels. There is a caravan park, an 18-hole golf course, a swimming pool, tennis courts, and a game reserve which is not open. Numbers: 6,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Provincial Administration of the Orange Free State. Nature Conservation, Annual Report 1975/1976.

Staff Management - one senior staff, four junior staff, and 23 labourers

Budget R50,000 per annum (excluding salaries)

Local Park or Reserve Administration The Senior Nature Conservator, PO Box 18, Verwoerd Dam, 9922.

Date June 1982

SOETDORING NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.17.07 (Karoo)

Legal Protection Total

Date Established 28 July 1978. Administrator's Notice 96 of 28 July 1978.

Geographical Location 40km from Bloemfontein in Orange Free State. 28°52'S, 26°0'E.

Altitude 1,250-1,291m

Area 6,173ha (4,117ha land and 2,056ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Orange Free State Provincial Administration.

Physical Features Flat plainsland with a few low hills and the Modder River. The reserve is situated around on the Krugersdrift Dam, which consists of 2,056ha open water; the dam is mainly used for angling. Soils are clay and sand. Annual average temperature range minimum: 0.3°C, maximum: 29.8°C. Annual rainfall 560mm, falling mainly in summer (January-March).

Vegetation Vegetation types consist of the False Upper Karoo (Veld Type 36) and dry *Cymbopogon-Themeda* Veld (Veld Type 50), Grassveld dominated by *Themeda triandra*, karroid veld dominated by *Felicia muricata*, riparian bush dominated by *Acacia karroo*, koppie scrub dominated by *Rhus ciliata* or *Olea africana*.

Fauna Mammals: black wildebeest *Connochaetes gnou* (O) (260), eland *Taurotragus oryx* (4), blesbok *Damaliscus dorcas phillipsi* (185), red hartebeest *Alcelaphus buselaphus* (20), springbok *Antidorcas marsupialis* (600), Burchell's zebra *Equus burchelli* (6), gemsbok *Oryx gazella* (10), impala *Aepyceros melampus* (150). A number of ostrich *Struthio camelus* (21) occur on the reserve. Threatened species: none.

Conservation Management No management plan exists for this area.

Zoning No information

Disturbances or Deficiencies Old farmlands

Visitor Facilities Facilities include angling and picnicking. Numbers: 1,100 per annum. Potential: 20,000 per annum. A predator park in the reserve consists of two 45ha camps, one for lion and the other for cheetah, and is open to the public.

Scientific Research None

Special Scientific Facilities Laboratory

Principal Reference Material

° Provincial Administration of the Orange Free State. Nature Conservation, Annual Report 1975/1976.

Staff Management: one senior staff, four junior staff, and 23 labourers

Budget R61,000 per annum (excluding salaries)

Local Park or Reserve Administration The Senior Nature Conservator, Soetdoring Nature Reserve, PO Box 517, Bloemfontein, 9300.

Date June 1982

KOPPIES DAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 12 March 1976. Administrator's Notice 45 of 12 March 1976.

Geographical Location 13km from Koppies in Orange Free State. 27°15'S, 27°45'E.

Altitude 1,400-1,415m

Area 4,325ha (2,965ha land and 1,365ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Orange Free State Provincial Administration.

Physical Features The reserve is situated on flat plains around the Koppies Dam, 1,360ha open water in extent. The Renoster River flows through the area. Soils are loamy. Annual average temperature range minimum: -1.6°C, maximum: 30°C. Annual rainfall 610mm, falling mainly in summer (January-March).

Vegetation Vegetation types consist of the Dry *Cymbopogon-Themedra* Veld (Veld Type 50); grassveld is dominated by *Themeda triandra* and *Cymbopogon plurinodis*; and riparian thornveld dominated by *Acacia karroo*.

Fauna Mammals: black wildebeest *Connochaetes gnou* (O) (85) and springbok *Antidorcas marsupialis*. Ostrich *Struthio camelus* also occur on the reserve. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning No information

Disturbances or Deficiencies Previously a farming area with associated disturbances to the natural communities remaining in some areas

Visitor Facilities Facilities include angling, boating, and camping. Numbers: 10,400 per annum. Potential: 62,400 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

* Provincial Administration of the Orange Free State. Nature Conservation, Annual Report 1975/1976.

Staff Management - one senior staff, three junior staff, and 18 labourers

Budget R61,750 per annum (excluding salaries)

Local Park or Reserve Administration The Senior Nature Conservator, PO Box 151, Koppies, 9540.

Date June 1982

UMFOLOZI GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland savanna)

Legal Protection Total

Date Established 27 April 1897. First proclaimed as the Umfolosi Junction Reserve by Zululand Government Notice 12 of 1895 and subsequently as the Umfolozi Game Reserve on 27 April 1897, Government Notice 16 of 1897. Subsequent amendments were detailed in the following proclamations: Government Notice 322 of 1907, Provincial Notice 74 of 1916, Provincial Notice 57 of 1917, Provincial Notice 147 of 1920, Provincial Notice 231 of 1920, Provincial Notice 15 of 1930, Provincial Notice 140 of 1939, Provincial Notice 131 of 1941, and Proclamation 53 of 1962.

Geographical Location About 30km from Mtubatuba in Natal. 28°S, 32°E.

Altitude 100-550m

Area 47,753ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features Broken country with a complex geology, bisected by various streams and the Black and White Umfolozi Rivers. There are three major soil associations: 1) Upland soil association: present in localities where runoff water drains away. These soils are usually stony, shallow (less than 50cm deep) and leached. 2) Bottomland soil association - soils of the Bottomland Association occur in localities where run-off water drains away more slowly or tends to accumulate on valley bottoms, alluvial terraces or toe-slopes or pediments where they merge into a valley bottom. The soils are from one to several metres deep and are illuviated. 3) Riverine soil association - this soil formation consists of unconsolidated alluvia up to 5m deep. These alluvia are unstable and are easily eroded. A fine alluvium of mixed sand and silt

occurs along the Black and White Umfolozi Rivers. Annual average temperature range minimum: 22°C, maximum: 28°C. Annual rainfall 760mm in the north, and 1,250mm in the east, falling mainly in summer (October-March).

Vegetation 11,930ha Zululand Thornveld (Veld Type 6) and 35,820ha Lowveld (Veld Type 10). The woody vegetation consists mainly of *Acacia* mixed woodlands and associated species. The dominant *Acacia* species include *Acacia burkei*, *A. caffra*, *A. grandicornuta*, *A. nigrescens*, *A. nilotica*, *A. robusta*, and *A. tortilis*. There is thicket encroachment by *Dichrostachys cinerea* and other species. *Phoenix reclinata* is a locally dominant riverine species, frequently associated with *Syzygium guineense* and *Phragmites mauritianus*. The main grasses, also frequently occurring as local dominants, include: *Themeda triandra*, *Panicum maximum*, *P. deustum*, *P. coloratum*, *Urochloa mosambicensis*, *Chloris gayana*, *Bothriochloa insculpta*, *Digitaria* spp. and *Sporobolus* spp.. Fossils of the plant *Glossopteris* have been found. Economically important species: none. Endemic species: none.

Fauna Bourquin *et al.*, (1971) listed 48 species of mammals, 37 species of reptiles, 10 species of fish, and nine species of amphibia. Some 336 birds have been recorded and a list of 136 butterflies has been compiled. The main browsers, mixed feeders, grazers, and predators include: kudu *Tragelaphus strepsiceros*, giraffe *Giraffa camelopardalis*, bushbuck *Tragelaphus scriptus*, klipspringer *Oreotragus oreotragus*, impala *Aepyceros melampus*, nyala *Tragelaphus angasi*, common duiker *Sylvicapra grimmia*, steenbok *Raphicerus campestris*, square-lipped rhinoceros *Ceratotherium simum*, buffalo *Syncerus caffer*, zebra *Equus burchelli*, blue wildebeest *Connochaetes taurinus*, mountain reedbuck *Redunca fulvorufula*, waterbuck *Kobus ellipsiprymnus*, warthog *Phacochoerus aethiopicus*, lion *Panthera leo*, spotted hyena *Crocuta crocuta*. Threatened species: suni *Neotragus moschatus*, blue duiker *Cephalophus monticola*, cheetah *Acinonyx jubatus* (T), brown hyena *Hyaena brunnea* (T), samango monkey *Cercopithecus mitis*, hunting dog *Lycaon pictus* (T), aardwolf *Proteles cristatus*, leopard *Panthera pardus* (T), serval *Felis serval*, black rhinoceros *Diceros bicornis* (T), red duiker *Cephalophus natalensis*, and crocodile *Crocodylus niloticus* (V).

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies Management problems are varied, but revolve mostly around working towards a balance between large mammals and the available habitat.

Visitor Facilities Facilities include wilderness trails with fenced camps, restcamp, game viewing and picnic sites. Numbers: 19,500 per annum. Potential: full capacity.

Scientific Research Mostly management orientated

Special Scientific Facilities None

Principal Reference Material

- ° Bourquin, O., Vincent, J. and Hitchins, P.M. (1971). The vertebrates of the Hluhluwe Game Reserve-Corridor (State Land) - Umfolozi Game Reserve Complex. *The Lammergeyer* 14: 5-58.
- ° Downing, B.H. (1972). A plant ecological survey of the Umfolozi Game Reserve, Zululand. Ph.D. Thesis, University of Natal.
- ° Foster, W.E. (1955). History of the Umfolozi Game Reserve. Cyclostyled Report, Natal Parks Board Library.
- ° Henkel, J.S. (1937). Report on the plant and animal ecology of the Hluhluwe Game Reserve with special reference to the tsetse flies. *Natal Witness*, Pietermaritzburg.
- ° Mentis, M.T. (1970). Estimates of natural biomasses of large herbivores in the Umfolozi Game Reserve area. *Mammalia* 34(3): 363-393.
- ° Porter, R.N. (1972). Report on soil erosion associated with roads in the Hluhluwe Game Reserve. Mimeo., Natal Parks Board files.

- ° Porter, R.N. (1975). The production, utilization and effects of grazing on some of the pastures in the Umfolozi Game Reserve, Zululand. M.Sc. Thesis, University of the Witwatersrand.
- ° Vincent, J. (1970). The history of Umfolozi Game Reserve, Zululand as it relates to management. *The Lammergeyer* 11: 7-49.

Staff Management and Wilderness Trails - six senior and 100 junior staff; Game Capture - 60; Research - one senior; Tourism - four senior, and 26 junior staff

Budget R130,775 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, PO Box 99, Mtubatuba, 3935.

Date July 1983

ST LUCIA GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 27 April 1897. Government Notice 16 of 1897, Provincial Notice 74 of 1916, Provincial Notice 59 of 1917, Provincial Notice 108 of 1935, Provincial Notice 140 of 1939 and Proclamation 35 of 1939.

Geographical Location 25km from Mtubatuba in Natal; 28°00'-25'S, 32°25'-30'E

Altitude Sea level to about 10m

Area 36,826ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The reserve includes flat to undulating country around the St Lucia Lake system, with a lagoon-estuary complex which is the largest system of its kind in South Africa. The lakes are fed by five major rivers, the largest of which has been diverted into the sea to prevent siltation of the estuary mouth. Recent wind blown sands and alluvial sediments cover much of the area, while pans and vleis have high peat and clay content. Annual average temperature range minimum: 12-20°C, maximum: 20-30°C. Annual rainfall 2,000mm falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Coastal Forest and Thornveld (Veld Type 1). Coastal forest, thicket and grassland with large beds of *Phragmites communis* and mangroves line the shore. Marine vegetation includes *Zostera nana*.

Fauna Large mammals are for the most part found in the adjoining park. Hippopotamus *Hippopotamus amphibius* are however, plentiful. Over 350 species of birds, including the rare Woodward's batis *Batis fratrum* and Rudd's apalis *Apalis ruddi*. In addition there are two species of pelican *Pelecanus onocrotalus* and *P. rufescens* and several species of stork including the saddlebilled stork *Ephippiorhynchus senegalensis* and yellowbilled

stork *Mycteria ibis*. Almost all of Natal's surviving crocodiles *Crocodylus niloticus* are confined to this reserve. Threatened species: crocodile *Crocodylus niloticus* (V) and various bird species.

Conservation Management A management plan exists for this area.

Zoning None

Disturbances or Deficiencies Catchment area development has affected water quality and quantity and increased salinity has affected mammals and birds. There is some fish poaching.

Visitor Facilities Facilities include two camps with huts and camp sites. Boats available for hire as well as launch tours. Numbers: 15,900 per annum. Potential: Maximum at present.

Scientific Research Management orientated studies of hippopotamus biology and fish and prawn ecology.

Special Scientific Facilities None

Principal Reference Material

° Anon. (Undated). Report of the commission of enquiry into the alleged threat to animal and plant life in the St Lucia Lake, 1964-1966. Government Printer, Pretoria.

Staff Shared with St Lucia Park

Budget Covered by that for St Lucia Park

Local Park or Reserve Administration Officer-in-Charge, Charter's Creek, Post Bag 7205, Mtubatuba, 3935.

Date June 1983

GIANTS CASTLE NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 29 October 1903. First proclaimed on 29 October 1903, Government Notice 735 of 1903, subsequently expanded by various other proclamations, most recently that of 2 January 1976, Proclamation 205.

Geographical Location 40km from Estcourt in Natal. 29°00'S, 29°30'E.

Altitude 1,380-3,451m (Injasuti Peak)

Area 34,638ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features Features include a rugged area forming part of the Drakensberg Escarpment, which is composed of basalt at the higher elevations, cave sandstones and others

forming the lower strata and producing spectacular mountain scenery. Bushman's and Little Tugela Rivers flow through the area. The soils may be divided into ferriferous and acid hydromorphic types; the ferriferous soils predominate and are characteristic of well-drained uplands with high rainfall and relatively low temperatures. Leaching has been extreme, and fertility is, therefore, low. Red ferriferous soils, derived from igneous rocks (Drakensberg lavas and Karroo Dolerite) are less acid (pH 5.6-6.0) and, therefore, probably have a higher base status than grey brown ferriferous types (pH 4.3-5.2) derived from secondary parent materials. Over large areas, the ferriferous soils are shallow. Acid hydromorphic soils occur in wet bottomlands and have been considerably leached (pH 5-6). Annual average temperature range minimum: -15°C, maximum: 15°C-35°C. Annual rainfall 800mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of 13,520ha *Themeda-Festuca* Alpine Veld (Veld Type 58) and 20,764ha Highland Sourveld (Veld Type 44(a)). Three vegetation zones may be recognized with climax vegetation as follows: 1) Montane Belt (1,280-1,830m above sea level) *Themeda triandra* grassland, *Hyparrhenia* grassland, *Miscanthidium-Cymbopogon* grassland, *Protea* woodland, Boulder-bed scrub, Streambank scrub, *Leucosidea-Buddleja* scrub, *Greyia-Cussonia* consociates, Cliff scrub, and *Podocarpus atifolius* forest. 2) Sub-alpine Belt (1,830-2,865m above sea level) *Themeda triandra* grassland, Temperate grassland, Tall grassland, *Rendlia altera* grassland, *Merxmüllera macowanii* consociates, *Cliffortia linearifolia* scrub, *Leucosidea sericea* scrub, *Buddleja salviifolia* scrub, *Protea* woodland, and *Passerina-Philippia-Widdringtonia* fynbos. 3) Alpine Belt (above 2,865m above sea level) *Merxmüllera-Festuca-Pentaschistis* grassland, *Erica-Helichrysum* heath. Economically important species: none. Endemic species: none.

Fauna Large mammals include: bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, common duiker *Sylvicapra grimmia*, reedbuck *Redunca arundinum* and mountain reedbuck *R. fulvorufula*, grey rhebok *Pelea capreolus*, blesbok *Damaliscus dorcas phillipsi*, klipspringer *Oreotragus oreotragus*, red hartebeest *Alcelaphus buselaphus*, and black wildebeest *Connochaetes gnou* (O). The latter two species have been reintroduced. Small mammals are well represented and there are over 130 species of birds. Threatened species: aardwolf *Proteles cristatus*, striped weasel *Poecilogale albinucha*, serval *Felis serval*, and oribi *Ourebia ourebi*. The endangered bearded vulture *Gypaetus barbatus* also occurs, as well as the wattled crane *Bugeranus carunculatus* (of special concern).

Cultural Heritage Bushman paintings are found in the area

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies Some poaching and illegal burning

Visitor Facilities Amenities include a small camp with huts and facilities for horse riding and two to three day guided tours. There is also a museum at the site of a former Bushman encampment and trout fishing may be pursued. Possibility of more mountain huts and trails, and enlargement of camping site. Numbers: 15,500 per annum. Potential: full capacity.

Scientific Research Management orientated research

Special Scientific Facilities None

Principal Reference Material

* Killick, D.J.B. (1963). An account of the plant ecology of the Cathedral Peak area of the Natal Drakensberg. *Memoirs of the Botanical Survey of South Africa* 34.

Staff Management, four senior and 116 junior staff; Tourism, three senior and 29 junior staff

Budget R35,390 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Giants Castle Game Reserve,
Private Bag 755, Estcourt, 3319.

Date June 1983

ITALA NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1973. Proclamation 36 of 1973, Proclamation 157 of 1974, Proclamation 31 of 1975, Proclamation 61 of 1977, Proclamation 158 of 1979, and Proclamation 157 of 1982.

Geographical Location 15km from Louwsberg in Natal. 27°30'S, 31°25'E.

Altitude 350-1,550m (Louwsberg)

Area 25,896ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The area is heavily dissected by streams with a network of pools, and varies from undulating grassland to steep rocky cliff faces and deep gorges with forests and clear streams Pongola, Piraam, Ithala, Hululumbela, and Ncence Rivers. A soil report has been completed, but is not yet available. Annual rainfall 700-1,200mm falling mainly in summer (September-March).

Vegetation Vegetation types consist of the Lowveld (Veld Type 10), North-eastern Sandy Highveld (Veld Type 57), and Northern Tall Grassveld (Veld Type 64). (a) Montane types: grassland with *Themeda triandra* dominant, woodland with *Ficus capensis*, *Euclea schimperi*, and *Leucosidea sericea*; (b) Riverine and scrub forest; (c) Woodlands: various types depending on utilisation history. Dominants include *Acacia davyi*, *A. nilotica*, *A. nigrescens*, *Combretum zeyheri*, *C. apiculatum*, *Pterocarpus angolensis*, *Faurea saligna*, *Protea caffra*, and *Spirostachys africana*; (d) Grassveld types: sour and mixed plateau grasslands, vleis and secondary grasslands. Economically important species: none. Endemic species: none.

Fauna Large mammals have been introduced to the reserve and are now well represented. These include 18 species of antelope and both species of southern African rhinoceros. Small mammals are numerous. Threatened species: black rhinoceros *Diceros bicornis* (T), cheetah *Acinonyx jubatus* (T), crocodile *Crocodylus niloticus* (V), Southern African python *Python sebae natalensis*, and pangolin *Manis temminckii*.

Conservation Management A management plan is in preparation

Zoning The area is zoned

Disturbances or Deficiencies Main problems are invasive alien plants and soil erosion.

Visitor Facilities Facilities include one picnic site, two camp sites and overnight hiking trails. Numbers: 2,500 per annum. Potential: not yet determined.

Scientific Research Baseline information, management orientated research

Special Scientific Facilities None

Principal Reference Material

° Rautenbach, *et al.* (1981). Mammals of Itala Nature Reserve, Natal. *The Lammergeyer* 31: 21-37.

Staff One warden, one senior ranger, and 79 junior staff

Budget R27,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, PO Box 42, Louwsburg, 3150.

Date December 1983

MKUZU GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 15 February 1912. first proclaimed on 15 February 1912, in terms of Provincial Notice 23 of 1912. Subsequent amendments are: Provincial Notice 28 of 1912, Provincial Notice 74 of 1916, Provincial Notice 57 of 1917, Provincial Notice 266 of 1918, Provincial Notice 140 of 1939, and Provincial Notice 131 of 1941.

Geographical Location 110km from Mtubatuba in Natal; 27°33'-27°46'S, 32°06'-32°23'E.

Altitude 40-400m (Nhlonhlela Hill)

Area 25,091ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The topography is mainly flat or gently undulating intersected by seasonal drainage lines alternating with low ridges. The western sector, comprised of the foothills of the Lebombo Mountains is rugged and rises to an altitude of approximately 305m in the south with streams running into the Mkuze River and towards the Msunduzi River. The Mkuze River flows through an impressive gorge in the Lebombo Mountains, the lower end of the gorge being in the reserve. The eastern foothills of the Lebombo Mountains give way to gently undulating ridges, intersected by drainage lines, carrying water only after heavy rains. Complex geological formations with Cretaceous beds containing enormous ammonites form the Bumbeni geological complex and the Lebombo Rhyolite Interphase. The complex geological formations, tectonic movements, natural and accelerated erosional processes over a very long period, have resulted in a great variety of soil forms and soil series ranging from light sandy soils in the *Terminalia sericea* sandveld areas to very heavy clay soils, for example, in the *Acacia luederitzii* floodplain areas. Annual average temperature range minimum: 12°C-20°C, maximum: 25-34°C. Annual rainfall 628mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of 13,800ha of Coastal Forest and Thornveld (Veld Type 1) and 11,291ha Lowveld (Veld Type 10). Seven principal vegetation communities are recognizable in the reserve. They intergrade to a greater or lesser degree according to differences in soil, water and topography. (a) Riparian forest (i) Riverine forest with *Ficus sycomorus*, *Acacia xanthophloea*; (ii) Streambank and drainage line vegetation. (b) *A. luederitzi* and *Euclea divinorum* thicket with poor grass cover. (c) *A. nigrescens* woodland with *Themeda triandra* as an important grass. (d) Mixed *Acacia* woodland with *A. nilotica* and *A. tortilis*. The dominant grasses are *Themeda triandra*, *Bothriochloa insculpta*, and *Aristida congesta*. (e) Sandveld communities (i) Sandveld dry deciduous *Newtonia hildebrandtii* forest and *Pteleopsis myrtifolia* thicket; (ii) Sandveld woodland with *Terminalia sericea*. (f) *Combretum apiculatum* woodland with *Themeda triandra* as an important grass. (g) Grasslands (i) Floodplain and lowlying grasslands; (ii) Upland grasslands.

Fauna Large mammals are well represented and include Burchell's zebra *Equus burchelli*, square-lipped rhinoceros *Ceratotherium simum*, warthog *Phacochoerus aethiopicus*, giraffe *Giraffa camelopardalis*, kudu *Tragelaphus trepsiceros* and lesser kudu *Tragelaphus imberbis*, nyala *Tragelaphus angasi*, common duiker *Sylvicapra grimmia*, reedbuck *Redunca arundinum*, mountain reedbuck *Redunca fulvorufula*, blue wildebeest *Connochaetes taurinus*, klipspringer *Oreotragus oreotragus*, steenbok *Raphicerus campestris* and impala *Aepyceros melampus*. Carnivores include spotted hyena *Crocuta crocuta* and several endangered species. Threatened species: black rhinoceros *Diceros bicornis* (T), cheetah *Acinonyx jubatus* (T), red duiker *Cephalophus natalensis*, striped weasel *Poecilogale albinucha*, aardwolf *Proteles cristatus*, suni *Neotragus moschatus*, leopard *Panthera pardus* (T), serval *Felis serval*, and crocodile *Crocodylus niloticus* (V).

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies There is no natural, permanent water. Game eradication and spraying to control tsetse fly has in the past had a great impact on the reserve. There has also been some habitat destruction due to overgrazing. Poaching also occurs.

Visitor Facilities Facilities include a small camp with huts and some game viewing hides. Also, various walks and trails are available. An outdoor museum is being planned. Numbers: 18,400 per annum. Potential: full capacity.

Scientific Research Current research is directed towards improving management

Special Scientific Facilities None

Principal Reference Material

- ° Davies, O. (1967). Mkuzi Game Reserve. The apparent geomorphological surfaces. Report to Natal Parks Board following surveys in 1950 and 1967.
- ° Dixon, J.E.W. (1964). Preliminary notes on the mammal fauna of the Mkuzi Game Reserve. *The Lammergeyer* 3(1): 40.
- ° Goodman, P.S. (1982). The dilemma of artificial water points in Mkuzi Game Reserve. Natal Parks Board Cyclostyled paper, 12 pp.
- ° Goodman, P.S. (1982). Some background information on Mkuzi Game Reserve. Natal Parks Board Cyclostyled paper, 11 pp.
- ° Goodman, P.S. (1982). A summary of the Geology and Geomorphology of Mkuzi Game Reserve. Natal Parks Board Cyclostyled paper, 3 pp.
- ° Moll, E.T. (1968). Some notes on the vegetation of Mkuzi Game Reserve. *The Lammergeyer* 8: 25-30.
- ° Pooley, A.C. (1965). A preliminary check list of the reptiles within the Mkuzi and Ndumu Game Reserve in Northern Zululand. *The Lammergeyer* 3(2): 41-55.

Staff Management - three senior and 70 junior staff; Research, one senior and three junior staff; Tourism two senior and 30 junior staff

Budget R103,120 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-charge, Mkuzi Game Reserve, PO Mkuzi, 3965.

Date July 1983

HLUHLUWE GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 27 April 1897. Government Notice 16 of 1897, Government Notice 322 of 1907, Provincial Notice 74 of 1916, Provincial Notice 57 of 1917, Provincial Notice 147 of 1920, Provincial Notice 231 of 1920, Provincial Notice 15 of 1930, Provincial Notice 140 of 1939, Provincial Notice 131 of 1941, and Proclamation 53 of 1967.

Geographical Location 51km from Mtubatuba in Natal. 28°00'S, 32°00'E.

Altitude 100-550m

Area 23,067ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The topography is steeply undulating with complex geology. It is bisected by two rivers, one of which, is the Hluhluwe, flows eastwards into Lake St Lucia. Complex soil composition. Annual average temperature range minimum: 13°C-22°C, maximum: 25-33°C. Annual rainfall 760mm in north and 1,250mm in the south and east, falling mainly in summer (October-April).

Vegetation Vegetation types consist of 4,620ha of Zululand Thornveld (Veld Type 6) and 18,477ha Lowveld (Veld Type 10). About 20,000ha is occupied by drought-deciduous woodlands and thornveld. About 3,000ha is occupied by lowland semi-deciduous forest with *Acacia* spp. and *Calodendrum* sp. along the rivers and on the high ground at the northern end of the reserve.

Fauna Larger mammals include: spotted hyena *Crocuta crocuta*, lion *Panthera leo*, Burchell's zebra *Equus burchelli*, square-lipped rhinoceros *Ceratotherium simum*, warthog *Phacochoerus aethiopicus*, hippopotamus *Hippopotamus amphibius*, giraffe *Giraffa camelopardalis*, bushbuck *Tragelaphus scriptus*, lesser kudu *Tragelaphus imberbis* and greater kudu *Tragelaphus strepsiceros*, nyala *Tragelaphus angasi*, buffalo *Syncerus caffer*, common duiker *Sylvicapra grimmia*, waterbuck *Kobus ellipsiprymnus*, blue wildebeest *Connochaetes taurinus*, and impala *Aepyceros melampus*. About 100 cheetah and 200 black rhinoceros form significant populations of these vulnerable species. Birdlife is plentiful and includes the marabou stork *Leptoptilos crumeniferus*, various vultures, and the ground hornbill *Bucorvus leadbeateri*. Threatened species: black rhinoceros *Diceros bicornis* (T), cheetah *Acinonyx jubatus* (T), leopard *Panthera pardus* (T), and red duiker *Cephalophus natalensis*.

Conservation Management A management plan exists for this area.

Zoning None

Disturbances or Deficiencies There is some poaching and uncontrolled fires. There are plans for a barrage on the Hluhluwe River.

Visitor Facilities Camp with huts to accommodate 70 people. Numbers: 44,500 per annum. Potential: no further development planned at present.

Scientific Research Current research is management orientated and includes population biology and range management studies.

Special Scientific Facilities Herbarium and library

Principal Reference Material

- ° Bourquin, O., Vincent, J. and Hitchins, P.M. (1971). The vertebrates of the Hluhluwe Game Reserve-Corridor (State Land) - Umfolozi Game Reserve Complex. *The Lammergeyer* 14: 1-58.
- ° Henkel, J.S. (1937). Report on the plant and animal ecology of the Hluhluwe Game Reserve with special reference to the tsetse flies. *Natal Witness*, Pietermaritzburg.
- ° Hitchins, P.M. (1968). Records of plants eaten by mammals in the Hluhluwe Game Reserve. *The Lammergeyer* 8: 31-39.
- ° King, L. (1970). The geology of the Hluhluwe Game Reserve. *Petros* 2: 16-19 (Journal of the Students' Geological Society, University of Natal, Durban).
- ° Penner, D.F. (1970). Report on a preliminary archaeological survey in Zululand Game reserves. Mimeo., Natal Parks Board files.
- ° Ward, C.J. (1962). A report on scrub control, Hluhluwe Game Reserve. *The Lammergeyer* 2(1): 57-62.

Staff Ten senior staff including three research, two tourism, and two game capture specialists, and 40 junior staff (game guards)

Budget R127,990 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-charge, Hluhluwe Game Reserve, PO Box 25, Mtubatuba, 3935.

Date July 1983

ST LUCIA PARK

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Eoodland/savanna)

Legal Protection Total

Date Establishd 31 August 1939. Proclamation 35 of 1939, Proclamation 11 of 1944 and Proclamation 36 of 1957.

Geographlcal Locatlon 29km from Mtubatuba in Natal; 28°00'S, 32°30'E

Altitude Sea level-30m

Area 12,545ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features Features include coastal dunes with steep seaward slopes giving rise to an undulating terrain with flat lowlands in between. The Park includes Lake St Lucia, which covers about 300sq.km. This coastal lake is separated from the sea by a strip of land of two to 11km in width. Recent wind-blown sands and alluvial sediments cover much of the area, while pans and vleis have high peat and clay content. Annual average temperature range minimum: 14-21°C, maximum: 22-29°C. Annual rainfall 2,000mm in the east falling to 800mm in the west, falling mainly in summer (October-April).

Vegetation Vegetation types consist of coastal Forest and Thornveld (Veld Type 1). About 600ha freshwater marsh, 5,000ha tropical deciduous lowland woodland and 1,000ha swamp forest. Marshland is dominated by *Phragmites communis* and *Cyperus papyrus*, groundwater forest by *Barringtonia racemosa*, *Ficus hippopotami* and *Syzygium cordatum* and the woodland by *Terminalia sericea*, *Acacia* spp. and *Trichilia emetica*. Sections of the lake shore are lined by mangroves.

Fauna Mammals include the samango monkey *Cercopithecus mitis*, leopard *Panthera pardus* (T), nyala *Tragelaphus angasi*, red duiker *Cephalophus natalensis* and reedbuck *Redunca arundinum*. There is a very rich avifauna of about 350 spp. and reptiles include the rare central African gaboon adder *Bitis gabonica gabonica* and crocodile *Crocodylus niloticus*. Seven major breeding grounds of the crocodile are known in the park. Threatened species: Suni *Neotragus moschatus*, red duiker *Cephalophus natalensis* and crocodile *Crocodylus niloticus* (V) and leopard *Panthera pardus* (T).

Conservation Management A management plan exists for this area.

Zoning 2,000ha are zoned as wilderness whilst the remainder is designated as conservation or recreation area.

Disturbances or Deficiencies Disturbances include fish poaching and water regulation for agriculture, extensive irrigation schemes and the diversion of the Umfolozi River to flow direct to the sea have adversely affected the salinity and water levels on which much of the wildlife depend.

Visitor Facilities Facilities include two small camps with huts and two camp sites. Numbers: 16,385 per annum (conservation area) 120,000 per annum (recreation area).

Scientific Research Management orientated studies of fish and prawn ecology, hippopotamus biology and crocodile rehabilitation

Special Scientific Facilities A small laboratory

Principal Reference Material

- ° Day, J.H., Millard, N.A.M. and Broekhuysen, G.J. (1954). The ecology of South African estuaries - Part 4. The St Lucia system. *Transactions of the Royal Society of South Africa* 34: 129-152.
- ° Pooley, E.C. (1973). Notes on the ecology of the Lake St Lucia crocodile population. Crocodiles, Proceedings of the 2nd meeting of crocodile specialists, IUCN Publications New Series, Supplementary paper 41: 81-90.

Staff 13 senior staff (five management, two research, six tourist) and 25 junior staff (game guards)

Budget R125,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Charter's Creek, Private Bag 7205, Mtubatuba, 3935.

Date June 1983

NDUMU GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 17 April 1924. Provincial Notice 96 of 1924. Subsequent amendments were Provincial Notice 140 of 1939, Provincial Notice 131 of 1941, and Proclamation 13 of 1947.

Geographical Location 100km from Mkuze in Natal. 26°50'-26°54'S, 32°09'-32°21'E

Altitude 25-175m

Area 10,117ha (6,070ha land, 4,047ha water)

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features Topography is very flat with a few small hills. The reserve comprises part of the floodplains of the Usutu and Pongolo Rivers with numerous shallow pans (such as Nyamithi Pan with its large fever trees *Acacia xanthophloea*) with permanent water. Ndumu Hill is composed of red sands, while east of Ndumu Hill is another sandveld area composed of undulating pallid sands, situated mostly above 30m above sea level. The two sandveld areas together comprise about 1,151ha. Lower down the slope, there occurs grey compacted coarse sandy clay with a hard mottled layer at one metre depth. The flats comprising about 6,316ha consist of reddish sandy clay with a compacted layer at about 1.2m depth. The western area of 648ha consists of reddish sandy clay of basaltic origin with an admixture of calcareous material. Annual average temperature range minimum: 17°C, maximum: 28°C. Annual rainfall 633mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of 6,070ha Lowveld (Veld Type 10) (Acocks 1975) (a) Riverine and floodplain vegetation: the aquatic communities are characterised by abundant *Nymphaea* spp., *Potamogeton* spp., and *Cyperus papyrus*. Tree species include *Ficus sycomorus*, *Trichilia emetica*, *Rauvolfia caffra*, *Acacia xanthophloea*, and *Syzygium guineense*. (b) Drainage line communities: the tree communities occurring along seasonal stream banks include species such as *Spirostachys africana*, *Schotia brachypetala*, and *Acacia robusta*. (c) Deciduous tree and shrub community: this community generally consists of bush clumps and scattered trees, three to eight metres high, among outcrops of rocks, on shallow sandy soil derived from rhyolite and characteristic of the Lebombo Mountain range. Characteristic species in the bush clumps include *Pavetta edentula*, *Combretum apiculatum*, and *C. hereroense*. (d) *Acacia nigrescens* woodland: *A. nigrescens* woodland with trees ranging from 8 to 15m high occurs among Cretaceous stony boulder bed outcrops; and in areas with dark grey and reddish brown soils. (e) Thicket, scrub and woodland: this association consists of a large number of species growing mainly on reddish brown and grey clay soils. It includes *Acacia tortilis* woodland shrubs and grass with *Panicum maximum* common. On the sandy soils there are relic forest trees of *Newtonia hildebrandtii*. (f) Woodland and forest relic: this is a variable vegetation type with semi-evergreen forest and deciduous broad-leaved woodland species into which numerous thicket species have encroached. The woodland and forest species include trees such as *Sclerocarya caffra*, *Albizia versicolor*, *Azelia quanzensis*, *Terminalia sericea*, *Newtonia hildebrandtii*, *Spirostachys africana*, and *Balanites maughanii*.

Fauna Mammals include: the square-lipped rhinoceros *Ceratotherium simum*, bushpig *Potamochoerus porcus*, hippopotamus *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, nyala *Tragelaphus angasi*, common duiker *Sylvicapra grimmia*, reedbuck *Redunca arundinum*, and impala *Aepyceros melampus*. Some 380 species of birds have been recorded. Threatened species: black rhinoceros *Diceros bicornis* (T), suni *Neotragus moschatus*, samango

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monkey *Cercopithecus mitis*, crocodile *Crocodylus niloticus* (V), serval *Felis serval*, leopard *Panthera pardus* (T), red duiker *Cephalophus natalensis*, and aardwolf *Proteles cristatus*.

Conservation Management A management plan exists for this area. Veld management policies including culling are necessary. Fire is also used.

Zoning In progress

Disturbances or Deficiencies No information

Visitor Facilities Facilities include a small camp with seven huts. Numbers: 1,600 per annum. Potential: undetermined.

Scientific Research Mainly directed towards management problems. The transitional character of the flora and fauna from subtropical to tropical species is of particular interest to scientists.

Special Scientific Facilities None

Principal Reference Material

- ° De Moor, P.P., Pooley, E., Neville, G. and Barichiev, J. (1977). The Vegetation of Ndumu Game Reserve, Natal: A Quantitative Physiognomic Survey. *Annals of the Natal Museum* 23(1): 239-272.
- ° Dixon, J.E.W. (1966). Notes on the mammals of Ndumu Game Reserve. *The Lammergeyer* 6: 24-40.
- ° Dutton, T.P. (1970). From smelting furnace to the Ndumu Game Reserve. *The Lammergeyer* 12: 37-40.
- ° Pooley, A.C. (n.d.). A preliminary check list of the reptiles found within the Mkuzi and Ndumu Game Reserve. *The Lammergeyer* 3(2): 41-55.

Staff Management - three senior and 57 junior staff; Tourism - three senior and seven junior staff.

Budget R93,660 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Ndumu Game Reserve, PC Ndumu, 3972.

Date June 1983

ROYAL NATAL NATIONAL PARK AND RUGGED GLEN NATURE RESERVE

Management Category II (III or IV) (National Park) (Natural Monument or Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 19 September 1916 by Executive Commission Resolution. Proclamation 20 of 1943, Rugged Glen added by Proclamation 32 of 1950.

Geographical Location 48km from Bergville in Natal. 28°30'S, 29°00'E.

Altitude 1,300–3,282m (Mont-aux-Sources)

Area 8,856ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features This area is part of the Drakensberg Escarpment, dominated by the Amphitheatre, a semi-circle of high cliffs with a sheer drop of 613m. The park also includes part of the Drakensberg foothills and one of the sources of the Tugela River. Outstanding features are the amphitheatre and Tugela Falls. The soils are leached, acidic and of low fertility. The marshy vleis characteristic of the bottomlands possess acid hydromorphic soils, rich in organic matter. Frost and snow occur in the winter months. Annual rainfall 1,448mm, falling mainly in summer (October–April).

Vegetation Vegetation types consist of 8,186ha Highland Sourveld (Veld Type 44(a)) and 670ha *Themeda-Festuca* Alpine Veld (Veld Type 58). The vegetation types fall under the following categories: (a) grasslands - below 2,000m, grassland occurs as an understorey to *Protea* woodland, above this altitude, there are extensive pure grasslands. Grasses such as *Themeda triandra* dominate up to about 2,300m above sea level, after which temperate grasses such as *Rendlia*, *Festuca* and *Merxmüllera* become dominant. (b) *Protea* woodland - this is the next most extensive after grassland. Dominant trees are *Protea multibracteata* and *P. roupelliae*. (c) Evergreen mountain forest: this occurs in small patches, confined to rocky stream banks or sheltered valleys. *Podocarpus latifolius* is dominant. (d) *Leucosidea-Buddleja* scrub - patches of this vegetation type represent an early stage in the succession to forests. (e) Streambank woodland - dominants are *Ilex mitis*, *Bowkeria verticillata* and *Salix woodii*. (f) Rock and cliff scrub - this includes small trees and shrubs such as *Cyathea dregei*, *Cussonia paniculata* and *Greyia sutherlandii*. (g) Fynbos - at high altitudes (up to 2,750m above sea level) a dense small tree or shrub community dominated by plants such as *Passerina* spp., occurs. (h) *Erica-Helichrysum* heath - dwarf shrub community at altitudes above 2,750m above sea level. Economically important species: none. Endemic species: *Protea nubigena*.

Fauna Mammals are not present in very large numbers, however, the black wildebeest *Connochaetes gnou* (O) is of particular interest. Also present are mountain reedbuck *Redunca fulvorufula*, grey rhebok *Pelea capreolus*, blesbok *Damaliscus dorcas phillipsi*, and klipspringer *Oreotragus oreotragus*. Over 180 bird species have been recorded. Threatened species: aardwolf *Proteles cristatus*, brown hyaena *Hyaena brunnea* (T) and striped weasel *Poecilogale albinucha*, bearded vulture *Gypaetus barbatus* and Cape vulture *Gyps coprotheres* (T).

Cultural Heritage There are caves with bushman paintings on the reserve

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies Tourist facilities are sited in the heart of the park thus, increasing disturbance which would have been much less had they been on the eastern periphery.

Visitor Facilities There is an hotel on the reserve which can accommodate 120 people, and also a camp which can accommodate 60 people in cottages. There are two camp sites to accommodate 600 people. Tourist facilities include walking and climbing, swimming, horse riding and fishing. Numbers: 66,600 per annum. Potential: full capacity has already been reached.

Scientific Research Management orientated research - veld management, mammal monitoring, and controlled burning

Special Scientific Facilities None

Principal Reference Material

- ° Acocks, J.P.H. (1953). Veld types of South Africa. *Memoirs of the Botanical Survey of South Africa* 28.
- ° Bews, J.W. (1917). The plant ecology of the Drakensberg range. *Annals of the Natal Museum* 3: 511-565.
- ° Edwards, D. (1967). A plant ecological survey of the Tugela River Basin. *Memoirs of the Botanical Survey of South Africa* 36.
- ° Killick, D.J.B. (1963). An account of the plant ecology of the Cathedral Peak area of the Natal Drakensberg. *Memoirs of the Botanical Survey of South Africa* 34.
- ° Phillips, J.F.V. (1973). The agricultural and related development of the Tugela Basin and its influent surrounds. Town and Regional Planning Report. Vol. 19: Pietermaritzburg.
- ° Stewart, P.G. (1969). A management plan for Royal Natal National Park and Rugged Glen Nature Reserve. Natal Parks Board Report: Pietermaritzburg.

Staff Conservation and Technical staff - 37; Hotel Staff - 120; Labourers - 105

Budget R44,060 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Royal Natal National Park, PO Mont-aux-Sources, 3353.

Date July 1983

CHELMSFORD PUBLIC RESORT NATURE RESERVE

Management Category V (Protected Landscape)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 31 July 1975. Government Proclamation 73 of 1980

Geographical Location 26km from Newcastle in Natal. 27°57'S, 29°57'E.

Altitude 1,249-1,270m

Area 6,845ha (3,989ha land, 2,856ha water)

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features Features are gently undulating, with wooded hills with flat bottomed valleys. Waterbodies include Chelmsford Dam, a large man-made impoundment and Ngagane River. Soils are shallow on a shale base. Annual rainfall 900mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of 3,989ha of Natal Sour Sandveld (Veld Type 66); grassland with patches of mixed *Acacia* dominated woodlands.

Fauna Fauna includes: the square-lipped rhinoceros *Ceratotherium simum* (6), Burchell's zebra *Equus zebra burchelli* (82), red hartebeest *Alcelaphus buselaphus* (80), blesbok *Damaliscus dorcas phillipsi* (180), reedbuck *Redunca arundinum* (17), springbok *Antidorcas marsupialis* (200), steenbok *Raphicerus campestris*, common duiker *Sylvicapra grimmia*, and black wildebeest *Connochaetes gnou* (O). Threatened species: oribi *Ourebia ourebi*.

Conservation Management A management plan is in preparation

Zoning In preparation

Disturbances or Deficiencies Stray dogs and littering by visitors pose problems

Visitor Facilities Facilities include horse riding, boat lockers, fishing, and boating. Numbers: 72,000 per annum. Potential: full capacity.

Scientific Research Veld monitoring plots

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Two senior rangers, one ranger, and two clerks

Budget R68,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Chelmsford Public Resort, PO Box 3, Ballengeich, 2942.

Date 1983

SPIOENKOP PUBLIC RESORT NATURE RESERVE

Management Category V (Protected landscape)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 31 July 1975. Government Notice 101 of 1975

Geographical Location 17km from Winterton in Natal. 28°41'S, 29°31'E.

Altitude 1,060-1,146m

Area 4,562ha (3,021ha land, 1,541ha water)

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The topography is undulating hills with valleys. Waterbodies include Spioenkop Dam, a large man-made impoundment and Tugela River. Soils are shallow with a shale base. Annual rainfall 398mm falling mainly in summer (October-March).

Vegetation Vegetation types include 3,021ha of Southern Tall Grassveld (Veld Type 65). Mixed grassland (*Eragrostis* and *Themeda* spp.) with *Acacia caffra*, *A. nilotica* and *A. sieberana* woodland.

Fauna Square-lipped rhinoceros *Ceratotherium simum* (3), giraffe *Giraffa camelopardalis* (4), greater kudu *Tragelaphus strepsiceros* (50) and lesser kudu *Tragelaphus imberbis*, blue wildebeest *Connochaetes taurinus* (5), impala *Aepyceros melampus* (50), blesbok *Damaliscus dorcas phillipsi* (17), black wildebeest *Connochaetes gnou* (O)(65), Burchell's zebra *Equus zebra burchelli* (85), eland *Taurotragus oryx* (30), red hartebeest *Alcelaphus buselaphus* (35), springbok *Antidorcas marsupialis* (45), steenbok *Raphicerus campestris*, common duiker *Sylvicapra grimmia*, reedbuck *Redunca arundinum* (24), and mountain reedbuck *Redunca fulvorufula* (30). Threatened species: none.

Conservation Management In progress

Zoning In progress

Disturbances or Deficiencies Stray dogs

Visitor Facilities Facilities include horse riding, launch tours, tennis, badminton, table tennis, TV lounge, outdoor chess, swimming pools, historical tours, museum, overnight trail, and game park walks. Numbers: 34,000 per annum. Potential: full capacity.

Scientific Research Veld monitoring plots

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One warden, one senior ranger, two rangers, one camp superintendent, one artisan and two clerks

Budget R106,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Spioenkop Public Resort, PO Box 140, Winterton, 3340.

Date August 1983

LOTENI NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 2 April 1953. Proclamation 52 of 1958, Proclamation 134 of 1966, and Proclamation 62 of 1973.

Geographical Location 76km from Nottingham Road in Natal. 29°55'S, 29°15'E.

Altitude 1,370-2,100m (Seven high peaks, +/-2,000m)

Area 3,984ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The reserve is situated in a valley among the steep slopes of the foothills of the Drakensberg, the landscape is rugged and underlain by sandstone. It is characterised by rugged scenery and waterfalls; the Loteni River flows through the area. Due to the high rainfall and relatively low temperatures, weathering is intense and, through percolation, the soils have been depleted of bases such as calcium, magnesium, sodium, and potassium. All well-drained uplands are occupied by leached ferriferous soils. On the crests of the hills in the reserve, Mispah forms are dominant, whilst on the mid- and footslopes, Clovelly and Hutton forms are dominant with Mispah rare. The marshy vleis characteristic of the bottomlands contain acid hydromorphic soils. Annual rainfall 800mm falling mainly in summer (October-March).

Vegetation Vegetation types consist of 3,989ha of Highland Sourveld (Veld Type 44(a)). Seven broad vegetation types are recognized in the reserve, but because of their subjective delineation, they can only represent a somewhat crude classification subject to correction. The seven types are as follows: (a) *Themeda triandra* grassland; (b) *Protea* open woodland; (c) *Aloe spectabilis* boulder scrub; (d) boulder bed scrub; (e) streambank scrub; (f) *Greyia sutherlandii* cliff scrub; and (g) evergreen mountain forest.

Fauna Mammals include the following species: eland *Taurotragus oryx*, reedbuck *Redunca arundinum*, mountain reedbuck *Redunca fulvorufula*, grey rhebok, *Pelea capreolus*, and klipspringer *Oreotragus oreotragus*. Over 150 species of birds have been recorded in the reserve. Threatened species: serval *Felis serval*, striped weasel *Poecilogale albinucha*, aardwolf *Proteles cristatus*, and oribi *Ourebia ourebi* are the endangered mammals. The bearded vulture *Gypaetus barbatus* also occurs.

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies Soil erosion poses the most serious threat compounded by uncontrolled grass fires.

Visitor Facilities Facilities include a small camp with huts. Horses may be hired. Numbers: 5,700 per annum. Potential: no further plans for expansion.

Scientific Research Range management studies

Special Scientific Facilities None

Principal Reference Material

- ° Bews, J.W. (1917). The plant ecology of the Drakensberg range. *Annals of the Natal Museum* 3: 511-565.
- ° Edwards, D. (1967). A plant ecological survey of the Tugela River basin. *Memoirs of the Botanical Survey of South Africa* 36.
- ° MacVicar, C.N. (1962). Soil studies in the Tugela Basin. Ph.D. Thesis, University of Natal.
- ° Scott, J.D. (1951). A contribution to the study of the problems of the Drakensberg Conservation Area. *Science Bulletin* 324. Department of Agriculture, Government Printer, Pretoria.

Staff Officer-in-Charge; Tourism - two senior and 15 junior staff

Budget R20,500 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-charge, Loteni Nature Reserve, PO Box 14, Himeville, 4585.

Date July 1983

UMTAMVUNA NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 25 June 1971. Proclamation 97 of 1971 and Proclamation 39 of 1983.

Geographical Location 5km from Port Edward in Natal. 31°00'S, 30°10'E.

Altitude Sea level-300m

Area 3,137ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The reserve occupies the northern side of a steep gorge on the Umtamvuna River and also includes some sandy, grassland plains within its boundaries. The soils are sandy. Annual average temperature range: no recordings. Annual rainfall 1,200mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of Coastal Forest and Thornveld (Veld Type 1). About 1,500ha are occupied by grassland. The remaining 1,500ha support a lowland deciduous forest, an example of sub-tropical to temperate coastal forest. *Encephalartos natalensis* is a rare species present in the reserve.

Fauna Few large mammals survive, however, those that do, include bushbuck *Tragelaphus scriptus*. There is a large variety of bird species. Threatened species: blue duiker *Cephalophus monticola*.

Conservation Management A management plan exists for this area.

Zoning None

Disturbances or Deficiencies Some poaching

Visitor Facilities Visitors are few, but there are some nature trails. Numbers: 1,087 per annum. Potential: 2,000 per annum

Scientific Research A botanical survey has been completed.

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One senior and 10 junior staff (game guards)

Budget R10,000 per annum (excluding salaries)

Local Park or Reserve Administration The Officer-in-Charge, Umtamvuna Nature Reserve, PO Box 25, Port Edward, 4295.

Date June 1983

ALBERT FALLS PUBLIC RESORT NATURE RESERVE

Management Category V (Protected Landscape)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 31 July 1975. Government Notice 102

Geographical Location 18km from Pietermaritzburg in Natal. 29°26'S, 30°25'E.

Altitude 662-720m

Area 3,012ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features Undulating hills with valleys and lower lying open areas, and containing the Albert Falls Dam, a large man-made impoundment, and the Umgeni and Doornspruit Rivers. Shallow soils with a shale base. Annual rainfall 702mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of 642ha Valley Bushveld (Veld Type 23). A mixed grassland of *Eragrostis*, *Themeda*, and *Aristida* spp. with open woodland in places dominated by *Acacia nilotica* and *A. sieberana*.

Fauna Burchell's zebra *Equus zebra burchelli* (12), impala *Aepyceros melampus* (20), blesbok *Damaliscus dorcas phillipsi* (30), and reedbuck *Redunca fulvorufula* (8). These species are mostly introduced. Threatened species: Oribi *Ourebia ourebi* and wattled crane *Bugeranus carunculatus*.

Conservation Management A management plan is nearing completion.

Zoning The area is zoned, but no information is available

Disturbances or Deficiencies Stray dogs and littering by visitors pose problems.

Visitor Facilities Facilities include fishing, boating, walking, birdwatching, BMX track, scrambling track and horse riding. Numbers: 70,000 per annum. Potential: full capacity.

Scientific Research Veld monitoring plots

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Management - three senior and two junior staff; Tourism - one senior and three junior staff

Budget R103,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Albert Falls Public Resort, PO Box 31, Cramond, 3420.

Date August 1983

WEENEN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1 April 1975. Proclamation 116 of 1975, Proclamation 85 of 1981, and Proclamation 51 of 1982

Geographical Location 8km from Weenen in Natal; 29°S, 30°E

Altitude 1,000-1,240m

Area 2,929ha

Land Tenure State. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The reserve is situated on the Draycott Plain. In the south and south-east is a dolerite hill which is incised by numerous, mostly seasonal streams, while the west is bounded by a more precipitous escarpment. There are no major rivers and streams. The reserve falls into the Tugela Basin, the soils of which have been mapped. In summary, most of the reserve has been classified as stony land, steep land, land with very shallow soils, or land that has been denuded of soil by gully erosion. Only a very small part of the reserve has not been eroded. Annual rainfall 500-625mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of 2,929ha Valley Bushveld (Veld Type 23). The reserve falls into Valley Bushveld (Acocks 1975), while Phillips (1972) classifies the area as a sub-arid riverine and lowland mixed thicket, and short to medium woodland/open woodland (Bioclimatic Group No 10). In a more detailed study, Edwards (1967) classified the area as marginal and transitional valley vegetation or more specifically as Interior *Acacia karroo* and *A. nilotica* Thorn Veld. This woody vegetation type has invaded what Edwards (1967) terms *Themeda-Hyparrhenia* grassland. Economically important species: none. Endemic species: none.

Fauna The land was denuded and very severely eroded prior to conservation measures being taken, and, therefore, the mammalian fauna has been drastically depleted due to habitat deterioration and excessive hunting. The most important large mammals are buffalo *Syncerus caffer* introduced recently from Addo Elephant National Park. Other large mammals included: square-lipped rhinoceros *Ceratotherium simum* (6), giraffe *Giraffa camelopardalis* (4), Burchell's zebra *Equus burchelli* (40), red hartebeest *Alcelaphus caama* (20), and eland *Taurotragus oryx* (46). Various small antelope and other small mammals occur on the

reserve. Over 60 species of birds have been recorded on the reserve. Threatened species: black rhinoceros *Diceros bicornis* (T).

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies Overgrazing in the past caused erosion which has caused management related problems. The grassland has been heavily utilised since 1890. This has resulted in serious deterioration, extensive *Acacia karroo*-*A. nilotica* encroachment, and in impoverished grass cover.

Visitor Facilities Facilities include picnic sites. Numbers: 2,000 per annum. Potential: could be increased by a planned caravan park.

Scientific Research Management orientated research - monitoring fauna, flora and soil erosion

Special Scientific Facilities None

Principal Reference Material

- ° Edwards, D. (1967). A plant ecological survey of the Tugela River basin. *Memoirs of the Botanical Survey of South Africa* 36.
- ° Phillips, J.F.V. (1972). The agricultural and related development of the Tugela Basin and its influent surrounds. Natal Town and Regional Planning Commission Reports Vol. 19.
- ° West, O. (1951). The vegetation of Weenen County, Natal. *Memoirs of the Botanical Survey of South Africa* 23.

Staff One senior ranger and 19 other graded and ungraded staff

Budget R12,590 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Weenen Nature Reserve, PO Box 122, Weenen, 3325.

Date July 1983

MIDMAR PUBLIC RESORT NATURE RESERVE

Management Category V (Protected Landscape)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 21 March 1968. Government Notice 17 of 1974

Geographical Location 5km from Howick in Natal. 29°30'S, 30°12'E.

Altitude 1,040-1,138m

Area 2,831ha (1,316ha land, 1,515ha water)

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features Gently undulating grass covered hills, lower lying open grassland and vleis. Waterbodies include Midmar Dam, a large man-made impoundment and the Umgeni River. Soils are rocky, and shale based with shallow top soil. Annual average temperature range: no available information. Annual rainfall 775mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of 1,316ha Southern Tall Grassveld (Veld Type 65). Mixed grassland, including species such as *Eragrostis*, *Themeda*, and *Aristida* spp..

Fauna Fauna includes square-lipped rhinoceros *Ceratotherium simum*, Burchell's zebra *Equus zebra burchelli* (52), blesbok *Damaliscus dorcas phillipsi* (28), red hartebeest *Alcelaphus buselaphus* (55), impala *Aepyceros melampus* (36), reedbuck *Redunca fulvorufula* (60), springbok *Antidorcas marsupialis* (22), black wildebeest *Connochaetes gnou* (23), and eland *Taurotragus oryx* (6). Virtually all these species were introduced. Threatened species: oribi *Ourebia ourebi* and wattled crane *Bugeranus carunculatus*.

Conservation Management A management plan is being drafted.

Zoning In progress

Disturbances or Deficiencies Stray dogs and littering by visitors pose problems.

Visitor Facilities Facilities include game park tours, boat tours, horse riding, museum, restaurant, boat hire, boat locker, swimming pool, bowls, squash, tennis, boating, and fishing. Numbers: 552,000 per annum. Potential: full capacity.

Scientific Research Veld monitoring plots

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Management four senior and five junior staff; Tourism - four senior and eight junior staff

Budget R250,000 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Midmar Public Resort, Private Bag, Howick, 3290.

Date August 1983

FALSE BAY NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1 June 1954. Proclamation 9 of 1944 and Proclamation 111 of 1952.

Geographical Location 8km from Hluhluwe in Natal. 28°00'S, 32°15'-32°22'E

Altitude Sea level-30m

Area 2,247ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The reserve comprises a narrow strip of shore along the western shore of Lake St Lucia, gently sloping up to flat or slightly undulating countryside. This reserve is situated on Lake St Lucia, which covers about 300 sq.km. Hluhluwe and Mzinene Rivers. Soils are sandy and 17 soil series occur in the reserve. Annual average temperature range minimum: 10-19°C, maximum: 23-30°C. Annual rainfall 500mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of Coastal Forest and Thornveld (Veld Type 1); thicket to open woodland of a tropical drought-deciduous type. Notable species include *Cleistanthus schlechteri*, *Newtonia hildebrandtii*, and *Balanites maughamii*.

Fauna Mammals include: serval *Felis serval*, warthog *Phacochoerus aethiopicus*, nyala *Tragelaphus angasi*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca arundinum*, blue wildebeest *Connochaetes taurinus*, and impala *Aepyceros melampus*. Birds of interest include white pelican *Pelecanus onocrotalus* and Goliath heron *Ardea goliath*. Threatened species: pangolin *Manis temminckii*, suni *Neotragus moschatus*, red duiker *Cephalophus natalensis*, and crocodile *Crocodylus niloticus* (V).

Conservation Management A management plan exists for this area.

Zoning None

Disturbances or Deficiencies Intensive farming around the reserve has led to the extermination of large carnivores and a reduction in numbers of large herbivores.

Visitor Facilities Facilities include campsites; hunting and fishing is permitted within the reserve. Numbers: 20,380 per annum. Potential: maximum at present.

Scientific Research Management orientated studies

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Two senior staff and 15 junior staff (game guards)

Budget R45,430 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-charge, False Bay Park, PO Hluhluwe, 3960.

Date June 1983

KAMBERG NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1 June 1951. Proclamation 38 of 1951

Geographical Location 40km from Rosetta in Natal. 29°15'-29°25'S, 29°40'-29°45'E.

Altitude 1,645-2,224m (Gladstone's Nose)

Area 2,232ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The area is flat to undulating with a large natural vlei and the Mooi River. The soils, derived largely from sandstone of the Upper Beaufort Beds, are brown on the surface changing to a buff colour at greater depth, and are classified as Lateritic Yellow Earths. Alluvial soils along the riverbanks are underlain by coarse gravel. Annual average temperature range not recorded, but complete range drops well below zero and rises to nearly 40°C. Annual rainfall 1,077mm, falling mainly in summer (November-March).

Vegetation Vegetation types consist of 2,232ha Highland Sourveld (Veld Type 44(a)). The reserve includes samples of several natural biotic communities. Most of the grasses are unpalatable on reaching maturity, and the grassland is referred to as sourveld and is only readily grazed for about five months, after burning in early spring. *Leucosidea sericea* (umtchitchi) grows in profusion along the stream banks while *Protea* spp. occur in abundance below the sandstone cliffs. *Greyia sutherlandii* occurs to a limited extent in the sandstone belt. In some situations, the grassland seems to be invaded by *Helichrysum* spp, *Buddleja salviifolia*, and *Cliffortia nitidula* during the intermediate successional stages. The principal grasses include: *Andropogon appendiculatus*, *Alloteropsis semialata*, *Elionurus argenteus*, *Harpochloa falx*, *Themeda triandra* and *Tristachya hispida*. Economically important species: specially protected plant species on the reserve include *Protea roupelliae*.

Fauna Mammals include: klipspringer *Oreotragus oreotragus*, common duiker *Sylvicapra grimmia*, reedbuck *Redunca arundinum*, mountain reedbuck *Redunca fulvorufula*, grey rhebok *Pelea capreolus*, and blesbok *Damaliscus dorcas phillipsi* (reintroduced). Threatened species: oribi *Ourebia ourebi* and bearded vulture *Gypaetus barbatus*.

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies Soil erosion caused by fires, drainage and by overgrazing is a problem. There is a public road which traverses the reserve and increases disturbance and vulnerability.

Visitor Facilities A small camp with huts is available with facilities for trout fishing. Numbers: 3,600 per annum. Potential: no planned development.

Scientific Research Trout rearing and release; mammal monitoring

Special Scientific Facilities Large trout hatchery

Principal Reference Material

- ° Edwards, D. (1967). A plant ecological survey of the Tugela Basin. *Memoirs of the Botanical Survey of South Africa* 36.
- ° Scott, J.D. (1951). A contribution to the study of the problems of the Drakensberg Conservation Area. *Science Bulletin* 324. Government Printer, Pretoria.

Staff Officer-in-Charge, camp superintendent, relief ranger, and 30 junior staff

Budget R10,500 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Kamberg Nature Reserve, PO Rosetta, 3301.

Date July 1983

VERNON CROOKES NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1972. Proclamation 254

Geographical Location 10km from Umzinto in Natal. 30°15'-30°19'S, 30°33'-30°38'E.

Altitude 200-538m

Area 2,189ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features Features include a series of steep-sided valleys and drainage lines which arise from an undulating plateau in the northern part. Streams flowing from the reserve form part of the Umzinto River catchment. Main streams are the Nyengdezi, Mzinyani, mHlanga and Umzinto Rivers. Soils are derived in the main from pink granite. Uranium bearing quartzites are also present. The north-eastern portion of the reserve is a flat plateau of Table Mountain Sandstone. Annual average temperature range minimum: 9-19°C, maximum: 22-28°C. Annual rainfall 1,000mm falling mainly in summer (September-March).

Vegetation Vegetation types consist of Coastal Forest and Thornveld (Veld Type 1). (a) Forest and riverine forest: evergreen and partly deciduous. *Protorhus longifolia*, *Bequaertiodendron natalense*, *Millettia grandis*, *Vepris lanceolata*, *Rauvolfia caffra*, *Syzygium cordatum* and *Macaranga capensis*; (b) Scrub and scrub forest: *Albizia adianthifolia*, *Trema orientalis*, *Clerodendrum glabrum*, *Maesa lanceolata*; (c) Grasslands and grassland/bushclump mosaic: *Themeda triandra*, *Cymbopogon excavatus*, *Aristida junciformis*, *Pteridium aquilinum*, *Protorhus longifolia* and *Phoenix reclinata*; (d) Wetlands: swamp vlei with *Phragmites communis* and *Cyperus* spp.. Economically important species: none. Endemic species: none.

Fauna A variety of species have been recorded, including the following endangered species: Southern African python *Python sebae natalensis*, red duiker *Cephalophus natalensis*, blue duiker *Cephalophus monticola*, and oribi, *Ourebia ourebi*.

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies Main management problem has been invasion by alien plants, but this is now under control.

Visitor Facilities Facilities include a camp site. Numbers: 5,500 per annum. Potential: undetermined.

Scientific Research Management orientated - veld burning, vegetation mapping and assessing, and mammal monitoring

Special Scientific Facilities Laboratory for scientific study plus basic accommodation

Principal Reference Material

° Bourquin, O. and Sawler, S.G. (1980). The vertebrates of Vernon Crookes Nature Reserve. *The Lammergeyer* 28: 20-32.

Staff One senior ranger, part-time clerk, and 40 junior staff

Budget R15,050 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, PO Box 624, Umzinto Station, 4201.

Date December 1983

ORIBI GORGE NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 22 March 1950. Proclamation 19 of 1950, Proclamation 35 of 1957, and Proclamation 167 of 1972.

Geographical Location 21km from Port Shepstone in Natal. 30°41'-30°45'S, 30°10'-30°18'E

Altitude 150-517m

Area 1,809ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features King (1942) maintains that the Oribi and Murchison Flats (north and south of the reserve respectively) are structural plains or pseudo-peneplains which were formed by the weathering and erosion of a layer of softer rock on top of a harder one. Through this 500m plateau, between these plains, the Umzimkulwana River has eroded a gorge through the Table Mountain sandstone down to the granite - the Oribi Gorge. The cliffs at the Rocks (at the westernmost point of the reserve) which face westwards, were caused by faulting. Pieces of broken sandstone can be seen in a strip 50m wide along this fault. On the basis of the parent rock, viz Table Mountain sandstone in the higher parts of the reserve and granite in and around the river-bed, the following three soil forms can be expected: Cartref form on the sandstone on the well-drained parts; in the wetter places the Cartref form may merge into a Longlands form, and a Glenrosa form on the eastern side of the reserve along the river, comprising an orthic A on a lithocutanic B horizon. Annual average temperature range minimum: 13°C, maximum: 23°C. Annual rainfall 1,120mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of 1,809ha Valley Bushveld (Veld Type 23). The vegetation types are as follows: (a) forest; (b) evergreen riverine thicket; (c) evergreen and deciduous (mixed) thicket; (d) evergreen sclerophyllous shrubland, includes *Leucadendron spissifolium* and *Tarchonanthus trilobus*; (e) induced open woodland with clumped trees; (f) dwarf-shrub grassland; (g) grassland; and (h) lithophytic communities. Economically important species: none. Endemic species: none.

Fauna Mammals are few but include the common duiker *Sylvicapra grimmia* and bushbuck *Tragelaphus scriptus*. Threatened species: blue duiker *Cephalophus monticola*, oribi *Ourebia ourebi*, samango monkey *Cercopithecus mitis*, striped weasel *Poecilogale albinucha*, and leopard *Panthera pardus* (T).

Conservation Management A management plan exists for this area.

Zoning Zoning in progress

Disturbances or Deficiencies None

Visitor Facilities The rest camp has six fully equipped huts. There is a separate ablution block with toilets, baths, showers, wash basins with hot and cold water, and a kitchen where visitors' meals are prepared by the camp staff. There is also a common room, equipped with a fireplace and a herbarium, and barbecue facilities. There are various nature trails which may be used freely by visitors. Fishing is permitted. Numbers: 2,800 per annum. Potential: full capacity.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- ° Beater, B.E. (1970). Soil Series of the Natal Sugar Belt. South African Sugar Association, Durban.
- ° Bews, J.W. (1920). The plant ecology of the Coast Belt of Natal. *Natal Museum Annals* 4: 367-470.
- ° Du Toit, A.L. (1946). *The geology of parts of Pondoland, East Griqualand and Natal*. Department of Mines, Geological Survey, Pretoria.
- ° Glen, H.F. (1972). A contribution to the flora of the Oribi Gorge Nature Reserve, Natal South Coast. Honours Project, University of the Witwatersrand.
- ° King, L.C. (1942). *South African Scenery: Textbook of Geomorphology*. Oliver and Boyd, Edinburgh.

Staff One senior ranger, one camp superintendent, and 21 junior staff (management)

Budget R5,410 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, Oribi Gorge Nature Reserve, PO Plains, 4243.

Date July 1983

COLEFORD NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 24 February 1948. Proclamation 72 of 1959

Geographical Location 27km from Underberg in Natal. 30°S, 29°E.

Altitude 1,410m-1,650m

Area 1,272ha

Land Tenure State. Administered by the Natal Parks, Game and Fish Preservation Board of the Natal Provincial Administration.

Physical Features The major feature of the reserve is the Ingwangwana River, which flows south-south-eastwards through the south-eastern portion of the reserve. Its floodplain is fairly flat and narrow, rising up gently from the south bank to a series of low hills which overlook its major tributary, the Ndowana River. In the north-western section of the reserve (Sunnyside) the slope up from the Ingwangwana is much steeper, rising rapidly to high hills (1,650m) with cliffs of Beaufort Sandstone on their south-eastern sides. The soils have not been studied. There are no records of the annual average temperature range, which falls to well below freezing and rises to well above 30°C. Annual rainfall 970mm, falling mainly in summer (November-March).

Vegetation Vegetation types consist of 1,272ha Highland Sourveld (Veld Type 44(a)). The vegetation consists of open grassland with a dense, fairly short sward. Typical grasses include: *Alloteropsis semialata*, *Andropogon appendiculatus*, *Elionurus argenteus*, *Harpochloa falx*, *Monocymbium ceresiiforme*, *Themeda triandra*, and *Tristachya hispida*. Economically important species: none. Endemic species: none.

Fauna Large mammals re-established in the reserve are blesbok *Damaliscus dorcas phillipsi*, black wildebeest *Connochaetes gnou* (O), red hartebeest *Alcelaphus buselaphus*, and eland *Taurotragus oryx*. Common duiker *Sylvicapra grimmia* and reedbuck *Redunca arundinum* also occur. Well over 100 species of birds occur on the reserve. Threatened species: bearded vulture *Gypaetus barbatus* and wattled crane *Bugeranus carunculatus* (of special concern).

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies Drained oxbow lakes and erosion scars due to past agrarian practises.

Visitor Facilities Facilities include a rest camp with 40 beds, trout fishing, tennis, croquet, horse riding, and walking. Numbers: 2,775 per annum. Potential: 14,600 per annum.

Scientific Research Management orientated, including burning and a certain amount of research on eland.

Special Scientific Facilities None

Principal Reference Material Management Plan of Natal Parks Board

Staff Management - two senior staff and 20 junior staff; Tourism - one senior staff and 14 junior staff

Budget R22,970 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, PO Box 128, Underberg, 4590.

Date July 1983

VERGELEGEN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 14 December 1967. Proclamation 110 of 1967, Proclamation 135 of 1970, and Proclamation 133 of 1976.

Geographical Location 35km from Himeville in Natal. 29°S, 30°E.

Altitude 1,380-1,850m

Area 1,159ha

Land Tenure Government. Administered by the Natal Parks, Game and Fish Preservation Board, Natal Provincial Administration.

Physical Features The terrain along the Mlahlangubo Stream valley is precipitous and scenic with steep slopes ascending into the Drakensberg range. The Mkomazi River and Mlahlangubo Stream flows through the area. Due to the high rainfall and relatively low temperatures, weathering is intense and, through percolation, the soils have been depleted of bases such as calcium, magnesium, sodium, and potassium. All well-drained uplands are occupied by leached ferriferous soils. On the crests of the hills in the reserve, Mispah forms are dominant whilst on the mid- and footslopes, Clovelly and Hutton forms are dominant. The marshy vleis characteristic of the bottomlands possess acid hydromorphic soils. Snowfalls are frequent. Annual rainfall 1,330mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of 1,159ha Highland Sourveld (Veld Type 44(a)). The vegetation may be described as follows: (a) grassland: dominated by *Themeda triandra*. (b) *Protea* woodland: dominated by *Protea multibracteata* and *Protea roupelliae*. (c) Boulder bed scrub: typical species are *Leucosidea sericea* and *Bowkeria verticillata*. (d) Streambank scrub: this includes a variety of species such as *Halleria lucida*, *Leucosidea sericea*, *Rhus* spp., and *Buddleja salviifolia*. (e) Evergreen mountain forest: climax species is *Podocarpus latifolius*. Economically important species: none. Endemic species: none.

Fauna Thirteen species of mammals have been recorded in the reserve. The important mammals include: bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, grey rhebok *Pelea capreolus*, reedbuck *Redunca arundinum*, and mountain reedbuck *Redunca fulvorufula*. A considerable number of birds and several reptiles and amphibians have been recorded. Indigenous fish known to occur are *Barbus natalensis* and *Amphilius natalensis*. Threatened species: oribi *Ourebia ourebi*; Cape vulture *Gyps coprotheres*, peregrine falcon *Falco peregrinus*, and bearded vulture *Gypaetus barbatus*.

Conservation Management A management plan exists for this area.

Zoning In progress

Disturbances or Deficiencies Problem with exotic tree plantations in a natural area.

Visitor Facilities The reserve is open to the public. Two two-bedroomed cottages are available and there are two picnic sites near the Mhahlangubo causeway. Trout fishing is available and rod tickets may be purchased at the office or at Himeville and Loteni Nature Reserves. Hiking is permitted throughout the reserve and visitors may purchase permits to enter the adjoining State Forestry Land. Records have been kept of visitor numbers since January 1973. Numbers: 800 per annum. Potential: numbers can be increased.

Scientific Research Management orientated - mammal monitoring, veld monitoring, burning policies

Special Scientific Facilities None

Principal Reference Material

* Killick, D.J.B. (1963). An account of the plant ecology of the Cathedral Peak area of the Natal Drakensberg. *Memoirs of the Botanical Survey of South Africa* 34.

Staff Officer-in-Charge and 16 junior staff

Budget R1,940 per annum (excluding salaries)

Local Park or Reserve Administration Officer-in-Charge, PO Box 53, Himeville, 4585.

Date July 1983

BLYDE RIVER NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1965. Administrator's Notice 356 of 1965.

Geographical Location 25km from Graskop in Transvaal. 24°35'S, 30°50'E.

Altitude 676-1,831.7m (Drakensberg)

Area 22,664ha (22,401ha land and 263ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The Eastern Transvaal escarpment is deeply incised by the Blyde and Ohrigstad Rivers forming the impressive canyon which is at the centre of the reserve. This escarpment forms the eastern boundary of the reserve. A number of other outstanding physical features occur; God's Window, Devil's Window, Quartzkop, Cowveld View, Blyde Dam and Canyon, The Peak, potholes at the confluence of the Blyde and Treuer Rivers, and Kadishi

stream with tufa deposits. Geology of the area comprises quartzite krantzies and softer shales of the Wolkberg series and a dolomite layer overlaying the quartzite. Rivers include Blyde, Ohrigstad, Treur, and Watervalsspruit and there are two Rondawels, the Pinnacle and Mariepskop. Annual average temperature range minimum: 9°C, maximum: 24°C. Annual rainfall 2,661mm (God's Window), 1,231mm (Bourke's Luck) and 650mm (Swadini), falling mainly in summer (October–April).

Vegetation Vegetation types consist of the North-Eastern Mountain Sourveld (Veld Type 8) and Lowveld Sour Bushveld (Veld Type 9). The reserve is characterised by the high montane grassland and scrubland areas dominated by *Eragrostis sclerantha*, *E. capensis*, *Loudetia simplex*, *Themeda triandra*, *Protea roupelliae*, *P. caffra*, *P. laetans*, *P. rubropilosa*, *Lopholaena disticha*, *Erica drakensbergensis*, *Ekebergia pterophylla* and *Bequaertiodendron magalismontanum*. Montane forests with *Podocarpus latifolius*, *Diospyros whyteana*, and *Rapanea melanophloeos*. *Halleria lucida* and *Apodytes dimidiata* are found in the protected kloofs and higher mountain slopes. The foothills and low-lying valley areas are characterised by closed to open tall woodland communities with *Ptaeroxylon obliquum*, *Cussonia natalensis*, *Celtis africana*, *Rhus legati*, *Mimusops zeyheri*, *Parinari curatellifolia*, *Sclerocarya caffra*, *Faurea saligna*, *Lannea edulis*, *Catha edulis*, *Ficus ingens*, and *Dombeya rotundifolia*. Economically important species: none. Endemic species: the following are endemic to the Transvaal and occur in this reserve: *Encephalartos inopinus*, *E. cupidus*, *E. laevifolius*, *E. paucidentatus*, *Protea laetans*, *P. rubropilosa*, *Aloe minima* var. *blyderivierensis*, *Dombeya autumnalis*, *Gladiolus varius* var. *micranthus*, *G. vernus*, *Watsonia transvaalensis*, and *Clivia caulescens*.

Fauna The more important mammals are: hippopotamus *Hippopotamus amphibius*, bushpig *Potamochoerus porcus*, mountain reedbuck *Redunca fulvorufula*, and klipspringer *Oreotragus oreotragus*. Birds include: black eagle *Aquila verreauxii*, bald ibis *Geronticus calvus* (R), crowned eagle *Stephanoaetus coronatus*, purple crested lourie *Tauraco porphyreolophus* and narina trogon *Apaloderma narina*. Reptiles include: water snake *Lycodonamorphus laevis* var. *fitzsimonsi*, also rough-scaled plated lizard *Gerrhosaurus major*. Fish include: large-scale yellowfish *Barbus marequensis*, tilapia *Oreochromis mossambicus*, chubbyhead barb *Barbus anoplus* and southern red-breasted tilapia *Tilapia rendalli*. Threatened species: mammals; leopard *Panthera pardus* (T), Meller's mongoose *Rhynchogale melleri*, Welwitsch's hairy bat *Myotis welwitschii*, South African hedgehog *Erinaceus frontalis*, four-toed elephant shrew *Petrodromus tetradactylus*, lesser bushbaby *Galago senegalensis*, thick-tailed bushbaby *Galago crassicaudatus*, samango monkey *Cercopithecus mitis*, pangolin *Manis temminckii*, honey badger *Mellivora capensis*, striped weasel *Poecilogle albinucha* and African civet *Civettictis civetta*. Reptiles: veld monitor *Varanus exanthematicus albigularis*, water monitor *V. niloticus*, Southern African python *Python sebae* and dwarf chameleon *Bradypodion pumilo transvaalensis*; birds: Cape vulture *Gyps coprotheres* (V) and black sparrowhawk *Accipiter melanoleucus*.

Conservation Management A management plan exists for this area.

Zoning Hiking trails in natural area, wilderness area, and high density tourism area

Disturbances or Deficiencies Management problems are associated with the mountainous terrain and the invasion of plant species such as *Acacia mearnsii* and *Pinus* spp.. To date, 37 alien species have been identified in the Blyde River Canyon.

Visitor Facilities Facilities include two resorts, picnicking, mountaineering, camping, horse riding, hiking, guided tours, and birdwatching. The Blyde Canyon is one of the most impressive canyons in the world. It has been developed chiefly as a hiking area, with the Blyderivierspoort, Eerste Liefde and Muilhuis Hiking Trails. Numbers: 160,000 per annum. Potential: 300,000 per annum.

Scientific Research None

Special Scientific Facilities Laboratory

Principal Reference Material Various unpublished internal reports

Staff 15 nature conservators and 88 labourers

Budget R450,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Blyde River Nature Reserve, PO Bourke's Luck, 1272.

Date March/April 1983

BLOEMHOF DAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1975; Provincial Ordinance 12 of 1983

Geographical Location 5km from Bloemhof in Transvaal; Vaal River forms the southern border. 27°35'S, 25°52'-26°05'E.

Altitude 1,239-1,249m

Area 22,072ha (12,850ha land and 9,222ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This reserve is part of the Vaal River System. The topography is flat, lying on pre-Karoo rocks with a geology of shale and sandstone. Sandy in places, but predominantly loam soils and Kalahari sand on limestone. Annual average temperature range minimum: 10°C, maximum: 27°C. Annual rainfall 508mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Kalahari Thornveld (Veld Type 16) and Dry *Cymbopogon-Themeda* Veld (Veld Type 50), and the vegetation is dominated by open short grassveld with clumps of *Tarchonanthus camphoratus* and small thickets of *Ziziphus mucronata*, *Rhus lancea*, and *Acacia karroo* in the central areas, with denser thickets of *A. erioloba*, *A. karroo*, and *A. heteroneura* in the Kalahari Thornveld areas. Important grasses are *Eragrostis obtusa*, *E. lehmanniana*, *E. trichophora*, *E. curvula*, *Cymbopogon plurinodis*, and *Panicum stapfianum*. Economically important species: none. Endemic species: none.

Fauna Mammals: black wildebeest *Connochaetes gnou* (O), eland *Taurotragus oryx*, springbok *Antidorcas marsupialis*, gemsbok *Oryx gazella*, blesbok *Damaliscus dorcas phillipsi*, and red hartebeest *Alcelaphus buselaphus*. Fish: smallmouth yellowfish *Barbus holubi*, threespot barb *B. trimaculatus* and sharptooth catfish *Clarias gariepinus*. There is a large waterfowl population. Noteworthy reptiles are the Cape cobra *Naja nivea* and serrated tortoise *Psammobates oculifer*. Threatened species: none.

Conservation Management The area does have a management plan. The reserve is still being developed and a large portion is not yet fenced.

Zoning Recreation and natural areas

Disturbances or Deficiencies There are large areas of previously ploughed lands, and the reserve is not easy to manage as it is mainly a long, narrow strip along the Vaal River. Termite problems

Visitor Facilities Facilities include angling; facilities are still basic. Numbers: 30,000 per annum. Potential: 50,000 per annum.

Scientific Research Veld succession monitoring

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Three nature conservators and 25 labourers

Budget R50,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Bloemhof Nature Reserve, Private Bag X7, Bloemhof, 2660.

Date March/April 1983

LOSKOP DAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1954. Administrator's Notice 223 of 1954

Geographical Location 35km from Groblersdal in Transvaal. 25°30'S, 29°20'E.

Altitude 14,800ha (12,448ha land and 2,352ha water)

Area No information

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The landscape may be described as hilly with fairly steeply sloping valley sides and deeply incised drainage lines that have a relatively narrow alluvial deposition representing the bottomlands. To the south, the reserve is dominated by the Nylstroom Series of the Waterberg System, the main geological materials being lava, sandstone, conglomerate, siltstone, and greywacke. Underlying the northern region are feldspar, pyroclasts and granopyre of the Bushveld Igneous Complex. Olifants River and Kerkplaas se Loop flows through the area. The soils of the hills and slopes are comprised mainly of rocky lithosols, whilst those of the bottomlands are deep red to yellow clay loams and mostly base saturated. Annual average temperature range minimum: 14°C, maximum: 28°C. Annual rainfall 664mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Mixed Bushveld (Veld Type 18) and Sourish Mixed Bushveld (Veld Type 19). Physiognomically the hilltops and slopes are open savanna vegetation with a tall herbaceous layer; shrubs are scarce. Along drainage lines, a narrow fringe of closed woodland occurs, whilst on the bottomlands in the north, a relatively dense thicket occurs. The vegetation can be structurally divided into 14 plant communities. The most dominant are *Diplorhynchus condylocarpon*, *Enneapogon* spp., and *Loudetia simplex* open woodland; *Combretum apiculatum*-*Acacia caffra*-*Themeda triandra* open woodland and *Burkea africana*-*Loudetia simplex* open woodland. Economically important species: none. Endemic species: *Gladiolus pole-evansii* and *Triaspis glaucophylla* are endemic to the Transvaal and occur in this reserve.

Fauna Mammals: mountain reedbuck *Redunca fulvorufula*, kudu *Tragelaphus strepsiceros* and lesser kudu *Tragelaphus imberbis*, square-lipped rhinoceros *Ceratotherium simum*, chacma baboon *Papio ursinus*, buffalo *Syncerus caffer*, impala *Aepyceros melampus*, blue wildebeest *Connochaetes taurinus*, Burchell's zebra *Equus burchelli* and nyala *Tragelaphus angasi*. Reptiles: pygmy sand snake *Psammodon angolensis*. Fish: largescale yellowfish *Barbus marequensis*, sharptooth catfish *Clarias gariepinus*, butter catfish *Eutropius depressirostris* and redbreast tilapia *Tilapia rendalli*. Threatened mammals: brown hyena *Hyaena brunnea* (T), African civet *Civettictis civetta*, leopard *Panthera pardus* (T), sable *Hippotragus niger*, South African hedgehog *Erinaceus frontalis*, straw-coloured fruit bat *Eidolon helvum*, lesser bushbaby *Galago senegalensis*, thick-tailed bushbaby *Galago crassicaudatus*, pangolin *Manis temminckii*, African water rat *Dasymys incomtus*, honey badger *Mellivora capensis*, striped weasel *Poecilogale albinucha*, aardwolf *Proteles cristatus* and oribi *Ourebia ourebi*; reptiles: veld monitor *Varanus exanthematicus albigularis*, water monitor *Varanus niloticus*, South African python *Python sebae*, and Nile crocodile *Crocodylus niloticus* (V); birds: African fish eagle *Haliaeetus vocifer*, martial eagle *Polemaetus bellicosus* and peregrine falcon *Falco peregrinus* (V).

Conservation Management A management plan exists for this area.

Zoning High intensity tourism area, natural area and wilderness area

Disturbances or Deficiencies Rugged nature of terrain; all the flat alluvial plains in the reserve have been inundated by the dam.

Visitor Facilities Facilities include a public resort, shop, camping, huts, caravanning, and a swimming pool. Numbers: 4,000 per annum. Potential: 10,000 per annum.

Scientific Research Detailed vegetation description. Ecology of mountain reedbuck *Redunca fulvorufula*. Survey of chacma baboon *Papio ursinus* endo-parasites. Study of mistletoe/bird inter-relationships.

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports.

° Theron, G.K. (1973). 'n Plant-ekologiese studie van die Loskopdam Natuureservaat. M.Sc. Thesis, University of Pretoria.

Staff Three nature conservators and 21 labourers

Budget R100,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Loskop Dam Nature Reserve, Private Bag X606, Groblersdal, 0470.

Date March/April 1983

SUIKERBOSRAND NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1974. Administrator's Notice 514 of 1974

Geographical Location 20km from Heidelberg in Transvaal. 26°30'S, 28°15'E.

Altitude 1,608–1,918m (Suikerbosrand)

Area 13,337ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This reserve forms part of the series of quartzite ridges along the Witwatersrand. The topography is mountainous with non-perennial streams. The soil is poor and acidic and either stony or sandy. Annual average temperature ranges minimum: 10°C, maximum: 25°C. Annual rainfall 700mm, falling mainly in summer (October–April).

Vegetation Vegetation types consist of the Bankenveld (Veld Type 61(b)). Grassland with patches of woodland and shrubland. The dominant communities include *Rhus pyroides* thickets: *Canthium gilfillanii*, *Aristida transvaalensis*, *Cymbopogon marginatus* savanna, *Eragrostis racemosa*, *Digitaria monodactyla* grassland, *Euclea crispa*, *Rhoicissus tridentata* shrubland, and *Trachypogon spicatus*, *Themeda triandra* grassland. Economically important species: none. Endemic species: *Mossia intervallaris* is endemic to the Transvaal and occurs in this reserve.

Fauna Mammals: eland *Taurotragus oryx*, black wildebeest *Connochaetes gnou*, red hartebeest *Alcelaphus buselaphus*, Burchell's zebra *Equus burchelli*, blesbok *Damaliscus dorcas phillipsi*, and anteater *Orycteropus afer*. Reptiles and amphibians: cross-marked grass snake *Psammophis crucifer*, common egg-eater *Dasypeltis scabra*, guttural toad *Bufo gutturalis*, rattling kassina *Kassina weali*, Transvaal crag lizard *Pseudocordylus microlepidotus melanotus*, rock agama *Agama atra*, and spotted harlequin snake *Homoroselaps lacteus*. Threatened species: brown hyena *Hyaena brunnea*, South African hedgehog *Erinaceus frontalis*, water rat *Dasymys incommutus*, striped weasel *Poecilogale albinucha*, aardwolf *Proteles cristatus*, leopard *Panthera pardus* (T), and oribi *Ourebia ourebi*.

Conservation Management A management plan exists for this area.

Zoning Natural and recreational areas

Disturbances or Deficiencies Invasive plants including *Acacia mearnsii* and *Opuntia* spp.
ls

Visitor Facilities Facilities include camping, hiking, picnic spots and environmental education facilities for youth groups. Numbers: 30,000 per annum. Potential: 100,000 per annum.

Scientific Research Population dynamics of predator/prey relationships and vegetation surveys are currently being researched.

Special Scientific Facilities Laboratory

Principal Reference Material Various unpublished internal reports

Staff Ten nature conservators and 40 labourers

Budget R400,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Suikerbosrand Nature Reserve, Private Bag X616, Heidelberg, 2400.

Date March/April 1983

DOORNDRAAI DAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1973; Provincial Ordinance 12 of 1983

Geographical Location 40km from Potgietersrus in Transvaal. 24°20'S, 28°45'E.

Altitude 1,183m-1,464m

Area 7,229ha (6,652ha land and 577ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The terrain is undulating and hilly. The reserve lies in the Sterk River valley of the Waterberg, which consists of sandstone, granite, and conglomerates. There are also rock piles, the origins of which are not known and archaeological artifacts in erosion gullies. The Sterk River flows into the Doorndraai Dam. The soils are very poor litholsols of a sandy, rubbly nature. Annual average temperature range minimum: 13°C, maximum: 28°C. Annual rainfall 611mm, falling mainly in summer (October-April).

Vegetation Vegetation types include the Sour Bushveld (Veld Type 20), open savanna of tall straight *Faurea saligna*, in a tall, tufted, wiry sour grassveld in the less rocky parts, and a dense mixed bushveld in the rugged parts. Examples of trees: *Acacia caffra*, *Protea caffra* on southern slopes, *Burkea africana* on rocky soils, *Terminalia sericea* on sandy soils, and *Acacia karroo* on plains. Also, *Combretum molle*, *C. zeyheri*, and *C. apiculatum*. Grasses: *Themeda triandra*, *Heteropogon contortus*, *Aristida congesta* and *Cymbopogon excavatus*. Economically important species: none. Endemic species: *Aloe petrophila* is endemic to the Transvaal and is found in the reserve.

Fauna Mammals: giraffe *Giraffa camelopardalis*, blue wildebeest *Connochaetes taurinus*, greater kudu *Tragelaphus strepsiceros* and lesser kudu *Tragelaphus imberbis*, Burchell's zebra *Equus burchelli*, waterbuck *Kobus ellipsiprymnus*, impala *Aepyceros melampus*, and anteater *Orycteropus afer*. Reptiles: Waterberg girdled lizard *Cordylus warreni breyeri* (endemic to Waterberg area) and serrated tortoise *Psammobates oculifer*. Fish: large scale yellowfish *Barbus marequensis*, canary largemouth *Chetia flaviventris* and redbreast tilapia *Tilapia rendalli*. Threatened mammals: leopard *Panthera pardus*, aardwolf *Proteles cristatus*, sable *Hippotragus niger*, brown hyena *Hyaena brunnea*, tsessebe *Damaliscus lunatus*, South African hedgehog *Erinaceus frontalis*, lesser bushbaby *Galago senegalensis*, African water rat *Dasymys incomtus*, honey badger *Mellivora capensis*, roan antelope *Hippotragus equinus*, African civet *Civettictis civetta*, thick-tailed bushbaby *Galago crassicaudatus* and

white-naped weasel *Poecilogle albinucha*; reptiles: veld monitor *Varanus exanthematicus albigularis*, water monitor *Varanus niloticus* and South African python *Python sebae natalensis*; birds: martial eagle *Polemaetus bellicosus* and fish eagle *Haliaeetus vocifer*.

Conservation Management A management plan exists for this area.

Zoning Zoned into various regions eg. watersports, trails, and recreational areas.

Disturbances or Deficiencies Invasive plants. Lack of artificial water points, old farm lands and concentration of game in good grazing areas. Reserve is divided by the irrigation dam. Some erosion occurs.

Visitor Facilities Facilities include camping, guided tours, boating, picnicking, fishing, and birdwatching. Proposed visitor centre, nature trails and bus tours will increase visitor numbers. Numbers: 30,000 per annum. Potential: 40,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Three nature conservators and 38 labourers

Budget R100,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Doorndraai Nature Reserve, PO Box 983, Potgietersrus, 0600.

Date March/April 1983

PONGOLA NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African woodland/savanna)

Legal Protection Total

Date Established 1979 This was possibly the first Game Reserve to have been proclaimed in Africa (1894). It was, unfortunately, deproclaimed in circa 1926, but reproclaimed in 1979. Provincial Ordinance 12 of 1983.

Geographical Location Golela in Transvaal. 27°20'S, 31°58'E.

Altitude 146m-730m (Lebombo Mountains)

Area 6,222ha (5,762ha land and 460ha water)

Land Tenure Government owned, administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The reserve borders on the Lebombo range which is an elevated tract built of lavas dipping to the east. The escarpment consists mainly of rhyolites of the Jozini

Formation. The Pongola River flows through the area. Approximately half of the reserve consists of a steep west facing scarp and talus slope with poorly developed lithosols. The other half of the reserve consists primarily of a west facing sediment slope on which the dominant soils are red to dark brown clays. Annual average temperature range minimum: 15°C, maximum: 29°C. Annual rainfall 617mm, falling mainly in summer (October-April).

Vegetation Zululand Thornveld (Veld Type 6), Lowveld (Veld Type 10) and Arid Lowveld (Veld Type 11). Open woodland communities on the low lying areas, high montane grassveld on the summits with grasslands, sparse woodland on the lower foothills and dense montane bush and kloof forest on the higher foothills and near summits. Dominant species of the summits are *Aloe marlothii*, *A. bainesii*, *Diospyros microphylla*, *Euphorbia grandidens*, *Croton sylvaticus*, and *Diospyros whyteana*. The foothills are represented by *Acacia nigrescens*, *Euclea* spp., and a variety of grasses with *Themeda triandra* as dominant. The low-lying areas are dominated by *Acacia nigrescens*, *Sclerocarya caffra*, *Acacia exuvialis*, *Ziziphus mucronata*, *Trichilia emetica*, *Spirostachys africana* and *Acacia schweinfurthii*. Economically important species: none. Endemic species: none.

Fauna Mammals: blue wildebeest *Connochaetes taurinus*, bushbuck *Tragelaphus scriptus*, nyala *Tragelaphus angasi*, impala *Aepyceros melampus*, and hippopotamus *Hippopotamus amphibius*. Birds: crowned eagle *Stephanoetus coronatus*, goliath heron *Ardea goliath*, crested guineafowl *Guttera pucherani*, black-bellied bustard (korhaan) *Lissotis melanogaster*, Rudd's apalis *Apalis ruddi*, and grey sunbird *Nectarinia veroxii*. Reptiles: flat gecko *Afroedura* spp. (restricted), short-headed burrowing skink *Scelotes brevipes* (uncommon) and thick-toed gecko *Pachydactylus* spp. (uncommon). Fish: large scale yellowfish *Barbus marequensis*, threespot barb *B. trimaculatus*, sharptooth catfish *Clarias gariepinus* and tigerfish *Hydrocynus vittatus*. Threatened reptiles: Nile crocodile *Crocodylus niloticus* (V) and Southern African python *Python sebae natalensis*.

Conservation Management The area does have a management plan.

Zoning All a natural area

Disturbances or Deficiencies Poaching of game

Visitor Facilities Being planned; reserve not open to the public. Numbers: none. Potential: probably 5,000 per annum.

Scientific Research Ecological study of impala

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 14 labourers

Budget R40,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Pongola Nature Reserve, PO Box 29, Golela, 3990.

Date March/April 1983

VERLOREN VALEI NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1984. Provincial Ordinance 12 of 1983

Geographical Location 15km from Dullstroom in Transvaal. 25°18'S, 30°07'E.

Altitude 2,150-2,316m (Steenkampsberg)

Area 6,055ha

Land Tenure State. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The area consists primarily of a plateau with a number of parallel dolerite and diabase ridges dissecting the area. A quartzite band dipping at 10° is protected by a series of dolerite dykes. Where the quartzite has been eroded, permanent marshes or sponges have formed along drainage lines between these ridges; 38 in all. Tributaries of Crocodile, Elands, and Steelpoort Rivers have their origins here. Annual average temperature range minimum: 5°C, maximum: 20°C. Annual rainfall 1,025mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the North-eastern Sandy Highveld (Veld Type 57). The vegetation contains a number of sub-alpine grassveld elements such as *Digitaria tricholaenoides*, *Harpochloa falx*, *Rendlia altera*, *Stiburus conrathii*, *Koeleria cristata*, *Alloteropsis semialata*, and *Festuca* spp. In the marshy areas, sedges, especially *Carex aethiopica* and various *Scirpus* and *Pycneus* spp., are dominant. The grass *Leersia hexandra* is locally common where there is open water, as are *Polygonum lapathifolium* and *Gunnera perpensa*. A few marshes support beds of the reed *Phragmites australis*. Economically important species: none. Endemic species: *Cheilanthes* sp. nov. *Aloe graciliflora*, *Agapanthus inapertus* ssp. *pendulus*, *A. inapertus* ssp. *parviflorus*, *Eucomis vandermerwei*, *Moraea modesta*, *Riocrexia aberrans*, and *Streptocarpus latens*.

Fauna Mammals: mountain reedbuck *Redunca fulvorufula*, grey rhebok *Pelea capreolus*, spotted-necked otter *Lutra maculicollis*, Cape clawless otter *Aonyx capensis*, and Hottentot golden mole *Amblysomus hottentotus*. Amphibians: bronze caco *Cacosternum nanum*, rattling kassina *Kassina weali*, striped grass frog *Ptychadena porosissima*, spotted rana *Rana grayi*, and gariep toad *Bufo gariepensis*. Reptiles: ocellated dwarf gecko *Lygodactylus ocellatus*, van Son's thick-toed gecko *Pachydactylus capensis vansonii*, Transvaal girdled lizard *Cordylus vittifer*, Transvaal crag lizard *Pseudocordylus microlepidotus melanotus*, common egg-eater *Dasypeltis scabra*, and cross-marked grass snake *Psammophis crucifer*. Threatened mammals: oribi *Ourebia ourebi*; birds: bald ibis *Geronticus calvus*, white stork *Ciconia ciconia*, black stork *C. nigra*, Cape vulture *Gyps coprotheres* (V) black harrier *Circus maurus*, wattled crane *Bugeranus carunculatus*, Stanley's bustard *Neotis cafra denhami*, Cape eagle owl *Bubo capensis*, Rudd's lark *Mirafra ruddi*, house martin *Delichon urbica*, pale-crowned cisticola *Cisticola brunneus*, yellow-breasted pipit *Anthus chloris* and Gurney's sugarbird *Promerops gurneyi*.

Conservation Management In preparation. Reserve only recently acquired and still being developed. The main objective of this reserve is the conservation of the wattled crane *Grus carunculata*, of which only a small number remain in South Africa, and the conservation of a wetland system.

Zonlng All a natural area

Disturbances or Deficiencies None

Visitor Facilities None; numbers: none. Potential: limited hiking

Scientific Research Proposed study of ecology of listed red data and rare species and grassland systems.

Special Scientific Facilities None

Principal Reference Material

- ° Tarboton, W.R. and Day, D. (1980). The Wattled Crane. *Fauna and Flora* 36.
- ° Tarboton, W.R. (in press). Breeding Behaviour of Stanley's Bustard. *Bustard Studies*.
- ° Various unpublished internal reports.

Staff One nature conservator (part time)

Budget R20,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Verloren Valei Nature Reserve, PO Box 98, Dullstroom, 1110.

Date July 1984

HANS MERENSKY NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1954. Administrator's Notice 223

Geographical Location 65km from Tzaneen in Transvaal. 23°42'S, 30°40'E.

Altitude 434-542m (Black Hills)

Area 5,282ha

Land Tenure Government Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features A relatively flat, slightly undulating topography. The eastern section is bordered by a low range of doleritic ridges known as the Black Hills. Other outstanding physical features include the island in the Letaba River and a mineral thermal spring. The great Letaba River and Mashavel Stream flow through the reserve. Sandy with brackish patches and a more loamy soil against the ridges (unleached subtropical). Annual average temperature range minimum: 15°C, maximum: 29°C. Annual rainfall 650mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Arid Lowveld (Veld Type 11). Predominantly closed *Colophospermum mopane* woodland and variations of *Combretum apiculatum*, *Pterocarpus rotundifolius*, and *C. apiculatum* and *Terminalia sericea* woodland. Patches of open *Terminalia sericea* woodland and *Acacia nigrescens* woodland are found scattered in this reserve. Riverine

vegetation is dominated by an *Acacia tortilis*-*Ficus sycomorus*-*Syzygium guineense* association. *Kirkia acuminata* scrubland is found in the Black Hills region. Economically important species: none. Endemic species: none.

Fauna Mammals: impala *Aepyceros melampus*, steenbok *Raphicerus campestris*, greater kudu *Tragelaphus strepsiceros* and lesser kudu *Tragelaphus imberbis*, giraffe *Giraffa camelopardalis*, Burchell's zebra *Equus burchelli*, blue wildebeest *Connochaetes taurinus*, warthog *Phacochoerus aethiopicus*, anteater *Orycteropus afer*, and hippopotamus *Hippopotamus amphibius*. Reptiles: tortoise *Geochelone pardalis*. Fish: redbreast tilapia *Tilapia rendalli*, silver labo *Labeo ruddi*, Mocambique tilapia *Oreochromis mossambicus*, and sharptooth catfish *Clarias gariepinus*. Birds: martial eagle *Polemaetus bellicosus*, thickbilled cuckoo *Pachycoccyx audeberti*, and Stierling's barred warbler *Camaroptera stierlingi*. Threatened mammals: wild dog *Lycaon pictus* (T), honey badger *Mellivora capensis*, African civet *Civettictis civetta*, tsessebe *Damaliscus lunatus*, sable *Hippotragus niger*, and cheetah *Acinonyx jubatus* (T). Reptiles: veld monitor *Varanus exanthematicus albigularis* and Nile crocodile *Crocodylus niloticus* (V).

Cultural Heritage The reserve has sites of considerable ethnological interest, these include an iron smelting oven and the Tsonga Kraal Open Air Museum.

Conservation Management A management plan exists for this area.

Zoning Vehicle borne tourism area as well as some natural areas

Disturbances or Deficiencies Problem weeds need control and there is some erosion along streams. Overgrazing in areas also causes a problem.

Visitor Facilities Visitor facilities include a holiday resort, visitor centre, bus tours, walking trails, and film shows. Numbers: 34,000 per annum. Potential: 40,000 per annum.

Scientific Research Vegetation survey

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Four nature conservators and 16 labourers

Budget R120,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Hans Merensky Nature Reserve, Private Bag X502, Letsitele, 0885.

Date March/April 1983

LANGJAN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1954. Administrator's Notice 223 of 1954

Geographical Location 20km from Vivo in Transvaal. 22°50'S, 29°13'E.

Altitude 775-824m

Area 4,774ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The topography of the reserve is flat. Geology consists of conglomerates, limestone, and sandstones. The Brak River flows through the area. Soils comprise Kalahari sand on limestone. Annual average temperature range minimum: 12°C, maximum: 35°C. Annual rainfall 482mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Arid Sweet Bushveld (Veld Type 14). Vegetation can be classified as short open woodland with patches of tall shrubland. Open woodland communities are represented by *Combretum apiculatum*, *Sclerocarya caffra*, *Acacia nigrescens*, *Terminalia sericea*, *Grewia bicolor*, *Commiphora pyracanthoides*, *Grewia flavescens*, *Digitaria eriantha*, and *Enneapogon cenchroides*. The shrublands are characterised by *Boscia albitrunca*, *Terminalia prunioides*, *Commiphora pyracanthoides*, *Grewia bicolor*, *Urochloa mosambicensis*, and *Tragus berteronianus*. Patches of *Acacia* thickets with *A. nebrownii*, *A. mellifera* and *A. tortilis* are found. Economically important species: none. Endemic species: none.

Fauna Mammals: bat-eared fox *Otocyon megalotis*, gemsbok *Oryx gazella*, giraffe *Giraffa camelopardalis*, red hartebeest *Alcelaphus buselaphus*, steenbok *Raphicerus campestris*, Common duiker *Sylvicapra grimmia*, and waterbuck *Kobus ellipsiprymnus*. Fish: threespot barb *Barbus trimaculatus* and Mocambique tilapia *Oreochromis mossambicus*. Reptiles and amphibians: African spotted skink *Mabuya striata*, black and yellow sand lizard *Eremias lugubris*, Smith's water tortoise *Pelusios sinuatus*, Jones's girdled lizard *Cordylus cordylus jonesii*, common variable skink *Mabuya varia*, striped long-tail lizard *Nucras taeniolata ornata*, spotted sandveld lizard *Nucras intertexta*, and mole snake *Pseudaspis cana*. Birds: kori bustard *Choriotis kori* and secretary bird *Sagittarius serpentarius* are some interesting species. Ostrich *Struthio camelus* also occurs. Threatened mammals: sable *Hippotragus niger*, leopard *Panthera pardus* (V), honey badger *Mellivora capensis*, South African hedgehog *Erinaceus frontalis*, pangolin *Manis temminckii*, lesser bushbaby *Galago senegalensis*, thick-tailed bushbaby *Galago crassicaudatus*, African civet *Civettictis civetta*, and striped weasel *Poecilogale albinucha*; reptiles: Southern African python *Python sebae natalensis*.

Conservation Management A management plan exists for this area.

Zoning All a natural area

Disturbances or Deficiencies Disused farmlands (30ha) where plant succession is progressing well.

Visitor Facilities A few huts. Camping allowed. Numbers: 200 per annum. Potential: 3,000 per annum.

Scientific Research Vegetation survey

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports.

Staff One nature conservator and 11 labourers

Budget R40,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Langjan Nature Reserve, PO Box 15, Vivo, 0924.

Date March/April 1983

RUSTENBURG NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1967. Administrator's Notice 62 of 1967

Geographical Location 8km from Rustenburg in Transvaal. 25°43'S, 27°12'E.

Altitude 1,296-1,706m (Magaliesberg)

Area 4,257ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The Magaliesberg Range on which the reserve occurs, is a homoclinal ridge formed of resistant quartzites dipping to the north. The reserve has an anticlinal ridge on the northern side and the valley is the result of an igneous intrusion. A major fault cuts through the reserve. There are waterfalls and potholes in well protected kloofs, characteristic of the Magaliesberg, and the Waterkloofspruit River flows through the area. There are sandy, loam soils with shallow litholitic soils on slopes and hills to deeper soils in vlei and basin areas. Annual average temperature range minimum: 11°C, maximum: 27°C. Annual rainfall 700-800mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Sourish Mixed Bushveld (Veld Type 19). Open savanna with a fairly tall and dense grassveld dominated by *Cymbopogon plurinodis*, *Themeda triandra*, and *Elionurus argenteus*. The bush areas are dominated by *Protea caffra* and *Acacia caffra*, with dense bush occurring in the kloofs. Slopes and rocky areas are dominated by seasonal grassland and semi-deciduous trees eg. *Landolphia capensis*, *Bequaertiodendron magalismontanum*. A marshy area is dominated by dense *Phragmites mauritianus*. Economically important species: none. Endemic species: *Aloe peglerae* and *Frithia pulcra* are endemic to the Magaliesberg Range.

Fauna The following mammals occur on the reserve: mountain reedbuck *Redunca fulvorufula*, reedbuck *Redunca arundinum*, eland *Taurotragus oryx*, and Burchell's zebra *Equus burchelli*. Reptiles: horned adder *Bitis caudalis*. Fish: chubbyhead barb *Barbus anoplus*, threespot barb *B. trimaculatus*, banded tilapia *Tilapia sparrmanii*, and southern mouth brooder *Pseudocrenilabrus philander*. Threatened mammals: brown hyena *Hyaena brunnea* (T), South African hedgehog *Erinaceus frontalis*, straw coloured fruit bat *Eidolon helvum*, lesser bushbaby *Galago senegalensis*, spectacled dormouse *Graphiurus ocularis*, honey badger *Mellivora capensis*, African civet *Civettictis civetta*, aardwolf *Proteles cristatus*, leopard *Panthera pardus* (T), sable *Hippotragus niger*, and oribi *Ourebia ourebi*; reptiles: veld monitor *Varanus exanthematicus albigularis* and Southern African python *Python sebae natalensis*; birds: martial eagle *Polemaetus bellicosus* and peregrine falcon *Falco peregrinus* (V).

Conservation Management There is a management plan for the area.

Zoning None

Disturbances or Deficiencies The mountain catchment area is very sensitive. Veld fires from lightning are frequent during late winter. There is also a presence of large numbers of invasive plant species in some parts.

Visitor Facilities Facilities include huts on hiking trails, camping, picnicking, bus tours, visitor centre, group camp and interpretative nature trail. Numbers: 2,000 per annum. Potential: 10,000 per annum.

Scientific Research Vegetation, large and small mammals

Special Scientific Facilities Small herbarium of local plants

Principal Reference Material Various unpublished internal reports

Staff Three nature conservators and 28 labourers

Budget R50,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Rustenburg Nature Reserve, PO Box 511, Rustenburg, 0300.

Date March/April 1983

S A LOMBARD NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1967. Administrator's Notice 62 of 1967

Geographical Location 10km from Bloemhof in Transvaal. 27°35'S, 25°30'E.

Altitude 1,244-1,268m

Area 3,663ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features Geology is characterised by the Ventersdorp System. Pans are common in the area. Four non-perennial pans occur. An ancient riverbed also passes through the reserve. Soils vary from sandy-loam to brackish with a high clay content, overlying a white, calcareous formation. Annual average temperature range minimum: 10°C, maximum: 27°C. Annual rainfall 380-500mm falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Dry *Cymbopogon-Themeda* Veld (Veld Type 50); open grassland area. An alluvial area is dominated by *Sporobolus ioclados*. There is grassland

on deeper soil, *Themeda triandra* and *Cymbopogon plurinodis*. Old farm areas dominated by *Eragrostis lehmanniana* and *Aristida* species, and a bushveld area is dominated by *Tarchonanthus camphoratus*. Old diamond diggings have been colonised by *Rhus lancea*. Economically important species: none. Endemic species: none.

Fauna Mammals: black wildebeest *Connochaetes gnou* (O), for which this is an important breeding area, springbok *Antidorcas marsupialis*, red hartebeest *Alcelaphus buselaphus*, blesbok *Damaliscus dorcas phillipsi*, gemsbok *Oryx gazella*, anteater *Orycteropus afer* and eland *Taurotragus oryx*. Birds: kori bustard *Choriotis kori*, tawny eagle *Aquila rapax*, and blacknecked grebe *Podiceps nigricollis*. Reptiles: Cape cobra *Naja nivea* and serrated tortoise *Psammobates oculifer*. Threatened species: South African hedgehog *Erinaceus frontalis*, Maquassi musk shrew *Crocidura maquassiensis*, and Southern African python *Python sebae natalensis*.

Conservation Management Some exists

Zoning All a natural area

Disturbances or Deficiencies Disused ploughed lands and abandoned alluvial diamond diggings.

Visitor Facilities None. Numbers: 1,000 per annum. Potential: 2,000 per annum

Scientific Research Vegetation, large and small mammals

Special Scientific Facilities Laboratory and small herbarium

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 16 labourers

Budget R30,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, SA Lombard Nature Reserve, PO Box 174, Bloemhof, 2660.

Date March/April 1983

HANS STRIJDOM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1978; Provincial Ordinance 12 of 1983

Geographical Location 50km from Ellisras in Transvaal. 24°00'S, 27°47'E.

Altitude 864-1,323m (Waterberg)

Area 3,618ha (2,762ha land and 856ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This reserve is situated in the resistant red sandstone Waterberg Mountains, giving a rugged, rocky appearance. The Mokolo River which rises on the plateau, descends through a steep gorge, through the reserve, down to the Limpopo River. The soils are poor lithological soils. Annual average temperature range minimum: 10°C, maximum: 27°C. Annual rainfall 640mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Sour Bushveld (Veld Type 20) and Mixed Bushveld (Veld Type 18). Open savanna of tall *Faurea saligna* trees in a tall, tufted, wiry, sour grassveld in the less rocky parts, a dense mixed bushveld in the rugged parts. Trees and shrubs: *Acacia caffra*, *Protea caffra*, *Dombeya rotundifolia*, *Lannea discolor*, *Vangueria infausta*, *Combretum molle*, *C. zeyheri*, and *C. apiculatum*. Grasses include: *Elionurus argenteus*, *Loudetia simplex*, and *Diheteropogon amplexans*. Economically important species: none. Endemic species: *Euphorbia waterbergensis*, *Freylinia tropica*, *Grewia rogersii*, *Triaspis glaucophylla*, and *Hibiscus waterbergensis* are all endemic to the Transvaal and occur in this reserve.

Fauna Mammals: greater kudu *Tragelaphus strepsiceros* and lesser kudu *Tragelaphus imberbis*, and klipspringer *Oreotragus oreotragus*. Reptiles: lesser flat rock lizard *Platysaurus guttatus minor*, Jalla's sand snake *Psammophis jallae* (rare). Fish: large scale yellowfish *Barbus marequensis*, paper mouth *B. mallozi*, canary largemouth *Chetia flaviventris* and butter catfish *Eutropius depressirostris*. Threatened species: sable *Hippotragus niger*, Sharpe's grysbok *Raphicerus sharpei*, brown hyena *Hyaena brunnea* (T), roan antelope *Hippotragus equinus* and pangolin *Manis temminckii*; Nile crocodile *Crocodylus niloticus* (V) and Southern African python *Python sebae natalensis*; Martial eagle *Polemaetus bellicosus* and fish eagle *Haliaeetus vocifer*.

Conservation Management A management plan exists for this area.

Zoning None

Disturbances or Deficiencies Invasive plants pose a problem and are being removed.

Visitor Facilities Facilities include camping, picnicking, fishing, boating and skiing, motorboat tours, and nature trails. Numbers: 13,000 per annum. Potential: 15,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Two nature conservators and 24 labourers

Budget R65,000 per annum (including salaries)

Local Park or Reserve Administration The Nature Conservation Officer, Hans Strijdom Dam, PO Box 473, Ellisras, 0555.

Date March/April 1983

MESSINA NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1980; Provincial Ordinance 12 of 1983

Geographical Location 2km from Messina in Transvaal. 22°24'S, 30°03'E.

Altitude 498-599m

Area 3,571ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This reserve descends into the Limpopo valley which is a wide plain with scattered inselbergs. The southern and south-eastern part of the reserve is covered by low sandstone hills separated by shallow valleys. The Sand River meanders along a wide sandy floor, and some of the oldest geological formations in the world occur here. Soils are unleached subtropical soils to red-brown sandy. Annual average temperature range minimum: 17°C, maximum: 29°C. Annual rainfall 350mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Mopani Veld (Veld Type 15); short, fairly dense growth of shrubby *Colophospermum mopane* in a sparse and tufted grassveld. Also: *Acacia tortilis*, *Adansonia digitata*, *Acacia nigrescens*, *Combretum apiculatum*, *Sclerocarya caffra*, and *Cadaba termitaria*. Grasses: *Eragrostis tricophora*, *Antheophora pubescens*, *Brachiaria nigropedata*, *Bothriochloa insculpta*, and *Eragrostis superba*. Economically important species: none. Endemic species: none. Baobab trees in this area have been declared National Monuments.

Fauna Mammals: steenbok *Raphicerus campestris*, waterbuck *Kobus ellipsiprymnus*, greater kudu *Tragelaphus strepsiceros* and lesser kudu *Tragelaphus imberbis* and impala *Aepyceros melampus*. Reptiles: Transvaal flat gecko *Afroedura transvaalica* (restricted), barking gecko *Ptenopus gugarrulus* (rare), Transvaal quill snouted *Xenocalamus transvaalensis* (rare). Birds: crested guineafowl *Guttera pucherani*, kori bustard *Choriotis kori*, and ground hornbill *Bucorvus leadbeateri*. Threatened mammals: brown hyena *Hyaena brunnea* (T), leopard *Panthera pardus* (T), sable *Hippotragus niger*, and Sharpe's grysbok *Raphicerus sharpei*; birds: martial eagle *Polemaetus bellicosus*.

Conservation Management A management plan exists for this area.

Zoning None at present, all a natural area

Disturbances or Deficiencies One boundary of the reserve is the Sand River. This river had to be excluded from the reserve with resultant management problems.

Visitor Facilities None (new reserve). A basic camping site will be established in the near future. Numbers: 200 per annum. Potential: 10,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 18 labourers

Budget R40,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Messina Nature Reserve, PO Box 78, Messina, 0900.

Date March/April 1983

NOOITGEDACHT DAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1980; Provincial Ordinance 12 of 1983

Geographical Location 15km from Carolina in Transvaal. 25°58'S, 30°4'E.

Altitude 1,547-1,656m

Area 3,420ha (2,644ha land and 756ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This area is bevelled, lying across Karoo strata with a broad synclinal arrangement. Inclined sheets of dolerite often appear as low dark ridges. The abruptness of the escarpment is lost in this area, the escarpment quartzites having been thinned down by pre-Karoo erosion. Komati River and Vaalwaterspruit. Annual average temperature range minimum: 7°C, maximum: 22°C. Annual rainfall 755mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Piet Relief Sourveld (Veld Type 63); grassveld with patches of bush and scrub forest, *Scolopia mundii*, *Leucosidea sericea*, *Pittosporum viridiflorum*, *Cephalanthus natalensis*, *Eulalia villosa*, *Tristachya hispida*, and *Themeda triandra*. Economically important species: none. Endemic species: none.

Fauna Mammals: common duiker *Sylvicapra grimmia*. Fish: large scale yellowfish *Barbus marequensis*, and carp *Cyprinus carpio*. Reptiles: spotted harlequin *Homoroselaps lacteus* and southern brown egg eater *Dasypeltis inornata*. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning Recreation and natural area

Disturbances or Deficiencies Invasive species *Acacia mearnsii* and *Eucalyptus* spp..

Visitor Facilities Facilities are being planned. There are basic picnic and camping facilities. Numbers: 7,000 per annum. Potential: 15,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 14 labourers

Budget R50,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Nootgedacht Nature Reserve, PO Box 325, Carolina, 1185.

Date March/April 1983

BOSKOP DAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1975; Provincial Ordinance 12 of 1983

Geographical Location 20km from Potchefstroom in Transvaal. 26°32'S, 27°6'E.

Altitude 1,404m-1,452m

Area 3,160ha (2,787ha land and 373ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration. Acquisition of land surface area not yet finalised.

Physical Features Flat to undulating countryside, with dolomite forming the basis of the geology. Mooi River flows into the dam (Boskop Dam). Fertile, but shallow soils on dolomitic formations. The soils are brown to red-brown lateritic. Main soil forms are Glen Rosa and Mispah. Annual average temperature range minimum: 9°C, maximum: 25°C. Annual rainfall 600mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Bankenveld (Veld Type 61); and open grassland with *Themeda triandra* and *Cymbopogon* spp. predominant. Trees such as *Rhus lancea* and *Celtis africana* are found clumped and scattered on disturbed areas. Other grasses of consequence are: *Eragrostis chloromelas*, *Trichoneura grandiglumis*, *Tristachya rehmannii*, and *Rhynchelytrum repens*. Economically important species: none. Endemic species: none.

Fauna Mammals: black wildebeest *Connochaetes gnou* (O), eland *Taurotragus oryx*, red hartebeest *Alcelaphus buselaphus*, blesbok *Damaliscus dorcas phillipsi*, Burchell's zebra *Equus burchelli*, and springbok *Antidorcas marsupialis*. Threatened species: none.

Conservation Management No management plan exists for this area.

Zoning A recreation area around the dam, and a natural area

Disturbances or Deficiencies *Potamogeton pectinatus* growing in shallow water hinders angling. Management of the plant is difficult as water level of the dam seldom fluctuates. There is reed encroachment at main angling area at inflow to dam.

Visitor Facilities Facilities include angling and sailing. Numbers: 20,000 per annum. Potential: 25,000 per annum. Visitor facilities preliminary, yet to be developed.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 18 labourers

Budget R30,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Boskop Dam Nature Reserve, PO Box 24, Boskop, 2528.

Date March/April 1983

NYLSVLEY NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1967. Administrator's Notice 281 of 1967

Geographical Location 22km from Naboomspruit in Transvaal. 24°39'S, 28°42'E.

Altitude 1,103-1,166m

Area 3,121ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The reserve is situated on the margin of the Springbok Flats, a wide internal drainage basin, and is traversed by the Nyl River floodplain. Five main soil groups occur - (a) litholitic soils on felsite and sandstone outcrops; (b) non-calcareous, well-drained sandy soils overlying Waterberg and Karoo sandstones; (c) non-calcareous, poorly drained sandy soils at the margins of depressions; (d) calcareous alluvial soils on the margins of the Nyl floodplain; and (e) calcareous black clayey soils on the river margin bottomlands. Annual average temperature range minimum: 12°C, maximum: 26.4°C. Annual rainfall 608mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Mixed Bushveld (Veld Type 18). The vegetation patterns correspond with soil groupings. (a) Broadleaf deciduous woodlands and savannas are

dominated by *Burkea africana*, *Ochna pulchra*, *Combretum molle*, and *C. apiculatum*, and *Terminalia sericea* occur on the deep sandy soils. (b) The poorly drained sandy soils are occupied by grasslands including *Cymbopogon plurinodis*, *Tristachya rehmannii*, *Trachypogon spicatus*, etc. (c) The alluvial calcareous soils support microphyllous savannas and woodlands of *Acacia* spp., with *Panicum maximum*, *Chloris virgata*, etc. (d) The self mulching soils carry *Setaria woodii*, and *Dichanthium papillosum* grassland. Economically important species: none. Endemic species: none.

Fauna Dominant and interesting mammals include: giraffe *Giraffa camelopardalis*, reedbuck *Redunca arundinum*, waterbuck *Kobus ellipsiprymnus*, blue wildebeest *Connochaetes taurinus*, and Burchell's zebra *Equus burchelli*. The following bird families occur: Ardeidae (17-20 spp.) including little bittern *Ixobrychus minutus* and dwarf bittern *Ixobrychus sturmii*, Anatidae and Rallidae (12-19 spp.) including Baillon's crane *Porzana pusilla*. Birds comprise the greater part of the fauna of this reserve. Reptiles: Waterberg quill-snouted snake *Xenocalamus bicolor australis*, pygmy sandsnake *Psammophis angolensis* and serrated tortoise *Psammobates oculifer*. Threatened mammals: roan *Hippotragus equinus*, brown hyena *Hyaena brunnea* (T), lesser bushbaby *Galago senegalensis*, fat mouse *Steatomys* sp. and honey badger *Mellivora capensis*, aardwolf *Proteles cristatus* and leopard *Panthera pardus* (T); reptiles: veld monitor *Varanus exanthematicus albigularis*, water monitor *Varanus niloticus*, and Southern African python *Python sebae natalensis*.

Conservation Management A management plan exists for this area.

Zoning All a natural area

Disturbances or Deficiencies Removal of invasive plants and monitoring of certain plant species which are spreading rapidly. Campsite and overnight facilities for the public are inadequate. The Nylsvley Nature Reserve protects only a part of the Nyl River floodplain.

Visitor Facilities Facilities include guided trails and guided vehicle tours. There is a small camp site. Numbers: 400 per annum. Potential: 3,000 per annum.

Scientific Research There are numerous research projects with the Savanna Ecosystem Project and a cooperative undertaking by various universities and government bodies, which have been in operation for the past 10 years. The Project is coordinated by the Council for Scientific and Industrial Research.

Special Scientific Facilities Laboratory and accommodation for visiting scientists

Principal Reference Material Numerous publications pertaining to all levels of savanna ecosystem research, obtainable from the South African Savanna Ecosystem Project, FRD, CSIR, PO Box 395, Pretoria, 0001.

Staff One nature conservator and 16 labourers

Budget R40,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Nylsvley Nature Reserve, PO Box 508, Naboomspruit, 0560.

Date March/April 1983

BARBERSPAN NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1954. Administrator's Notice 223 of 1954. One of the two wetlands in South Africa of international significance, as defined by the RAMSAR convention.

Geographical Location 15km from Delareyville in Transvaal. 26°35'S, 25°35'E.

Altitude 1,345-1,360m

Area 3,068ha (1,068ha land and 2,000ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The pan is connected with the Harts River by a channel and is the largest of a series of depressions along this channel. The pan itself is a natural, shallow, alkaline lake, which is perennial. Other pans in the vicinity are non-perennial. Soils are shallow, alkaline, and calcareous and sandy in places. Annual average temperature range minimum: 9°C, maximum: 27°C. Annual rainfall 557mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Dry *Cymbopogon-Themeda* Veld (Veld Type 50). Open *Cymbopogon-Themeda* grassveld with thickets of *Acacia karroo*, *A. grandicornuta*, *Rhus lancea*, *R. pyroides* and *Diospyros lycioides*. Dominant grasses are *Themeda triandra*, *Cymbopogon plurinodis* with *Eragrostis lehmanniana*, *E. superba*, and *Heteropogon contortus*. Aquatic vegetation is dominated by *Potamogeton pectinatus*, whilst the marginal vegetation is comprised of rushes (Juncaceae) and sedges (Cyperaceae). Karroid encroachment notable on one shore. Economically important species: none. Endemic species: none.

Fauna Some 347 species of birds, mostly waterfowl, have been recorded and comprise the greater part of the fauna of the reserve. Species include: greater flamingo *Phoenicopterus ruber*, lesser flamingo *Phoeniconaias minor*, spurwinged goose *Plectropterus gambensis*, Egyptian goose *Alopochen aegyptiacus*, yellowbilled duck *Anas undulata*, and redknobbed coot *Fulica cristata*. Mammals: blesbok *Damaliscus dorcas phillipsi*, red hartebeest *Alcelaphus buselaphus*, Burchell's zebra *Equus burchelli*, and black wildebeest *Connochaetes gnou* (O). Reptiles: striped long-tail lizard *Nucras taeniolata ornata*, Cape thick-toed gecko *Pachydactylus capensis capensis*, aurora housesnake *Lamprophis aurora*, leopard tortoise *Geochelone pardalis babcocki*, serrated tortoise *Psammobates oculifer*, and ring-necked spitting cobra *Hemachatus haemachatus*. Threatened mammals: South African hedgehog *Erinaceus frontalis*, striped weasel *Poecilogale albinucha*. Birds: Peregrine falcon *Falco peregrinus* (V), fish eagle *Haliaeetus vocifer*, openbilled stork *Anastomus lamelligerus*, goliath heron *Ardea goliath*, pink-backed pelican *Pelecanus rufescens*, white pelican *Pelecanus onocrotalus*, Caspian tern *Hydroprogne caspia*, and yellow-billed stork *Mycteria ibis*.

Conservation Management A management plan exists for this area.

Zoning Natural area and small recreation area

Disturbances or Deficiencies Management of large areas of abandoned farm lands presents problems due to a very slow rate of plant succession

Visitor Facilities Facilities include angling, ablution blocks and camp sites. Numbers: 3,000 per annum. Potential: 6,000 per annum.

Scientific Research Research on waterfowl

Special Scientific Facilities Ornithological research station and library

Principal Reference Material Various unpublished internal reports.

° Hutchinson, G.E., *et al.* (1932). A contribution to the hydrobiology of pans and other inland waters of South Africa. *Arch Hydrobiology*, 24: 1-136.

Staff One nature conservator and 16 labourers

Budget R40,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Barberspan Nature Reserve, P K Barberspan, 2765.

Date March/April 1983

PERCY FYFE NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1954. Administrator's Notice 223 of 1954

Geographical Location 25km from Potgietersrus in Transvaal. 24°02'S, 29°10'E.

Altitude 1,378-1,513m

Area 2,985ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This reserve is located on the Pietersburg plateau, a granite region, and has an undulating topography with three inselbergs occurring in the south-west corner. There are non-perennial streams and spols are sandy-loam and grey ferriferous lateritic. Annual average temperature range minimum: 6°C, maximum: 34°C. Annual rainfall 575mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Mixed Bushveld (Veld Type 18) and Sourish Mixed Bushveld (Veld Type 19). Open savanna with *Acacia caffra* dominant. Fairly tall dense grassveld dominated by *Cymbopogon plurinodis*, *Themeda triandra*, *Hyparrhenia* sp., *Elionurus argenteus* and *Acacia karroo*, *A. robusta*, *A. tortilis*, *Rhus lancea*, *Faurea saligna*, *Vangueria infausta*, *Ximenia caffra*, and *Aloe marlothii*. Economically important species: none. Endemic species: *Euphorbia clivicola* is endemic to the Transvaal and occurs in this reserve.

Fauna Mammals: waterbuck *Kobus ellipsiprymnus*, buffalo *Syncerus caffer*, steenbok *Raphicerus campestris*, Burchell's zebra *Equus burchelli*, and anteater *Orycteropus afer*. Fish: *Oreochromis mossambicus* and largemouth bass *Micropterus salmoides*. Reptiles and amphibians: puff adder *Bitis arietans*, common platanna *Xenopus laevis*, bushveld

short-headed frog *Breviceps adpersus*, common bullfrog *Pyxicephalus adpersus* and Cape river frog *Rana fluscigula*. Threatened mammals: tsessebe *Damaliscus lunatus*, roan *Hippotragus equinus*, South African hedgehog *Erinaceus frontalis*, lesser bushbaby *Galago senegalensis*, honey badger *Mellivora capensis*, civet *Civettictis civetta*, and leopard *Panthera pardus* (T). Reptiles: Southern African python *Python sebae natalensis*. Birds: martial eagle *Polemaetus bellicosus*.

Conservation Management A management plan exists for this area.

Zoning Natural area with vehicle-borne tourism allowed

Disturbances or Deficiencies Erosion control, fire control, overgrazing. 600ha of fallow farmlands, and a large number of *Eucalyptus* and *Jacaranda* spp..

Visitor Facilities Facilities include camping, picnic areas, nature trails under supervision, and bus tours. Numbers: 1,000 per annum. Potential: 3,000 per annum.

Scientific Research Floristic survey and ecological study

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 15 labourers

Budget R35,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Percy Fyfe Nature Reserve, Private Bag X2585, Potgietersrus, 0600.

Date March/April 1983

OHRIGSTAD DAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1954. Administrator's Notice 234 of 1954

Geographical Location 40km from Lydenburg in Transvaal. 24°57'S, 30°38'E.

Altitude 1,411-1,882m

Area 2,563ha (2,463ha land and 100ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This reserve forms part of the Great Escarpment. Quartzite and shale are representative of the geology. The topography is mountainous with the Ohrigstad River

forming a fertile valley. Ohrigstad River flows through the area. Annual average temperature range minimum: 9°C, maximum: 24.5°C. Annual rainfall 690mm falling mainly in summer (October–April).

Vegetation Vegetation types consist of the North-Eastern Mountain Sourveld (Veld Type 8). Vegetation is represented by patches of short forest with *Combretum kraussii*, *Diospyros whyteana*, *Apodytes dimidiata*, *Greyia radkofferi*, *Ekebergia pterophylla*, *Ilex mitis*, *Halleria lucida*, and *Fagara capensis* among the more conspicuous elements. The valley lowlands, lower foothills and upper mountain slopes are dominated too by patches of sparse to open short woodland. These areas are represented by *Protea caffra*, *Acacia caffra*, *Cussonia spicata*, *Dovyalis zeyheri*, *Acacia karroo*, *Rhus pyroides*, *R. dentata*, *Rhamnus prinoides*, and *Diospyros lycioides*. The Escarpment plateau is characterised by grassland with *Themeda triandra*, *Eragrostis racemosa*, *E. curvula*, *Hyparrhenia cymbaria*, and *Trachypogon spicatus* among the more dominant species. These areas are interspersed with *Protea roupelliae*. Economically important species: none. Endemic species: *Clivia caulescens*, *Gladiolus rufomarginatus*, *Watsonia transvaalensis*, *W. wilmsii*, and *Aloe minima* var. *blyderivierensis* are endemic to the Transvaal and occur in this reserve.

Fauna Mammals: bushbuck *Tragelaphus scriptus*, grey rhebok *Pelea capreolus*, klipspringer *Oreotragus oreotragus*, mountain reedbuck *Redunca fulvorufula*. Reptiles: Cape filesnake *Mehelya capensis capensis* (uncommon). Birds: martial eagle *Polemaetus bellicosus*, crowned eagle *Stephanoaetus coronatus*, rednecked francolin *Francolinus afer*, Cape eagle owl *Bubo capensis* and Gurney's sugarbird *Promerops gurneyi*. Fish: large-scale yellowfish *Barbus marequensis*, sharp-tooth catfish *Clarias gariepinus* and banded tilapia *Tilapia sparrmanii*. Threatened mammals: brown hyena *Hyaena brunnea* (T), South African hedgehog *Erinaceus frontalis*, Welwitsch's bat *Myotis welwitschii*, and oribi *Ourebia ourebi*. Reptiles: veld monitor *Varanus exanthematicus albigularis*, water monitor *Varanus niloticus*, Southern African python *Python sebae natalensis*, and Swazi rock snake *Lamprophis swazicus*.

Conservation Management A management plan exists for this area.

Zoning The area around the Ohrigstad Dam is used for recreation while the remainder is not open to the general public.

Disturbances or Deficiencies The higher lying grasslands are fenced out of the reserve preventing natural movement of the game. Some of the catchment is afforested with the resultant encroachment of exotics (*Pinus* spp.).

Visitor Facilities Huts and trails are being planned, picnicking and camping. Numbers: 2,000 per annum. Potential: 7,000 per annum.

Scientific Research Inventory of the mammals and plants

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 11 labourers

Budget R40,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Ohrigstad Dam Nature Reserve, PO Lydenburg, 1120.

Date March/April 1983

WOLWESPRUIT NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1975; Provincial Ordinance 12 of 1983

Geographical Location 25km from Leeudoringstad in Transvaal. 27°25'S, 26°15'E.

Altitude 1,246-1,260m

Area 2,333ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This reserve is part of the Vaal River System containing parts of both the Wolwespruit and Vaal Rivers. The topography is flat, lying on pre-Karoo rocks with a geology of shale and sandstone. A number of islands occur in the river along the length of the reserve. Soils are loam to sandy, with deep clayey soils along riverbanks, and Kalahari sand on limestone. Annual average temperature range minimum: 10°C, maximum: 27°C. Annual rainfall 508mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Kalahari Thornveld (Veld Type 16); acacia savanna, *Acacia erioloba*, *A. tortilis*, *A. mellifera*, *A. luederitzii*, and *Grewia flava*. Grasses: *Eragrostis superba*, *Cymbopogon plurinodis*, *Themeda triandra*, and *Elionurus argenteus*. Shrubs occur along drainage lines, and thick riverine bush along river banks. Much of the reserve was in the past ploughed farmland resulting in pioneer grasses becoming established. Economically important species: none. Endemic species: none.

Fauna Mammals: blesbok *Damaliscus dorcas phillipsi*, Burchell's zebra *Equus burchelli*, red hartebeest *Alcelaphus buselaphus*, black wildebeest *Connochaetes gnou* (O) and springbok *Antidorcas marsupialis*. Reptiles include: Cape cobra *Naja nivea* and serrated tortoise *Psammobates oculifer*. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning Natural and recreation areas

Disturbances or Deficiencies Fallow farmlands with pioneer vegetation constitute one disturbance. The management of the riverine bush is also necessary and fencing has been erected to prevent game from crossing the river. Severe harvester termite problems have been experienced on the reserve.

Visitor Facilities Facilities include caravanning, camping, picnicking, and fishing. Numbers: 4,000 per annum. Potential: 10,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 12 labourers

Budget R30,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Wolwespruit Nature Reserve, PO Box 237, Leeudoringstad, 2640.

Date March/April 1983

ABE BAILEY NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1982; the existing reserve is to be expanded when the existing lease expires in 1987. Provincial Ordinance 12 of 1983.

Geographical Location 8km from Carletonville in Transvaal. 26°20'S, 27°16'E.

Altitude 1,484-1,509m

Area 1,888ha

Land Tenure Leased from the West Rand Dolomitic Water Association, administered as a nature reserve by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This reserve is a flat grassy plain. Dolomitic sinkholes and dolomitic caves occur commonly in the area. Soils are clayey-loam, and reddish containing residual oxides of manganese and iron. There are deep clay soils in a marshland area, and some ferriferous lateritic soil. Annual average temperature range minimum: 9°C, maximum: 25°C. Annual rainfall 600mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Bankenveld (Veld Type 61), sparse, sour, strongly tufted grassveld, *Eragrostis racemosa*, *Digitaria tricholaenoides*, *Setaria flabellata*, *Heteropogon contortus*, *Eragrostis chloromelas*, *Elionurus argenteus*, and *Themeda triandra*. Marshland dominated by *Phragmites australis* and *Typha capensis*. Dolomitic outcrops are dominated by *Celtis africana*, *Olea africana*, *Grewia* spp., *Rhus* spp., and *Diospyros mespiliformis*. Economically important species: none. Endemic species: none.

Fauna Mammals: springbok *Antidorcas marsupialis*, blesbok *Damaliscus dorcas phillipsi*, red hartebeest *Alcelaphus buselaphus*, zebra *Equus burchelli*, and black wildebeest *Connochaetes gnou* (O). Reptiles: spotted harlequin snake *Homoroselaps lacteus* (uncommon) and striped harlequin snake *H. dorsalis* (rare). Threatened species: none.

Conservation Management No management plan exists for this area. A proposal was made to create an extended marshland to encourage birdlife in a floodplain area.

Zoning All a natural area

Disturbances or Deficiencies Problems with dogs entering the reserve from adjoining township and reed encroachment in the wetland area.

Visitor Facilities Facilities include a conservation education centre for children. Potential: 3,000 per annum

Scientific Research Vegetation study

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 10 labourers

Budget R40,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Abe Bailey Nature Reserve, PO Box 13, Carletonville, 2500.

Date March/April 1983

VAALKOP DAM NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1983; Provincial Ordinance 12 of 1983

Geographical Location 60km from Rustenburg in Transvaal. 25°18'S, 27°25'E.

Altitude 1,009-1038m

Area 1,873ha (828ha land and 1,045ha water)

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The topography is flat and gently sloping towards the dam area with the principal rivers being the Elands and Hex. The geology of the area consists of granites and porphyry of the Bushveld Igneous Complex. Soils are light and red-coloured, varying from sandy to clay loam. Annual average temperature range minimum: 11°C, maximum: 27°C. Annual rainfall 680mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Mixed Bushveld (Veld Type 18); open mixed bushveld with a savanna type vegetation with *Acacia caffra*, *A. tortilis* and *A. nigrescens* the dominant tree species. Economically important species: none. Endemic species: none.

Fauna Mammals: impala *Aepyceros melampus*, kudu *Tragelaphus strepsiceros*, steenbok *Raphicerus campestris*, and common duiker *Sylvicapra grimmia*. Fish: carp *Cyprinus carpio* and largescale yellowfish *Barbus marequensis*.

Conservation Management This reserve has only recently been acquired and is still undeveloped and unfenced. No management plan exists for this area.

Zoning All a natural area

Disturbances or Deficiencies The land area of the reserve is divided into three portions, which results in management difficulties because of the distances between them.

Visitor Facilities Facilities include caravanning, camping, picnicking, and boating. Numbers: no information. Potential: 10,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and four labourers

Budget R30,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Vaalkop Dam Nature Reserve, PO Box 1846, Rustenburg, 0300.

Date March/April 1983

STERKSPRUIT NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1978; Provincial Ordinance 12 of 1983

Geographical Location 10km from Lydenberg in Transvaal. 26°09'S, 30°33'E.

Altitude 1,588-2,178m

Area 1,600ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features This reserve forms part of the Great Escarpment, which is an erosion scarp. The topography is mountainous. The area consists of fairly steep sided kloofs with perennial streams. The tops of these kloofs are flat and are typical of the lower Transvaal eastern escarpment. Geology is quartzite, shale, and tillite. Sterkspruit - Olifants River System. The soil overall, is poor and shallow throughout the area; it is mostly a reddish clay. Only near the streams and on the top of some plateaux does the soil improve and attain a greater depth, where it is loamy. Annual average temperature range minimum: 9°C, maximum: 24,5°C. Annual rainfall 690mm falling mainly in summer (October-April).

Vegetation Vegetation types consist of the North-Eastern Mountain Sourveld (Veld Type 8); short grassland on the foothills and plateau areas with stands of *Protea caffra*

and *P. roupelliae*. Short montane thickets are found with *Cussonia spicata*, *Euphorbia candelabrum* var. *candelabrum*, *Acacia tortilis*, *Rhamnus prinoides*, and *Ziziphus mucronata* as conspicuous elements. Valley lowlands are characterised by sparse short scrubland and grasslands with *Diospyros lycioides*, *Hypericum revolutum*, *Cussonia spicata*, *Protea caffra*, *Themeda triandra*, *Trachypogon spicatus*, *Eulalia villosa*, and *Loudetia simplex* among the more dominant species. *Gladiolus calcaratus* is endemic to the Transvaal and occurs in this reserve.

Fauna Mammals: mountain reedbuck *Redunca fulvorufula*, klipspringer *Oreotragus oreotragus*, and grey rhebok *Pelea capreolus*. Reptiles: spotted harlequin snake *Homoroselaps lacteus*. Fish: chubbyhead barb *Barbus anoplus*. Threatened mammals: oribi *Ourebia ourebi*; reptiles: South African python *Python sebae natalensis*. Economically important species: none. Endemic species: none.

Conservation Management No management plan exists for this specific area. This reserve is situated within a proclaimed mountain catchment area, the purpose of which is primarily water production. The entire valley of about 12,000ha also has been proclaimed a nature reserve and no afforestation is permitted. A management plan for the valley (which is mostly private land) is currently being prepared by the Transvaal Nature Conservation Division. The existing land-use is that of extensive cattle grazing. Hiking trails are at present being planned for the reserve.

Zoning None

Disturbances or Deficiencies None

Visitor Facilities There are no visitor facilities. Numbers: 100 per annum. Potential: 2,000 per annum.

Scientific Research Trout breeding research and water pollution control from hatchery

Special Scientific Facilities Wet and dry laboratory

Principal Reference Material Various unpublished internal reports

Staff One nature conservator and 15 labourers

Budget R50,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Sterkspruit Nature Reserve, PO Box 340, Lydenburg, 1120.

Date March/April 1983

HAPPY REST NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1975

Geographical Location 30km from Louis Trichardt in Transvaal. 23°0'S, 29°44'E.

Altitude 167-1,606m (Soutpansberg)

Area 1,585ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features Within the reserve sandstone strata dip strongly northward in the Soutpansberg, where strike faulting has produced triplication of strata and ridges. The northern half of the area descends into the Soutpansberg, the south being flat. Lava, sandstone and conglomerate comprise the geology and faulting occurs. There are non-perennial streams. Soils are light brown sandy lithosols, rubbly in nature, and very poor and sour. Annual average temperature range minimum: 13°C, maximum: 25°C. Annual rainfall +/-600mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Sour Bushveld (Veld Type 20). Vegetation can be classified as: (a) Montane grassveld on summit areas, e.g. *Faurea saligna*, *Protea roupelliae*, *Enterospermum rhodesiacum* and *Buddleja saligna*; (b) Dense tropical forest in kloofs, e.g. *Schefflera umbellifera*, *Diospyros whyteana*, *D. dichrophylla* and *Chionanthus battiscombei*; (c) Short montane scrubland on rocky areas on summit e.g. *Neorosea andongensis*, *Clusia pulchella* and *Canthium huillense*; (d) Mountain bushland on foothills, e.g. *Vangueria infausta*, *Sclerocarya caffra* and *Euphorbia candelabrum*; (e) Open woodland on lowlying areas, e.g. *Combretum zeyheri* and *Combretum molle*. Economically important species: none. Endemic species: the following are endemic to the Transvaal and occur in the reserve: *Felicia fruticosa*, *Encephalartos transvenosus*, *Cyrtanthus thorncroftii*, *Aloe vogtsii*, *Aloe soutpansbergensis*, *Zoutpansbergia caerulea* and *Linociera battiscombei*.

Fauna The following mammals occur on the reserve: rock dassie *Procavia capensis*, bushpig *Potamochoerus porcus* and klipspringer *Oreotragus oreotragus*. Threatened species: red duiker *Cephalophus natalensis*.

Conservation Management A management plan exists for this area.

Zoning Natural area and educational zones

Disturbances or Deficiencies Erosion problems. Invasive plants, e.g. *Eucalyptus*.

Visitor Facilities Facilities include camping for educational groups. Numbers: +/-12,000 per annum. Potential: maximum reached.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Two labourers. Area administered by the Northern Regional Office of the Transvaal Division of Nature Conservation. Environmental education led by the Department of Education

Budget R4,000 per annum (including salaries)

Local Park or Reserve Administration c/o The Officer-in-Charge, Langjan Nature Reserve, PO Box 15, Vivo, 0924.

Date March/April 1983

WOLKBERG CAVES NATURE RESERVE

Management Category III and IV (Natural Monument and Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1969; Provincial Ordinance 12 of 1983

Geographical Location 60km from Pietersburg in Transvaal. 24°06'S, 29°53'E.

Altitude 1,536-1,846m (Wolkberg)

Area 1,488ha

Land Tenure Government. Administered by the Nature Conservation Division, Transvaal Provincial Administration.

Physical Features The reserve forms part of the Great Escarpment which is an erosion scarp; it is mountainous, with the steeper slopes occurring in the south. Other features include caves and non-perennial streams. The area's geology comprises Black Reef quartzites which dip gently westwards, overlain with laterite and lateritic red soils. Annual average temperature range minimum: 8.5°C, maximum: 22.4°C. Annual rainfall of 900-1,950mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the North-Eastern Mountain Sourveld (Veld Type 8); sour grassveld, pure grassveld on mountain tops, and scrubby thornveld. Shrubs include: *Vitex mombassae*, *Erica woodii*. The more important trees are: *Erythrina lysistemon*, *Protea roupelliae* and *P. welwitschii*. Economically important species: none. Endemic species: none.

Fauna Mammals: common duiker *Sylvicapra grimmia*, klipspringer *Oreotragus oreotragus* and mountain reedbeek *Redunca fulvorufula*. Birds: whitebacked night heron *Gorsachius leuconotus*, cuckoo hawk *Aviceda cuculoides*, and whitenecked raven *Corvus albicollis*. Reptiles: Cape mountain adder *Bitis atropos* and spotted bush snake *Philothamnus semivariegatus*. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning None

Disturbances or Deficiencies Approximately 20ha fallow farmlands exist in the area, and a drainage channel of a stream has eroded to a depth of 10m. The invasive plant *Opuntia ficus-indica* occurs.

Visitor Facilities None. Numbers: not open to public. Potential: unknown

Scientific Research Present research includes surveys of the geomorphology, climatology and mineralogy of the Wolkberg Caves by the Cave Research Organization, as well as an investigation of the occurrence of histoplasmosis (Cave Man's disease).

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Two labourers. Administered from Regional Office

Budget R2,000 per annum (including salaries)

Local Park or Reserve Administration The Officer-in-Charge, Wolkberg Caves Nature Reserve, Wolkberg sub-region, PO Box 217, Pietersburg, 0700.

Date March/April 1983

PRINCE EDWARD ISLANDS (MARION AND PRINCE EDWARD)

Management Category Not allocated, but in effect Strict Nature Reserve (I)

Biogeographical Province 7.04.09 (Insulantarctica)

Legal Protection Total, under the Prince Edward Islands Act, and the Seal Birds and Seals Protection Act 46 of 1973.

Date Established 29 December 1947 (Prince Edward) and 4 January 1948 (Marion), by the Prince Edward Islands Act No. 43 of 1948. Sea Bird and Seals Protection Act 46 of 1973.

Geographical Location South African overseas territory, 2,700km south-east of Cape Town and at the western extremity of the Prince Edward-Crozet Ridge. Marion: 46°53'S, 37°45'E. Prince Edward: 46°36'S, 37°57'E.

Altitude From sea level to 722m on Prince Edward, and to 1,280m (State President Swart Peak) on Marion.

Area Marion 30,000ha; Prince Edward 9,000ha

Land Tenure State. Overseas territories, administered jointly by the South African National Committee for Antarctic Research, CSIR and the Department of Transport.

Physical Features The islands are volcanic in origin, believed to be closely associated volcanoes with coalescing shields. It is thought that the two stages of intense volcanic activity were separated by a period of glaciation. There are three main physiographical zones - central highland, escarpment zone, and the coastal plain. One perennial stream (Van den Boogaardt Stream) and many smaller erratically flowing streams. Soils are mainly peats with some shallow mineral rawmark soils on higher areas exposed to extremes of wind and temperature. They are true oceanic islands with a tundra-type climate and vegetation, regular high winds (roaring forties), and are passed over by two to three frontal systems per week. Annual rainfall 2,580mm, with rain or snow throughout year. Annual average temperature range 8-10°C.

Vegetation Terrestrial vegetation types characterised by presence of mire with peat forming bryophytes, closed communities of tussock-forming grasses, cushion-forming flowering plants, and herbfield communities with large-leaved perennial species. Five main ecological communities: salt spray complex of *Tillaea moschata* and *Cotula plumosa* halophytic herbfields; biotic complex of *Poa cookii* tussock grassland; swamp complex of *Agrostis magellanica* mires; slope complex of *Acaena ascendens* herbfield, *Blechnum penna* spp. *marina* fernbrake, and *Azorella selago* herbfields; and wind desert complex with *Azorella selago* fjaeldmark. Kerguelen cabbage *Pringlea antiscorbutica* was used as a source of ascorbic acid (Vitamin C) by sealers and ship-wreck survivors in the 16th-19th centuries. Endemic species of plants: there are only 22 indigenous vascular plants of which one (*Elaphoglossum randii*) is endemic to these two islands. A further six are endemic to the Kerguelen province, including *Polystichum marionense*, *Ranunculus moseleyi*, *Poa cookii*, and *Pringlea antiscorbutica*. Complete lists are available for the 72 species of musci (mosses), 36 species of hepatics (liverworts) and 360 species of lichens. A high incidence of local and provincial endemisms exists in Hepaticae.

Fauna Six species of seabirds are listed in the latest South African Red Data Book (Brooke, 1984), greatwinged petrel *Pterodroma macroptera*, softplumaged petrel *Pterodroma mollis*, common diving petrel *Pelecanoides urinatrix*, grey shearwater *Procellaria cinerea*, antarctic tern *Sterna vittata*, Kerguelen tern *Sterna vittata vittata*. The first four are burrow breeders in the category threatened due to predation by feral cats. The two tern species are in the rare category. Southern elephant seals *Mirounga leonina* and sub-antarctic fur seals *Arctocephalus tropicalis* were severely depleted by exploitation at the turn of the century, but populations are now well recovered. Several penguin species were exploited in the past, but are also now well recovered. Population estimates are available for most species other than for burrowing petrels. The islands are important breeding platforms for all species of seabirds and marine mammals that visit them.

Conservation Management A set of operational guidelines for visiting scientists is in preparation. In the absence of deliberate management, these guidelines fulfill the role of a management plan. A conservation policy for the Prince Edward islands is presently being developed. National, as well as international interests, are to be given due recognition in the formulation of the policy e.g. Scientific Committee for Antarctic Research (SCAR), Antarctic Treaty recommendation on the conservation of Antarctic marine living resources (CCAMLR), and the Law of the Sea Conference, etc.

Zoning Limited zoning is incorporated into the operational guidelines

Disturbances or Deficiencies Alien species include domestic cats which have severely reduced the breeding success and population size of several burrowing petrels. The house mouse *Mus musculus*, which is primarily an insectivore, is a widespread alien which has had no detectable impact on other species. Both cats and mice are absent on Prince Edward Island. There are up to 14 species of alien vascular plants, nine of which have become established, but none pose a threat to undisturbed indigenous vegetation.

Visitor Facilities None. Tourists are not encouraged as facilities and support/rescue services are fully committed to the National Antarctic Research programme.

Scientific Research An extensive multidisciplinary research programme (biological, terrestrial and atmospheric sciences) has been carried out under the auspices of the National Antarctic Research Programme since 1965.

Special Scientific Facilities Fully equipped scientific station on Marion Island. Accommodation for 20 overwintering personnel (scientists and support staff) of the National Antarctic Research Programme.

Principal Reference Material

- * A full and extensive scientific bibliography is available from the relevant research institutes.
- * Gremmen, N.J.M. (1981). The vegetation of the subantarctic islands Marion and Prince Edward. E. Junk. The Hague. 145 pp.
- * Van Zinderen Bakker, E.M., Winterbottom, J.M., and Dyer, R.A. (Eds), (1971). Marion and Prince Edward Islands: a report on the South African biological and geological expedition. 1965-1966. A.A. Balkema, Cape Town.
- * *South African Journal of Antarctic Research* Volume 8 (1978).

Staff The scientific and meteorological station is manned continuously. Up to 12 scientists are present (biologists, geologists, physicists) during the summer months, usually fewer during winter. A basic support team of eight personnel (radio operators, mechanics, medics, etc) man the station and are replaced once annually.

Budget Average annual research budget is approximately R300,000, about 85% of which is spent on biological work. The full cost of maintaining the station on Marion Island is in the region of R1,500,000 per annum.

Local Park or Reserve Administration South African Scientific Committee for Antarctic Research, c/o Dr P.R. Condy, CSIR, PO Box 395, Pretoria 0001; Antarctic Section, Department of Transport, Private Bag X193, Pretoria 0001.

Date August 1984

PILANESBERG NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 8 December 1979. Act to be passed by Bophuthatswana Parliament early in 1984.

Geographical Location 3km from Mogwase in Bophuthatswana. 25°15'S, 27°05'E.

Altitude 1,050-1,675m (Pilanesberg)

Area 50,000ha

Land Tenure State. Administered by the Bophuthatswana National Parks Board.

Physical Features The Pilanesberg is an isolated, almost perfectly circular, series of concentric hills and ring valleys composed of a unique suite of alkaline volcanic rocks. The outermost ring of hills rises abruptly 300-600m above the surrounding flat plains. Apart from the Pilanesberg, there are only two other large Alkaline Ring Complexes in the world, one in the USSR and one in Greenland. All surface water originates from sources within the reserve's boundaries, i.e. the Pilanesberg is an independent rainfall catchment area with no streams or rivers entering the system from outside. No major rivers arise in the catchment and all drainage is in the form of ephemeral streams. Soils are highly variable - hydromorphic loams and clays on valley floor and pediments, deep well drained loams on the steep slopes, and shallow rocky lithosols on the flattened crests. Annual average temperature range minimum: 4°C, maximum: 32°C. Annual rainfall 650mm, falling mainly in summer (October-March).

Vegetation Vegetation types include Sour Bushveld (Veld Type 20). A mosaic of pediment grasslands: *Trachypogon spicatus*, *Elionurus muticus*; secondary grasslands *Cynodon dactylon*/*Rhynchelytrum repens*; valley thickets *Acacia mellifera*/*Acacia tortilis*; Xerocline savannas *Combretum apiculatum*/*Chrysopogon montanus*; mesocline savannas *Acacia caffra*/*Faurea saligna*; pediment savannas *Acacia karroo*/*Acacia caffra*/*Faurea saligna*. Economically important species: Apart from the wide spectrum of plants used as food for livestock or as herbal medicines by the local Tswana people, there are no known economically important plant species. Endemic species: *Erythrophysa transvaalensis* (less than 250 known specimens, most of which occur in Pilanesberg).

Fauna Large mammals include square-lipped rhinoceros *Ceratotherium simum* (240), mountain reedbuck *Redunca fulvorufula* (1,250), and red hartebeest *Alcelaphus buselaphus* (600). Threatened species: cheetah *Acinonyx jubatus* (T), pangolin *Manis temminckii*, black rhinoceros *Diceros bicornis* (T), brown hyena *Hyaena brunnea*, and leopard *Panthera pardus* (T).

Conservation Management A management plan exists for this area. The Pilanesberg National Park operates a mobile film unit which provides lectures and film shows to schools, and reaches approximately 50,000 school children per year.

Zoning (a) Wilderness trails zone. (b) Controlled hunting zone (neither ((a)) nor ((b)) has any form of development whatsoever). (c) General visitor zone: priority activity is vehicle borne game viewing. Development includes access roads, hides and picnic sites. (d) Multiple-use zone: vehicle borne game viewing, secondary activity trails, and tertiary activity controlled hunting. Visitor roads the only development. (e) Peripheral development zone: priority activity visitor accommodation, education facilities, camping area and also staff housing, offices and workshops.

Disturbances or Deficiencies None

Visitor Facilities There is a basic camp with all facilities including food and bedding to accommodate eight people. Tented camp with beds, bedding and ablution blocks for 30 people. A 150km visitor road network. Numbers: 29,000 per annum. Potential: 100,000 per annum.

Scientific Research Baseline ecological studies in progress. Establishment of carrying capacity and stocking rates completed.

Special Scientific Facilities Laboratory, library, darkroom

Principal Reference Material

- ° Collinson, R.F.H. and Goodman, P.S. (1982). An assessment of range condition and large herbivore carrying capacity of the Pilanesberg Game Reserve, with guidelines and recommendations for management. *Inkwe* 1: 54 pp.
- ° Farrell and Van Riet. (1978). Pilanesberg National Park, Bophuthatswana. Planning and Management Proposals for Department of Agriculture. Republic of Bophuthatswana.

Staff Administration - three senior staff; Tourism - one senior and 15 junior staff; Conservation - six senior and ten junior staff; Education - four senior staff; Technical - 160 junior staff; Research and information - five senior staff

Budget R3,234,360 (including salaries)

Local Park or Reserve Administration Pilanesberg National Park, PO Box 1201, Mogwase, 0302, Bophuthatswana.

Date May 1983

BORAKALALO NATIONAL PARK

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1970. Act to be passed by Bophuthatswana Parliament early in 1984.

Geographical Location 80km from Brits in Bophuthatswana. 25°10'S, 27°55'E.

Altitude 1,000-1,167m

Area 7,380ha

Land Tenure State. Administered by the Bophuthatswana National Parks Board

Physical Features Features are dominated by the Bushveld igneous complex containing the large Klipvoor Dam, approximately 10km long and up to 1km wide. The dam water is used for irrigation and is highly eutrophic and toxic to very large mammals (square-lipped rhino) over a long period of time. The dam supports a very high biomass of *Sarotherodon* species as well as populations of piscivorous birds. It has good potential for sustained harvesting, either as a food resource or for recreation. The principal river is the Pienaars. Soils are predominantly sandy loams. Annual average temperature range minimum: 3°C, maximum: 33°C. Annual rainfall 600-750mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of Mixed Bushveld (Veld Type 18) varying from open woodland to thicket. Dominant trees include *Combretum apiculatum*, *C. imberbe*, *Terminalia sericea*, and *Sclerocarya caffra*. Economically important species: grasses are potentially important as fodder for game and livestock. Endemic species: unknown.

Fauna Impala *Aepyceros melampus* (1,000), blue wildebeest *Connochaetes taurinus* (150), Burchell's zebra *Equus burchelli* (75), giraffe *Giraffa camelopardalis* (25), greater kudu *Tragelaphus strepsiceros* (75) and lesser kudu *Tragelaphus imberbis*, and waterbuck *Kobus ellipsiprymnus* (20), steenbok *Raphicerus campestris*, mountain reedbuck *Redunca fulvorufula*, common duiker *Sylvicapra grimmia*, bushbuck *Tragelaphus scriptus*, and klipspringer *Oreotragus oreotragus*. Threatened species: None

Conservation Management A management plan exists for this area.

Zoning (a) Managed natural zone: priority activity trails, secondary activity hunting. No development or uncontrolled access. (b) General visitor zone: priority activity vehicle borne tourists, secondary activity trails. Development restricted to access roads, game viewing hides, and picnic sites. (c) Peripheral development zone: priority activity visitor accommodation, camping, recreation and education. Development includes staff accommodation and visitor facilities.

Disturbances or Deficiencies A district road passes through part of the game reserve, but will be closed shortly. There is some fish poaching and a fair amount of soil erosion. The dam water level is dependent on agricultural requirements downstream and the National Parks Board has no control over fluctuations in the dam water level.

Visitor Facilities Facilities include picnic areas. Visitor accommodation is under development. Numbers: 15,000 per annum. Potential: 20,000 per annum.

Scientific Research There is a project in progress on piscivorous birds and a project has been completed on carrying capacity

Special Scientific Facilities None

Principal Reference Material

° Manson, J. (1979). Borakalalo Nature Reserve: origin, status and the Department of Agriculture's planning and management policy. Department of Agriculture, Republic of Bophuthatswana.

Staff Two senior and 20 junior staff, all related to management

Budget R1,588,000 (including salaries)

Local Park or Reserve Administration Klipvoor Dam, Borakalalo National Park, PO Atlanta, 0262, Bophuthatswana.

Date May 1983

NWANEDI NATIONAL PARK

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 27 June 1980. Government Notice 43 of 1980. The size of the park is to be increased considerably in the near future.

Geographical Location 50km from Tshipise in Venda. 22°37'-22°40'S, 30°22'E-30°27'E.

Altitude 590-918m (Gumela)

Area 3,200ha

Land Tenure State. Administered by the Venda Department of Agriculture and Forestry.

Physical Features The park is situated in a valley, around dams on the Nwanedzi and Luphephe Rivers. A series of waterfalls and pools form the most impressive physical features. Sandy (from Waterberg Sandstones), mainly very rocky with little soil. Annual average temperature range minimum: 12°C, maximum: 35°C. Annual rainfall 250mm, falling mainly in summer (October-May).

Vegetation Vegetation types consist of the Mopani Veld (Veld Type 15) and *Acacia nigrescens-Combretum apiculatum-Kirkia wilmsii* Veld (Veld Type 18(a)). Very thick bush with tall trees along river banks, including the following species: *Adina microcephala*, *Diospyros* spp., *Xanthocercis zambesiaca*, *Colophospermum mopane*, *Terminalia prunioides*, *Commiphora* spp., and *Adansonia digitata*. Shrubs: *Maytenus undata*, *Grewia* spp., and *Ehretia rigida*. Grasses: *Aristida* spp., and *Panicum maximum*. A checklist of the trees occurring in the Park is available on request. Economically important species: none. Endemic species: none.

Fauna Mammals: eland *Taurotragus oryx* (7), nyala *Tragelaphus angasi* (15), waterbuck *Kobus ellipsiprymnus* (7), klipspringer *Oreotragus oreotragus*, giraffe *Giraffa camelopardalis*, square-lipped rhinoceros *Ceratotherium simum* (6), greater kudu *Tragelaphus strepsiceros* (150) and lesser kudu *Tragelaphus imberbis*, bushbuck *Tragelaphus scriptus*, blue wildebeest *Connochaetes taurinus* (27), impala *Aepyceros melampus* (200) and common duiker *Sylvicapra grimmia*. Threatened mammals: cheetah *Acinonyx jubatus* (T), leopard *Panthera pardus* (T), and brown hyena *Hyaena brunnea* (T).

Conservation Management To be drafted shortly

Zoning In progress

Disturbances or Deficiencies The park is situated over copper claims, which may later pose a problem.

Visitor Facilities Facilities include furnished huts with a kitchen and bathroom, small shop, and a slipway for boats. A rest camp is being developed in this exceptionally scenic area. Hiking and fishing is allowed. Numbers: 20,000 per annum. Potential: 40,000 per annum.

Scientific Research Various studies by the University of the North are being undertaken, including species composition, age determination of fish and catfish breeding. A survey of small mammals has been done by the Mammal Research Institute, the University of Pretoria, and a vegetation survey by the Venda Herbarium.

Special Scientific Facilities None

Principal Reference Material

° Hecht, T. (1980). Age, growth and mortality of the Butter Catfish *Eutropius depressirostris* (Schilbeidae: pisces) in the Lephephe/Nwanedzi impoundment, Venda (South Africa). *Journal of the Limnological Society of Southern Africa*, 6(1): 39-45.

Staff One senior foreman, six rangers, and 10 casual labourers

Budget R80,000 per annum (excluding rest camp and including salaries)

Local Park or Reserve Administration The Manager, Nwanedi National Park, Private Bag X2247, Sibasa, 0970, Venda.

Date May 1983

TSOLWANA GAME PARK

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established April 1977. Ciskeian Forestry Act of 1976 (Act 6 of 1976).

Geographical Location 27km from Tarkastad in Ciskei. 32°8'-32°13'S, 26°26'-26°34'E.

Altitude 1,350-1,866m (1,866m)

Area 7,557ha

Land Tenure Government. Administered by the Ciskei Department of Agriculture and Forestry.

Physical Features The Swart Kei area has steep, stony and shallow soils, except for the valleys, where they are relatively deep with a dark grey structured top horizon and clayey structured B Horizon (Duplex). The annual rainfall is 460mm, falling mainly in summer and autumn (September and October; February to April).

Vegetation Vegetation types consist of Dry *Cymbopogon-Themeda* Veld (Veld Type 50). Karroo communities with *Acacia karroo*, *Chrysocoma tenuifolia*, *Felicia filifolia*, *Senecio* spp., *Helichrysum* spp., *Rhus erosa*, and grassland communities with *Cymbopogon plurinodis*, *Themeda triandra*, *Eragrostis curvula*, *E. plana*, and *Aristida junciformis*.

Fauna Mammals: mountain reedbuck *Redunca fulvorufula* (approximately 500), grey rhebok *Pelea capreolus* (50-100), springbok *Antidorcas marsupialis* (600), steenbok *Raphicerus campestris* (150-200), European fallow deer *Cervus dama* (150), eland *Taurotragus oryx* (110), red hartebeest *Alcelaphus buselaphus* (100), gemsbok *Oryx gazella* (90), black wildebeest *Connochaetes gnou* (56), giraffe *Giraffa camelopardalis* (3), greater kudu *Tragelaphus strepsiceros* (40) and lesser kudu *Tragelaphus imberbis*, buffalo *Syncerus caffer* (5). Various small mammals occur on the reserve. Threatened species: Cape mountain zebra *Equus zebra zebra* (25) and bontebok *Damaliscus dorcas dorcas* (20).

Conservation Management A management plan exists for this area. Hunting of surplus game has improved considerably during the last three years providing an income of over R130,000.00. All surplus meat from hunting is sold to rural people living close to Tsolwana.

Zoning No information

Disturbances or Deficiencies The encroachment of *Euryops* sp., karoid dwarf shrubs is excessive. Soil erosion is also very serious.

Visitor Facilities Facilities include four fully equipped homesteads, one dancing boma, and one outdoor school. There are 32 beds at present.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Resource Survey, A.P. Palmer. Studies by Mentis (1974) and Tinley (1976).

Staff One manager, one assistant manager, two hostesses, one nature conservation officer, one tourist officer, one clerk, 10 game guards, 12 TW workers, and 20 temporary workers

Budget R238,272 per annum (including salaries)

Local Park or Reserve Administration Director General, Department of Agriculture and Forestry, Private Bag X501, Zwelitsha, 5600, Ciskei.

Date June 1983

PIRIE FOREST (INCLUDING EVELYN VALLEY)

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1922. Government Notice 558 of 1922 and Ciskeian Forestry Act of 1976 (Act 6 of 1976).

Geographical Location Approximately 22km from King William's Town in Ciskei. 32°43'S, 27°16'E. The Pirie Forest and Evelyn Valley adjoins the Maden and Rooikrans Dams and the Pirie trout hatchery.

Altitude 540-1,300m (Little Mt Kemp)

Area 5,239ha (including plantation)

Land Tenure Government. Administered by Ciskei Department of Agriculture and Forestry.

Physical Features Very steep sloping pediment with cliffs; McNaughten's Krantz, Sandile's Krantz, Murray's Krantz. The Buffalo River flows through the reserve. Annual rainfall up to 1,800mm falling mainly in summer and autumn (September and October; February to April).

Vegetation Vegetation types consist of Döhne Sourveld (Veld Type 44(b)); excellent high forest typical of eastern Cape. Dominant species include: *Podocarpus falcatus*, *Podocarpus latifolius*, *Rapanea melanophloeos*, *Calodendrum capense*, *Xymalos monospora*, and *Nuxia floribunda*. Economically important species: *Podocarpus atifolius* and *Podocarpus falcatus*.

Fauna Mammals: bushbuck *Tragelaphus scriptus*, grey duiker *Sylvicapra grimmia*, bush pig *Potamochoerus porcus*, vervet monkey *Cercopithecus aethiops*, and porcupine *Hystrix africaeaustralis*. Threatened species: Samango monkey *Cercopithecus mitis*.

Conservation Management No management plan exists for this area.

Zoning Mostly a natural area, with some low density tourism areas

Disturbances or Deficiencies Problem of utilisation of economic species of indigenous timbers in an area otherwise managed as a nature reserve. One of the few forest railways in southern Africa was operated in the Pirie Forest some 70 years ago.

Visitor Facilities Facilities include National Hiking Way trails and overnight hut, managed by the Ciskei National Tourist Bureau, and numerous footpaths. Numbers: 1,500 per annum. Potential: 5,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports

Staff Managed by Government Forester of the Isidenge Plantation (RSA)

Budget R4,000 per annum (excluding salaries) for maintenance of trail

Local Park or Reserve Administration The Director General, Department of Agriculture and Forestry, Private Bag X501, Zwelitsha, 5600, Ciskei.

Date 6 June 1983

RABULA FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established Demarcated in 1912 and 1915. Government Notice 396 of 1912, and 97 of 1915, and Ciskeian Forestry Act of 1976 (Act 6 of 1976).

Geographical Location Approximately 6km from Keiskammahoek in Ciskei. 32°44'S, 27°12'E.

Altitude 730-1,289m (Mt Charybdis)

Area 3,884ha

Land Tenure Government. Administered by the Ciskei Department of Agriculture and Forestry.

Physical Features There are very steep slopes with numerous incised valleys and minor tributaries of the Rabula River which flows into the Keiskamma River. Annual rainfall approximately 900mm, falling mainly in summer and autumn (September and October; February to April)

Vegetation Vegetation types consist of Döhne Sourveld (Veld Type 44(b)). Drier type of high forest *Podocarpus falcatus*, *Podocarpus latifolius*, *Rapanea melanophloeos*, *Celtis africana*, and *Calodendrum capense*. Economically important species: *Podocarpus latifolius* and *Podocarpus falcatus*.

Fauna Mammals: bushbuck *Tragelaphus scriptus*, grey duiker *Sylvicapra grimmia*, and vervet monkey *Cercopithecus aethiops*. Threatened species: Samango monkey *Cercopithecus mitis*.

Conservation Management No management plan exists for this area.

Zoning Consists of numerous (43) widely scattered forests ranging in size from four to over 1,000ha, forming part of the Rabula State Forest. Plantation area of some 430ha and total area of 4836ha was under control of Department of Forestry, South Africa up to 31 March 1973.

Disturbances or Deficiencies Disturbances include the exploitation of dead and dying indigenous trees by private long-term contractor.

Visitor Facilities Nil at present

Scientific Research None

Special Scientific Facilities None

Principal Reference Material No information

Staff No information

Budget No information

Local Park or Reserve Administration Director General, Department of Agriculture and Forestry, Private Bag X501, Zwelitsha, 5600, Ciskei.

Date June 1983

ZINGCUKA FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established Demarcated Forest since 1913. Government Notice 1204 of 1913 and 315 of 1916 and Ciskeian Forestry Act of 1976 (Act 6 of 1976). The area was formerly known as Schwarzwald or Wolf River, and was taken over from the South African Department of Forestry in 1973.

Geographical Location Approximately 10km from Hogsback in Ciskei. 32°40'S, 27°00'E.

Altitude 700-1,650m (Hogsback)

Area 3,731ha; this area forms part of the Zingcuka State Forest, which consists of about 40 forests ranging in size from 8ha to over 1,000ha, including some 8,000ha of plantation.

Land Tenure Government. Administered by the Ciskei Department of Agriculture and Forestry.

Physical Features Very steep sloping pediment and incised valleys in the upper reaches of the Amatola Basin with tributaries of the Keiskamma River outside the reserve. Annual rainfall approximately 1,200mm, falling mainly in summer and autumn (September and October; February to April).

Vegetation Vegetation types consist of Döhne Sourveld (Veld Type 44(b)). Mainly moist high forest including dominant species such as *Podocarpus falcatus*, *Podocarpus latifolius*, *Rapanea melanophloeos*, *Vepris undulata*, *Celtis africana*, and *Calodendrum capense*. Economically important species: *Podocarpus falcatus*, *Podocarpus latifolius*, to an extent *Rapanea melanophloeos*, and *Olea capensis* ssp. *macrocarpa*.

Fauna Mammals: bushbuck *Tragelaphus scriptus*, common duiker *Sylvicapra grimmia*, bushpig *Potamochoerus porcus*, vervet monkey *Cercopithecus aethiops*, and porcupine *Hystrix africaeaustralis*. Threatened species: Samango monkey *Cercopithecus mitis*.

Conservation Management A management plan is in preparation.

Zoning Management plan currently being drawn up

Disturbances or Deficiencies Exploitation of dead and dying Yellowwoods (*Podocarpus* spp.) by a long-term contractor

Visitor Facilities Picnic sites are under construction and hiking trails are being planned. Numbers: none at present. Potential: undetermined.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished internal reports.

Staff No information

Budget No information

Local Park or Reserve Administration The Director General, Department of Agriculture and Forestry, Private Bag X501, Zwelitsha, 5600, Ciskei.

Date June 1983

CWENGWE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1926. Government Notice 2053 of 1926 and Ciskeian Forestry Act of 1976 (Act 6 of 1976).

Geographical Location Approximately 22km from Stutterheim in Ciskei. 32°42'S, 27°18'E.

Altitude 550-885m

Area 3,276ha (including plantation)

Land Tenure Government. Administered by Ciskei Department of Agriculture and Forestry.

Physical Features Relatively gentle slopes with few incised valleys. Murray's Krantz. Cwengcwe River, a tributary of the Buffalo River is the principal watercourse. Annual rainfall; 1,200mm, falling mainly in summer and autumn (September and October; February to April).

Vegetation Vegetation types consist of Döhne Sourveld (Veld Type 44(b)); typical high forest of the eastern Cape with *Podocarpus latifolius*, *Podocarpus falcatus*, *Rapanea melanophloeos*, *Calodendrum capense*, and *Celtis africana*. Economically important species: *Podocarpus latifolius*, *Podocarpus falcatus*, and *Rapanea melanophloeos*.

Fauna Mammals: bushbuck *Tragelaphus scriptus*, common duiker *Sylvicapra grimmia*, bushpig *Potamochoerus porcus*, vervet monkey *Cercopithecus aethiops*, and porcupine *Hystrix africaeaustralis*. Threatened species: Samango monkey *Cercopithecus mitis*.

Conservation Management A management plan exists for this area.

Zoning Plantation management plan

Disturbances or Deficiencies There are problems of conservation and total protection versus exploitation of commercial species.

Visitor Facilities None, other than walking trails

Scientific Research None

Special Scientific Facilities None

Principal Reference Material No information

Staff No information

Budget No information

Local Park or Reserve Administration Director General, Department of Agriculture and Forestry, Private Bag X501, Zwelitsha, 5600, Ciskei.

Date June 1983

CATA FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established Demarcated forest since 1913. Government Notice 1204 of 1913, and 1240 of 1913, and the Ciskeian Forestry Act of 1976 (Act 6 of 1976).

Geographical Location Approximately 16km from Keiskammahoek in Ciskei. 27°08'S, 32°34'E.

Altitude 910-1,300m (On slopes of Amatola Mountain)

Area 1,592ha, which includes a portion of Cata State Forest with a plantation area of 300ha and a total area of 4,020ha

Land Tenure Government. Administered by the Ciskei Department of Agriculture and Forestry under the control of the Department of Forestry up to 31 March 1973.

Physical Features This consists of scattered forests ranging in size from 8ha to 1,545ha, on a steep to very steep sloping pediment and incised valleys of the Mnyameni and Cata Streams, which flow into the Gxulu River; a tributary of the Keiskamma River. Annual rainfall is approximately +/- 1,100mm, falling mainly in summer and autumn (September and October; February to April).

Vegetation Vegetation types consist of the Döhne Sourveld (Veld Type 44(b)) with *Podocarpus falcatus*, *Podocarpus latifolius*, *Rapanea melanophloeos* and *Celtis africana*. Economically important species: *Podocarpus latifolius*, *Podocarpus falcatus*, and, to a lesser extent, *Rapanea melanophloeos*.

Fauna Mammals: bushbuck *Tragelaphus scriptus*, common duiker, *Sylvicapra grimmia*, and vervet monkey *Cercopithecus aethiops*. Threatened species: Samango monkey *Cercopithecus mitis*.

Conservation Management No management plan exists for this area.

Zoning No information

Disturbances or Deficiencies Exploitation of yellowwoods and other species by long-term contractors

Visitor Facilities None. Trails with overnight facilities are being planned.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material No information

Staff No information

Budget No information

Local Park or Reserve Administration Director General, Department of Agriculture and Forestry, Private Bag X501, Zwelitsha, 5600, Ciskei.

Date June 1983

IZELENI FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1917. Government Notice 1183 of 1917 and Ciskeian Forestry Act of 1976 (Act 6 of 1976). This area was taken over from the Republic of South Africa on 1 October 1978.

Geographical Location 27km from Stutterheim in Ciskei. 32°40'S, 27°25'E.

Altitude 700-885m

Area 1,330ha; this forest is part of the Izeleni State Forest, which includes 430ha of plantation and covers a total area of 1,814ha.

Land Tenure Government. Administered by the Ciskei Department of Agriculture and Forestry.

Physical Features The Izeleni River which flows into the Yellowwoods River. There is a steep sloping pediment with incised valleys of the Izeleni River. Annual rainfall +/-1,000mm, falling mainly in summer and autumn (September and October; February to April).

Vegetation Vegetation types consist of Döhne Sourveld (Veld Type 44(b)). Ranges from high forest to dry scrub forest. Dominant species: *Podocarpus latifolius*, *Podocarpus falcatus*, *Curtisia dentata*, *Xymalos monospora*, *Rapanea melanophloeos*, *Olea capensis* ssp. *macrocarpa*, *Erythrina caffra*, *Vepris undulata*, *Cussonia spicata*, and *Trichocladus crinitus*. Economically important species: *Podocarpus latifolius* and *Podocarpus falcatus*.

Fauna Red duiker *Cephalophus natalensis* and bushbuck *Tragelaphus scriptus*. Threatened species: none.

Conservation Management No management plan exists for this area. No exploitation of indigenous timber has taken place over the past 10 years or longer.

Zoning None

Disturbances or Deficiencies Conflict of activities such as grazing and fuel requirements versus catchment protection, and development versus protection.

Visitor Facilities None. Numbers: nil. Potential: undetermined

Scientific Research None

Special Scientific Facilities None

Principal Reference Material No information

Staff No information

Budget No information

Local Park or Reserve Administration Director General, Department of Agriculture and Forestry, Private Bag X501, Zwelitsha, 5600, Ciskei.

Date June 1983

DONTSA FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established Demarcated in 1913 and 1915. Government Notice 1204 of 1913, Notice 97 of 1915 and Ciskeian Forestry Act of 1976 (Act 6 of 1976).

Geographical Location Approximately 18km from Keiskammahoek in Ciskei. 32°35'S, 27°13'E.

Altitude 850-1,616m (Mt Thomas)

Area 1,209ha indigenous forest consisting of numerous (approximately 40) scattered forests ranging from four to 940ha in size, forming part of the Dontsa State Forest. Plantation area is 322ha and total area 3,012ha.

Land Tenure Government. Administered by the Ciskei Department of Agriculture and Forestry, which was under control of Department of Forestry up to 31 March 1973.

Physical Features Steep to very steep sloping pediment with numerous incised valleys. The MnQukwane, Ngobozana and Gwiligwili Streams flow into the Keiskamma River. Annual rainfall approximately 1,100mm, falling mainly in summer and autumn (September and October; and February to April).

Vegetation Vegetation types consist of Döhne Sourveld (Veld Type 44(b)); mainly high forest comprising *Podocarpus falcatus*, *Podocarpus latifolius*, *Rapanea melanophloeos*, *Olea capensis* ssp. *macrocarpa*, and *Xymalos monospora*. Economically important species: *Podocarpus falcatus*, *Podocarpus latifolius*, and *Rapanea melanophloeos*.

Fauna Bushbuck *Tragelaphus scriptus*, common duiker *Sylvicapra grimmia*, and vervet monkey *Cercopithecus aethiops*. Threatened species: Samango monkey *Cercopithecus mitis*.

Conservation Management No management plan exists for this area.

Zoning No information

Disturbances or Deficiencies There has been some exploitation of dying trees by a long-term contractor.

Visitor Facilities There are no facilities at present, but trails with overnight huts are being planned.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material No information

Staff No information

Budget No information

Local Park or Reserve Administration The Director General, Department of Agriculture and Forestry, Private Bag X501, Zwelitsha, 5600, Ciskei.

Date June 1983

DWESA NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 25 July 1975. Government Gazette 28 of 25 July 1975.

Geographical Location 60km from Idutywa in Transkei. 32°12'-32°20'S, 28°48'-28°58'E. (Dwesa and Cwebé Nature Reserves adjoin each other and this latitude/longitude includes both. A river forms a theoretical boundary).

Altitude Sea level-300m (Dwesa Hill, 300m)

Area 3,900ha contiguous to Cwebé Nature Reserve (2,140ha).

Land Tenure Government. Administered by the Transkei Department of Agriculture and Forestry.

Physical Features The reserve is situated along 8km of sea-frontage along the Indian Ocean, with topography rising step-wise from coast. The area is drained by a number of rivers namely Mbashee River, Mendu River, and Kobola Stream. The geology is composed of Karoo sediments of Ecca shales and sandstones with soils predominantly of Fernwood and Nomanci forms with relatively deep clays, loams and sands. Annual average temperature range minimum: 15°C, maximum: 21°C. Annual rainfall \pm 875mm, falling mainly in the summer (February-April and September-November) to 300m.

Vegetation Vegetation types consist of Coastal Forest and Thornveld (Veld Type 1) and valley Bushveld (Veld Type 23)(Acocks, 1975). This area is transitional between the temperate and subtropical forest types. Coastal vegetation includes: *Mimusops caffra*, *Brachylaena discolor*, *Scaevola thunbergii*, and *Rapanea melanophloeos*. *Stenotaphrum secundatum*, *Themeda triandra* and *Cymbopogon excavatus* are the dominant grasses. *Heywoodia lucens*, *Celtis africana*, *Podocarpus latifolius*, with *Millettia grandis*, and *Buxus natalensis* are the dominant trees in the areas of high forest. The valley bushveld has *Acacia karroo* as a dominant tree species. Economically important species: *Podocarpus latifolius*, *Buxus macowanii*, *Ptaeroxylon obliquum*. Endemic species: *Heywoodia lucens*, *Encephalartos* spp., and *Aloe* spp..

Fauna Square-lipped rhinoceros *Ceratotherium simum* (8), reedbuck *Redunca arundinum* (8), buffalo *Syncerus caffer* (6), warthog *Phacochoerus aethiopicus* (50), eland *Taurotragus oryx* (36), and blue duiker *Cephalophus monticola* (approximately 150), red hartebeest *Alcelaphus buselaphus* (30), bushbuck *Tragelaphus scriptus* (approximately 150), blesbok *Damaliscus dorcas* (200), and bushpig *Potamochoerus porcus* (approximately 50). The birdlife is prolific and diverse and includes some restricted forest species. Threatened species: leopard *Panthera pardus* (T) (2).

Conservation Management A management plan exists for this area.

Zoning Wilderness area with non-extractive form of tourism

Disturbances or Deficiencies Under utilisation by heavy bulk grazers, e.g. buffalo.

Visitor Facilities Facilities include eight log cabins and two rustic wilderness huts. Numbers: 6,000 per annum. Potential: 8,760 per annum.

Scientific Research All research is done by the University of Transkei on rocky shore productivity and investigation of primitive iron age sites.

Special Scientific Facilities None

Principal Reference Material Various comprehensive unpublished departmental reports

Staff Two senior staff and six junior staff as well as casual labourers

Budget R45,000 per annum (excluding salaries)

Local Park or Reserve Administration The Officer-in-Charge, Dwesa Nature Reserve, Department of Agriculture and Forestry, Private Bag X5002, Umtata, Transkei.

Date June 1983

CWEBE NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African grassland/savanna)

Legal Protection Total

Date Established 25 July 1975. Government Gazette 28 of 25 July 1975.

Geographical Location 80km from Umtata in Transkei. 32°12'-32°20'S, 28°48'-28°58'E. (Dwesa and Cwebé Nature Reserves adjoin each other and this latitude/longitude includes both. A river forms a theoretical boundary).

Altitude Sea level-240m

Area 2,140ha contiguous to Dwesa Nature Reserve (3,900ha)

Land Tenure Government. Administered by the Transkei Department of Agriculture and Forestry.

Physical Features The reserve comprises 4km of sea frontage drained by two rivers; Mbashee and Mbanyane. The topography rises gradually from the coast to 240m and is composed of Karoo sediments with soils of Fernwood and Nomanci forms of clays, loams and sands. Annual average temperature range minimum: 15°C, maximum: 21°C. Annual rainfall 870mm, falling mainly in summer (February-April and September-November).

Vegetation Vegetation types consist of Coastal Forest and Thornveld (Veld Type 1). The area is transitional between the temperate and subtropical forest types. Coastal vegetation includes: *Mimusops caffra*, *Brachylaena discolor*, *Scaevola thunbergii*, *Rapanea melanophloeos*; *Stenotaphrum secundatum*, *Themeda triandra* and *Cymbopogon excavatus* are the dominant grasses. *Heywoodia lucens*, *Celtis africana*, *Podocarpus latifolius*, and on sandy soils *Millettia grandis*, and *Buxus natalensis* are the dominant trees in the areas of high forest. The Valley Bushveld has *Acacia karroo* as a dominant tree species. Economically important species: *Podocarpus latifolius*; *Buxus macowanii*, and *Ptaeroxylon obliquum*. Endemic species: *Heywoodia lucens*, *Encephalartos* spp., and *Aloe* spp..

Fauna Mountain reedbuck *Redunca fulvorufula* (15), impala *Aepyceros melampus* (3), and bushbuck *Tragelaphus scriptus* (5). The bird life is very diverse because of the variety of habitats. Some restricted species related to lowland forest occur. Threatened species: leopard *Panthera pardus* (T), blue duiker *Cephalophus monticola* (10).

Conservation Management A management plan exists for this area.

Zoning Concentrated medium density recreation area around hotel. The remainder is a natural area.

Disturbances or Deficiencies Some 40 privately owned cottages fall within this area which causes immense disturbance and problems.

Visitor Facilities A hotel is situated inside the reserve and a camp site is being planned. Numbers: 900 per annum. Potential: 1,440 per annum.

Scientific Research University of Transkei projects on millet production and also on intertidal zone productivity.

Special Scientific Facilities None

Principal Reference Material Various comprehensive unpublished departmental reports.

Staff Two senior staff and six junior staff as well as casual labourers

Budget R20,000,00 per annum (excluding salaries)

Local Park or Reserve Administration Cwebe Nature Reserve, via Elliotdale, Transkei.

Date June 1983

MANYELETI GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 15 December 1967. Government Notice 340 of 1967 as amended.

Geographical Location 173km from Nelspruit in Gazankulu. 24°29'-24°42'S, 31°21'-31°36'E.

Altitude 366-488m

Area 22,772ha

Land Tenure State. Administered by the Nature Conservation Branch, Department of Cooperation and Development.

Physical Features Archaean granites are exposed in most areas. A large dolerite dyke runs from north to south in the west of the area. A few smaller intrusions of dolerite occur. Nwaswitsontsor River flows through the reserve. Poor, well drained, sandy soils on granite ridges with richer clayey soils in the valleys. Arcadia soil type developing from dolerite in poorly drained areas and Shortlands soil type on better drained slopes. Annual average temperature range minimum: 14.9°C, maximum: 28.5°C. Annual rainfall 582mm, falling mainly in summer (October-April).

Vegetation Vegetation types consist of the Lowveld (Veld Type 10). Seven plant communities are distinguished: *Perotis patens-Terminalia sericea* association, *Euclea divinorum-Acacia nigrescens* association, *Themeda triandra-Acacia gerrardii* association, *Euclea divinorum-Albizia harveyi* association, *Themeda triandra-Setaria woodii* association, *Cardiospermum corindum-Acacia nigrescens* association, and *Spirostachys africana-Diospyros mespiliformis* association.

Fauna The park has large numbers of mammals including: impala *Aepyceros melampus* (several thousand), reedbuck *Redunca arundinum* (350), blue wildebeest *Connochaetes taurinus* (350), Burchell's zebra *Equus burchelli* (230), giraffe *Giraffa camelopardalis* (130), greater kudu *Tragelaphus strepsiceros* (260) and lesser kudu *Tragelaphus imberbis*, waterbuck *Kobus ellipsiprymnus* (150), buffalo *Syncerus caffer* (170), square-lipped rhinoceros *Ceratotherium simum* (30), elephant *Loxodonta africana* (T), and lion *Panthera leo* (T). Both elephant and lion wander in and out of the park. Threatened species: cheetah *Acinonyx jubatus* (T), aardwolf *Proteles cristatus*, and sable *Hippotragus niger*.

Conservation Management No management plan exists for this area. The reserve is operated primarily as an education facility for the National State of Gazunkulu, which will take over the reserve in 1985.

Zoning Recreation zone with vehicle borne tourism and wilderness zone

Disturbances or Deficiencies Poaching and uncontrolled fires

Visitor Facilities Some 19 standard rondavels, 15 luxury rondavels and six dormitories for school groups. Hiking trails are being developed. Numbers: 27,000 per annum. Potential: unknown. A restaurant and shop complex is run by a private concern.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Bredenkamp, G.J. and Theron, G.K. (1980). Die Plantegroei van die Manyeleti-wildtuin. In: *Plant sosiologiese en plant ekologiese studie*.

Staff One senior management, six junior administrative, and 20 junior management staff. There is a fluctuating force of labourers of about 25.

Budget R350,000,00 per annum (including labourers' salaries)

Local Park or Reserve Administration The Manager, Manyeleti Game Reserve, PO Manyeleti, 1362.

Date 23 May 1983

BLOUBERG NATURE RESERVE (EAST)

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1977. Government Notice 1725 of 1983

Geographical Location 150km from Pietersburg in Lebowa. 23°02'S, 29°05'E.

Altitude 844-1,453m (Unnamed summit of Blouberg massif)

Area 6,848ha. It is planned to enlarge this Reserve in order to link up with the Blouberg Nature Reserve (West).

Land Tenure State. Administered by the Nature Conservation Branch, Department of Cooperation and Development

Physical Features Most of the Reserve is mountain and mountain slope. The remaining peripheral area is flat land. There are numerous high cliffs. No rivers, but small springs and streams from the mountain flow for much of the year. Reddish, sandy loams. Annual average temperature range minimum: 8°C, maximum: 27°C. Annual rainfall 340-400mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of Arid Sweet Bushveld (Veld Type 14). Mixed woodland with some forest remaining on the upper mountain slopes. Some dense thicket at the foot of the mountain. A vegetation survey has not been carried out, but dominants are likely to be as for Blouberg Nature Reserve (West). Economically important species: none. Endemic species: none.

Fauna Impala *Aepyceros melampus*, waterbuck *Kobus ellipsiprymnus*, and kudu *Tragelaphus strepsiceros*. Birds are well represented and include one of southern Africa's largest breeding colonies of Cape vulture *Gyps coprotheres*. Threatened species: leopard *Panthera pardus* (T), brown hyena *Hyaena brunnea* (V), and Cape vulture *Gyps coprotheres* (T).

Conservation Management A management plan exists for this area.

Zoning All are natural areas

Disturbances or Deficiencies Poaching and poor water supply. There is also a shortage of trained personnel.

Visitor Facilities None

Scientific Research One project on the breeding biology of the Cape vulture *Gyps coprotheres*.

Special Scientific Facilities None

Principal Reference Material Unpublished departmental reports

Staff Two senior management, five junior management staff, and a fluctuating labour force of about 15.

Budget R90,000,00 per annum (including labourers' wages)

Local Park or Reserve Administration Chief Commissioner's Office, Northern Areas, Private Bag X9322, Pietersburg, 0700.

Date February 1984

BLOUBERG NATURE RESERVE (WEST)

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established October 1982. Government Notice R4 of 1983.

Geographical Location 152km from Pietersburg in Lebowa. 23°00'-23°06'S, 28°50'-28°56'E.

Altitude 981-1,804m (Blouberg)

Area 4,450ha. It is planned to enlarge this reserve in order to link up with the Blouberg Nature Reserve (East).

Land Tenure Tribal land. Administered by the Lebowa Department of Agriculture and Environmental Conservation.

Physical Features Mostly flat land, but mountainous in the south-east. Reddish, sandy loams over calcrete ridges. Portsmouth, Shorocks, and Mudén are the main soil forms. Annual average temperature range minimum: 2°C, maximum: 31°C. Annual rainfall 310-630mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of Arid Sweet Bushveld (Veld Type 14). Mixed woodland with well developed tree cover. Dominants include *Combretum apiculatum*, *Commiphora mollis*, *Sclerocarya caffra*, and *Acacia tortilis*, *Faurea saligna*, *Euphorbia ingens* and *Commiphora marlothii*, *Acacia nigrescens*, *A. tortilis* and *Lannea discolor*. Economically important species: none. Endemic species: none.

Fauna Impala *Aepyceros melampus* (200), greater kudu *Tragelaphus strepsiceros* and lesser kudu *Tragelaphus imberbis*, eland *Taurotragus oryx*, gemsbok *Oryx gazella*, red hartebeest *Alcelaphus buselaphus* and various small mammals. A small number of ostrich *Struthio camelus* also occur. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning Recreation zone and hunting/wilderness zone

Disturbances or Deficiencies Shortage of trained personnel, lack of water and bush encroachment

Visitor Facilities Facilities include picnic sites and game viewing roads. Reserve not yet open to the public.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Unpublished departmental reports

Staff Three senior staff and eight labourers

Budget Approximately R75,000,00 per annum (including labourers' wages)

Local Park or Reserve Administration The Director: Nature Conservation, Department of Agriculture and Environment Affairs, Private Bag X01, Chuniemoor, 0745, Lebowa.

Date 4 July 1983

POTLAKE NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established August 1977. Government Notice R5 of 1983.

Geographical Location 85km from Pietersburg in Lebowa. 24°13'-24°16'S, 29°53'-29°58'E

Altitude 409-1,183m (Legobwe)

Area 2,928ha

Land Tenure Only partly Government; the greater portion is Tribal Land. The whole is administered by the Lebowa Department of Agriculture and Environmental Conservation.

Physical Features About 50% is mountain and mountain slopes, the remainder is flat land. The reserve is divided by mountains. The Olifants River touches the western boundary. There are large areas of bare rock, but otherwise, mixed sandy or clay loams. Annual average temperature range minimum: 18.4°C, maximum: 30°C. Annual rainfall 430mm, falling mainly in summer (September-March).

Vegetation Vegetation types consist of Arid Sweet Bushveld (Veld Type 14). Acacia woodland. Dominant species include: *Acacia tortilis*, *A. grandicornuta*, *A. mellifera*, *Albizia adianthifolia*, *Ehretia rigida*, *Boscia foetida*, *Commiphora pyracanthoides*, *Boscia albitrunca*, *Capparis* spp., and *Maerua* spp.. Grasses include: *Themeda triandra*, *Cymbopogon plurinodis*, *Eragrostis* spp., *Aristida congesta*, and *Digitaria* spp. Economically important species: none. Endemic species: none.

Fauna Except for a few impala and kudu, all large mammals were introduced: impala *Aepyceros melampus* (150), greater kudu *Tragelaphus strepsiceros* (25) and lesser kudu *Tragelaphus imberbis*, blue wildebeest *Connochaetes taurinus* (30), eland *Taurotragus oryx* (20), gemsbok *Oryx gazella* (20), waterbuck *Kobus ellipsiprymnus* (20), giraffe *Giraffa camelopardalis* (6), Burchell's zebra *Equus burchelli* (20), and red hartebeest *Alcelaphus buselaphus* (70). Ostrich *Struthio camelus* (34) also occurs. Threatened species: sable *Hippotragus niger*.

Conservation Management A management plan exists for this area.

Zoning About 60% wilderness, the remainder is accessible for motor borne game viewing

Disturbances or Deficiencies Shortage of trained personnel, bush encroachment, erosion, leaching and droughts.

Visitor Facilities Facilities include an interpretation centre, kiosk, and picnic sites. Wilderness trails will come into operation by June 1984. Numbers: none. Potential: considerable education and recreational potential.

Scientific Research A vegetation survey completed by the University of Pretoria, is unpublished.

Special Scientific Facilities None

Principal Reference Material Unpublished vegetation survey report and various internal departmental reports.

Staff Management, one senior and two junior staff, and seven labourers

Budget R150,000 per annum (excluding salaries)

Local Park or Reserve Administration The Director: Nature Conservation, Department of Agriculture and Environment Affairs, Private Bag X01, Chuniespoort, 0745, Lebowa.

Date 4 July 1983

TEMBE ELEPHANT PARK

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 21 October 1983. KwaZulu Government Notice 73 of 1983.

Geographical Location 38km from KwaNgwanase in KwaZulu. 26°51'S, 32°24'E.

Altitude 34-100m

Area 29,878ha

Land Tenure State. Administered by the KwaZulu Bureau of Natural Resources.

Physical Features The area comprises low sand ridges on the Mozambique coastal plain with Mozi drainage. Recent geological period. Grey to pale red sandy soils. Annual average temperature range minimum: 8°C, maximum: 34°C. Annual rainfall 700mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of Coastal Forest and Thornveld (Veld Type 1) and Lowveld (Veld Type 10). Sandforest thickets: *Newtonia hildebrandtii*, *Cleistanthus schlechteri*, *Dialium schlechteri*, and *Pteleopsis myrtifolia*. Swamp: *Phragmites mauritianus*, *Typha capensis* and *Cyperus* spp.. The Park incorporates the most southerly range of some plant species, such as *Azelia quanzensis*. Economically important species: *Phragmites mauritianus* for building material; and *Hyphaene natalensis*, for lala wine. Endemic species: none.

Fauna Elephant *Loxodonta africana* (T) (approximately 120) migrate across the border between Mozambique and KwaZulu. These are the last naturally occurring elephants in KwaZulu. Other mammals include: hippopotamus *Hippopotamus amphibius* (7), common duiker *Sylvicapra grimmia* and reedbuck *Redunca arundinum*. Various small mammals, e.g. rodents, occur in the area. Threatened species: suni *Neotragus moschatus*.

Conservation Management A management plan exists for this area.

Zoning All a natural area with a low density tourism area being planned

Disturbances or Deficiencies Inadequate distribution of water supply in the Park. Maintaining healthy balance between elephant population and sandforest poses management problems. Some alien invasive species occur, such as *Pereskia aculeata*.

Visitor Facilities None, but a basic camp is being planned. Numbers: none yet. Potential: unknown.

Scientific Research Vegetation survey and utilisation of vegetation by man and fauna, i.e. elephants

Special Scientific Facilities None

Principal Reference Material

- ° Bruton, M.N. and Cooper, K.H. (1980). Studies on the Ecology of Maputaland. Cape and Transvaal Printers, Natal Branch of the Wildlife Society, Durban, 560 pp.
- ° Tinley, K.L. and van Riet, W.S. (1981). Tongaland - zonal ecology and rural landuse proposals. Unpublished report.

Staff One warden, four nature conservation officers, 30 game scouts and labourers (excluding tourism staff)

Budget R200,000 per annum (excluding salaries)

Local Park or Reserve Administration The Regional Conservation Officer, Bureau of Natural Resources, PO Box 43, KwaNgwanase, 3973.

Date January 1984

LEKGALAMEETSE NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1979. Proclamation 461 of 1984.

Geographical Location 40km from Tzaneen in Transvaal. 24°05'S, 30°15'E.

Altitude 800-1,853m (Mogokolo)

Area 18,125ha

Land Tenure State. Administered by the Nature Conservation Branch, Department of Cooperation and Development.

Physical Features There are spectacular mountains with steep slopes, gorges and amphitheatres falling to flatter land in the lowveld parts of the reserve. Ngwabitsi, Mohlapitse and Selati Rivers. Six macrosoil associations are mapped, mostly acid, leached clays with rocks and some deep alluvial loamy to clayey soils. Annual average temperature range minimum: 4°C, maximum: 34°C. Annual rainfall 740-1,280mm, increasing with altitude, falling mainly in summer and early autumn (November-March).

Vegetation Lowveld Sour Bushveld (Veld Type 9) and North-eastern Mountain Sourveld (Veld Type 8). Ranges from open bushveld with *Trichilia emetica*, *Combretum erythrophyllum*, *Parinari curatellifolia*, *Ficus* spp. through scrub forest with *Syzygium cordatum*, *Ficus capensis*, *Acacia ataxacantha*, *A. dayi* and *Polystachya* spp., *Mystacidium venosum*, to montane forest

with trees, shrubs and lianoid plants. Dominants here include *Xymalos monospora*, *Trichilia dregeana*, *Maesa lanceolata*, and *Ilex mitis*. The summits are covered by open grassland with *Themeda triandra* dominant. This reserve includes a forest of *Encephalartos transvenosus* and a high altitude scrub forest reminiscent of the Cape flora. The reserve has 79 recorded plant species which are listed as threatened. Economically important species: none. Endemic species: *Euphorbia restricta*, *Cyrtanthus thorncroftii*, *Kniphofia coralligemma*, *Encephalartos eugene-maraisii*, *E. inopinus* are all endemic to the Transvaal Escarpment.

Fauna Bushbuck *Tragelaphus scriptus* and common duiker *Sylvicapra grimmia*. Over 200 species of birds have been recorded, including rare or restricted forest species. Lepidoptera are very numerous and include rare species and several new species not yet described. A frog *Breviceps* spp., endemic to the Transvaal escarpment is found here. Threatened mammals: leopard *Panthera pardus* (T), samango monkey *Cercopithecus mitis*, and Meller's mongoose *Rhyncogale melleri*; reptiles: dwarf chameleon *Bradypodion* spp., and leaf-toed gecko *Phyllodactylus* spp..

Conservation Management A management plan exists for this area. Extensions to the Reserve have been proposed, which would increase the area to about 42,000ha.

Zoning The area is zoned into wilderness, a natural buffer zone which will carry vehicles and provide game viewing, and three development zones where all major facilities will be concentrated.

Disturbances or Deficiencies There are more than 30 species of alien plants on the reserve, the removal of which is very difficult. Unauthorised collecting of Lepidoptera is also a problem as is removal of rare indigenous species such as cycads.

Visitor Facilities Facilities are under construction, but will eventually comprise wilderness trails and camps and main high density tourist camps. Numbers: none. Potential: undetermined.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Van Riet, W. (1981 and 1983). Planning proposals for The Downs. Internal report, unpublished.

Staff Three senior staff, 12 junior staff, and a fluctuating labour force of about 15 to 20.

Budget R192,500 per annum (excluding senior staff salaries)

Local Park or Reserve Administration The Assistant Director: Nature Conservation, Department of Cooperation and Development, PO Box 384, Pretoria, 0001.

Date February 1984

SEDERBERG MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1897. Government Notice 491 of 1897, Government Notice 1256 of 1973, and Government Notice 155 of 1978

Geographical Location 4km from Clanwilliam in Cape Province. 32°00'–45°S, 18°50'–19°25'E.

Altitude 213–2,027m (Sneeuberg)

Area 126,375ha

Land Tenure 67,242ha (53%) Government. Administered by the Directorate of Forestry, Department of Environment Affairs and 59,133ha (47%) privately owned, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features The reserve is scenically beautiful with rocky mountains small valleys and some sandy plateaux, areas of narrow kloofs and steep cliffs, and tributaries of the Olifants River. Soils are highly leached acid sands with small pockets of sandy loams. Annual average temperature range minimum: 6°C, maximum: 19°C. Annual rainfall 400–1,500mm, falling mainly in winter (May–September).

Vegetation Vegetation types consist of Macchia (Veld Type 69) and False Macchia (Veld Type 70). Characteristic species are ericoid low evergreen shrubs, restioids and proteoid medium to tall shrubs with broad, leathery leaves. Economically important species: families which are harvested for the flower trade such as the Proteaceae, Ericaceae and Restionaceae; and buchu *Agathosma betulina* for its oil. Endemic species: endemics which are numerous in the Cape floral kingdom are well represented.

Fauna Grey rhebok *Pelea capreolus*, klipspringer *Oreotragus oreotragus*, Chacma baboon *Papio ursinus*, caracal *Felis caracal*, African wildcat *Felis silvestris*, common duiker *Sylvicapra grimmia*, steenbok *Raphicerus campestris*, and grysbok *Raphicerus melanotis*. Threatened species: mammals: leopard *Panthera pardus* (T), Cape gerbil *Tatera afra*, Cape spiny mouse *Acomys subspinosus*, Verreaux's mouse *Praomys verreauxii*, aardwolf *Proteles cristatus*, serval *Felis serval*, honey badger *Mellivora capensis* and spectacled dormouse *Graphiurus ocellatus*; birds: white stork *Ciconia ciconia*, kori bustard *Choriotis kori*, and protea canary *Serinus leucopterus*. Amphibians: ghost frog *Heleophryne rosei*; reptiles: small-scaled leaf-toed gecko *Phyllodactylus microlepidotus* and armadillo lizard *Cordylus cataphractus*; fish: Clanwilliam yellowfish *Barbus capensis* (R), fiery redbin *Barbus phlegethon* (E), Clanwilliam rock catfish *Gephyroglanis gilli*, and Clanwilliam redbin *Barbus calidus* (R).

Conservation Management A management plan exists for this area.

Zoning State Forest Wilderness Area 67,242ha; private land 59,133ha

Disturbances or Deficiencies Proper control of fires lacking.

Visitor Facilities Facilities include a camp and caravan site, and hiking trails. Numbers: 10,500 per annum. Potential: undetermined.

Scientific Research Active research undertaken on all aspects of the region's ecology

Special Scientific Facilities None on site, but served by the Jonkershoek Forestry Research Station, Stellenbosch

Principal Reference Material

- ° Andrag, R.H. (1977). Studies in die Sederberg oor: (i) Die status van die Clanwilliam seder (*Widdringtonia cedarbergensis* Marsh) (ii) Buitelugontspanning. M.Sc. Thesis, University of Stellenbosch.
- ° Policy, Memorandum: Sederberg Mountain Catchment Area. Directorate of Forestry, Cape Town.

Staff One professional, two technical, one first level supervisor, and 40 labourers

Budget R93,760 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

HAWEQAS MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1913. Government Notice 1201 of 1913 and Government Notice 2121 of 1981.

Geographical Location 2km from Franschhoek in Cape Province. 33°15'-34°00'S, 19°0'-19°25'E.

Altitude 100-1,995m (Du Toits Peak)

Area 115,910ha; includes the State Forest Nature Reserve (376ha)

Land Tenure 65,010ha, 15% Government. Administered by the Directorate of Forestry, Department of Environment Affairs; 50,900ha, 44% privately owned, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features Features are dominated by the sandstone mountains of the Cape folded belt with very rocky terrain, narrow kloofs and steep cliffs dissected by tributaries of the Berg and Breede Rivers. Soils are highly leached acid sands with small pockets of sandy loams. Annual average temperature range minimum: 11°C, maximum: 24°C. Annual rainfall 300-3,000mm, falling mainly in winter (April-September).

Vegetation Vegetation types consist of Knysna Forest (Veld Type 4); Macchia (Veld Type 69), and False Macchia (Veld Type 70). More than 99% of the area is dominated by mountain fynbos. Characteristic families include the Ericaceae, Proteaceae and Restionaceae. Economically important species: various Proteaceae, Ericaceae and Restionaceae and other species which are harvested for the flower trade. Endemic species which are numerous in the Cape floral kingdom are well represented.

Fauna Grey rhebok *Pelea capreolus*, klipspringer *Oreotragus oreotragus*, chacma baboon *Papio ursinus*, caracal *Felis caracal*, and grysbok *Raphicerus melanotis*. Threatened species include the mammals: leopard *Panthera pardus* (T), Lesueur's hairy bat *Myotis lesueuri*, Cape spiny mouse *Acomys subspinosus*, Verreaux's mouse *Praomys verreauxii*, honey badger *Mellivora capensis* and aardwolf *Proteles cristatus*; reptiles and amphibians: geometric tortoise *Psammobates geometricus* (V) and Cape dainty frog *Cacosternum capense*; fish: Berg river redbfin *Barbus burgii* (R) and Burchell's redbfin *Barbus burchelli* (R) also occur; birds: booted eagle *Hieraetus pennatus*, black stork *Ciconia nigra*, Cape eagle owl *Bubo capensis*, Victorin's scrub warbler *Bradypterus victorini*, and protea canary *Serinus leucopterus*.

Conservation Management A management plan exists for this area.

Zoning State Forest Nature Reserve, 64,634ha, private land, 50,900ha.

Disturbances or Deficiencies The proper control of wild fires is lacking. Invasive plant species such as *Hakea sericea*, *Pinus* species, *Acacia longifolia* and *A. mearnsii* need to be controlled.

Visitor Facilities Facilities include a campsite and hiking trails. Numbers: 7,500 per annum. Potential: undetermined.

Scientific Research Resource inventory and monitoring as well as ecological research

Special Scientific Facilities None on site, but served by the Jonkershoek Forestry Research Station, Stellenbosch

Principal Reference Material

° Policy Memorandum: Hawequas Mountain Catchment Area. Directorate of Forestry, Cape Town.

Staff One professional, two technical, three first level supervisors, and 70 labourers

Budget R322,000 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

MATROOSBERG MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection 17% Government. 83% private land

Date Established 1977. Government Notice 2579 of 1977 and Government Notice 2418 of 1979.

Geographical Location Adjacent to Ceres in Cape Province. 33°38'-33°16'S, 19°47'-19°14'E

Altitude 400-2,249m (Matroosberg)

Area 95,256ha

Land Tenure 16,151ha Government. Administered by the Directorate of Forestry, Department of Environment Affairs, 79,105ha privately owned, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features The reserve is dominated by sandstone mountains of the Cape folded belt. The terrain is very rocky with narrow kloofs and steep slopes, and scenically beautiful. Tributaries of the Breede River run through the reserve. Soils are highly leached acid sands with small pockets of sandy loams. Annual average temperature range minimum: 6°C, maximum: 3,000mm. Annual rainfall 400mm (foothills) to 3,000mm (high mountain peaks), falling mainly in winter (May-September).

Vegetation Vegetation types consist of Macchia (Veld Type 69), False Macchia (Veld Type 70), Coastal Renosterbosveld (Veld Type 46), Mountain Renosterbosveld (Veld Type 43), and Knysna Forest (Veld Type 4). The area is dominated by mountain Fynbos. Characteristic families are Ericaceae, Restionaceae and Proteaceae. Economically important species: various Proteaceae, Ericaceae and Restionaceae and other species, which are harvested for the flower trade. Endemic species: endemics which are numerous in the Cape floral kingdom are well represented.

Fauna Caracal *Felis caracal*, klipspringer *Oreotragus oreotragus*, chacma baboon *Papio ursinus*, grysbok *Raphicerus melanotis*, and grey rhebok *Pelea capreolus*. Threatened mammals: leopard *Panthera pardus* (T), fat mouse *Steatomys pratensis* and Verreaux's mouse *Praomys verreauxii*; reptiles: geometric tortoise *Psammobates geometricus* (V), Cape mountain lizard *Lacerta australis*, Fisk's house snake *Lamprophis fiskii*; birds: Cape vulture *Gyps coprotheres* (V), peregrine *Falco peregrinus* (V), booted eagle *Hieraaetus pennatus*, martial eagle *Polemaetus bellicosus*, forest buzzard *Buteo oreophilus*, Cape eagle owl *Bubo capensis*, Victorin's warbler *Bradypterus victorini*, and protea canary *Serinus leucopterus*.

Conservation Management A management plan exists for this area.

Zoning State Forest 16,151ha, private land 79,105ha

Disturbances or Deficiencies Because of the mountainous terrain, the area is very inaccessible for management purposes. Proper control of wild fires is a problem.

Visitor Facilities There are no facilities for the general public, but the area is used for mountaineering. Numbers: 500 per annum. Potential: undetermined.

Scientific Research A resource inventory and monitoring activities are ongoing by management and research staff.

Special Scientific Facilities There are no facilities on site, but it is served by the Jonkershoek Forestry Research Station, Stellenbosch.

Principal Reference Material

° Policy Memorandum: Matroosberg Mountain Catchment Area, Directorate of Forestry, Cape Town.

Staff One professional, one technical, one first level supervisor and 20 labourers

Budget R60,000 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

HOTTENTOTS HOLLAND MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total; private land

Date Established 1907. Government Notice 1163 of 1907, Government Notice 469 of 1979, and Government Notice 2569 of 1979.

Geographical Location On boundary of Gordon's Bay in Cape Province. 33°49'-34°23'S, 18°50'-19°12'E.

Altitude Sea level-1,589m (Victoria Peak)

Area 84,936ha; State Forest 42,835ha; private land 17,532ha.

Land Tenure 67,404ha (79%) Government, administered by the Directorate of Forestry, Department of Environment Affairs, and 17,532ha (21%) privately owned, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features Features are dominated by sandstone mountains of the Cape folded belt with very rocky terrain of narrow kloofs and steep cliffs. Tributaries of Eerste, Lourens, Palmiet, Breede and Berg Rivers dissect the landscape. Soils are highly leached acid sands with small pockets of sandy loams. Annual average temperature range minimum: 6°C, maximum: 19°C. Annual rainfall 600mm (sea level) to 3,500mm (mountain peaks), falling mainly in winter (May-August).

Vegetation Coastal Macchia (Veld Type 47), Macchia (Veld Type 69) and False Macchia (Veld Type 70). More than 99% of the area is dominated by mountain fynbos. Characteristic families are Ericaceae, Restionaceae, and Proteaceae. Economically important species: various Proteaceae, Ericaceae and Restionaceae, and other species which are harvested for the flower trade. Endemic species: endemics which are numerous in the Cape floral kingdom are well represented.

Fauna Mammals: grey rhebok *Pelea capreolus*, klipspringer *Oreotragus oreotragus*, grysbok *Raphicerus melanotis*, steenbok *Raphicerus campestris*, and chacma baboon *Papio ursinus*, leopard *Panthera pardus* (T), Lesueur's hairy bat *Myotis lesueuri*, Cape gerbil *Tatera afra*, Cape spiny mouse *Acomys subspinosus*, Verreaux's mouse *Praomys verreauxii*, spectacled dormouse *Graphiurus ocularis*, and honey badger *Mellivora capensis*. Amphibians: ghost frog *Heleophryne rosei*. Fish: Berg river redbfin *Barbus burgi* (R), Birds: White stork *Ciconia ciconia*, kori bustard *Choriotis kori*, black stork *Ciconia nigra*, Cape eagle owl *Bubo capensis*, Victorin's warbler *Bradypertus victorini*, African fish eagle *Haliaeetus vocifer*, peregrine falcon *Falco peregrinus*, forest buzzard *Buteo oreophilus*, protea canary *Serinus leucopterus*, and Cape vulture *Gyps coprotheres* (V).

Conservation Management A management plan exists for this area.

Zoning State Forest Nature Reserve

Disturbances or Deficiencies Proper control of wild fires lacking. Invasive plant species such as *Pinus pinaster*, *Hakea sericea*, *H. suaveolens*, *Acacia* spp., *Albizia* spp., and *Eucalyptus* spp., which need to be controlled.

Visitor Facilities Facilities include the Boland Hiking Trail with five huts. Numbers: 4,428 per annum. Potential: undetermined.

Scientific Research Active research undertaken on hydrology and all aspects of ecology

Special Scientific Facilities None, but served by the Jonkershoek Forestry Research Station, Stellenbosch.

Principal Reference Material

° Policy Memorandum: Hottentots Holland Mountain Catchment Area. Directorate of Forestry, Cape Town.

Staff Two professional, four technical, six first level supervisors, and 100 labourers

Budget R350,000 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

GROOT WINTERHOEK MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1913. Government Notice 235 of 1913 and Government Notice 2121 of 1981.

Geographical Location 5km from Tulbagh in Cape Province. 32°35'-33°25'S, 18°55'-19°14'E.

Altitude 200-2,077m (Groot Winterhoek)

Area 81,188ha

Land Tenure 30,369ha (37%) Government, Department of Environment Affairs and 50,819ha (63%) private, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features The area is scenically beautiful with dominating sandstone mountains of the Cape folded belt, which are very rocky with some steep cliffs and narrow kloofs. Tributaries of the Berg and Olifants Rivers flow through the area. Soils are highly leached acid sands with small pockets of sandy loams. Annual average temperature range minimum: 6°C, maximum: 19°C. Annual rainfall 400mm (valleys) to 2,000mm (high peaks), falling mainly in winter (May-September).

Vegetation Vegetation types consist of Macchia (Veld Type 69), False Macchia (Veld Type 70), and Knysna Forest (Veld Type 4). The entire area can be classified as mountain fynbos with the exception of small relict forest patches. Characteristic families are Ericaceae, Restionaceae and Proteaceae. Economically important species: various Proteaceae, Ericaceae and Restionaceae, and other species which are harvested for the flower trade. Endemic species: endemics which are numerous in the Cape floral kingdom are well represented.

Fauna Rock hyrax *Procavia capensis*, grey rhebok *Pelea capreolus*, klipspringer *Oreotragus oreotragus*, chacma baboon *Papio ursinus*, caracal *Felis caracal*, and grysbok *Raphicerus melanotis*. Threatened mammals: leopard *Panthera pardus* (T), Cape gerbil *Tatera afra*, Cape spiny mouse *Acomys subspinosus*, Verreaux's mouse *Praomys verreauxii*, and spectacled dormouse *Graphiurus ocellatus*; amphibians: ghost frog *Heleophryne rosei*; reptiles: geometric tortoise *Psemodobates geometricus* (V) and armadillo lizard *Cordylus cataphractus*; fish: Clanwilliam yellowfish *Barbus capensis* (R) and Clanwilliam redfin *Barbus calidus* (R); birds: Victorin's warbler *Bradypterus victorini*, peregrine falcon *Falco peregrinus* (V), forest buzzard *Buteo oreophilus*, and protea canary *Serinus leucopterus*.

Conservation Management A management plan exists for this area.

Zoning State Forest (30,369ha), private land (50,819ha)

Disturbances or Deficiencies Proper control of wild fires lacking. Invasive plant species such as *Pinus pinaster*, *P. radiata*, *Hakea sericea*, *Acacia mearnsii*, and *A. longifolia* need to be controlled.

Visitor Facilities Facilities are limited to access points and hiking trails. Numbers: 1,000 per annum. Potential: undetermined.

Scientific Research Resource inventory and monitoring activities ongoing by management and research staff.

Special Scientific Facilities None of site, but the area is served by the Jonkershoek Forestry Research Station, Stellenbosch.

Principal Reference Material

° Policy Memorandum: Groot Winterhoek Mountain Catchment Area. Directorate of Forestry, Cape Town

Staff One professional, one technical, one first level supervisor, and 20 labourers

Budget R186,250 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

LANGEBERG WEST MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.6 (Cape Sclerophyll)

Legal Protection 19% Government owned and 81% private land

Date Established 1914. Government Notice 196 of 1914, Government Notice 2418 of 1979, and Government Notice 242 of 1981.

Geographical Location 0.5km from Montagu in Cape Province. 33°35'-34°01'S, 19°39'-20°44'E.

Altitude 122-1,710m (Misty Point)

Area 77,096ha

Land Tenure 14,688ha Government. Administered by the Directorate of Forestry, Department of Environment Affairs and 62,408ha private, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features The area is scenically beautiful and dominated by sandstone mountains of the Cape folded belt with very rocky terrain, narrow kloofs, steep cliffs, and the tributaries of the Breede River. Soils are highly leached acid sands with small pockets of sandy loams. Annual average temperature range minimum: 6°C, maximum: 19°C. Annual rainfall 130mm (foothills) to 2,500mm (high mountain peaks), falling all year round in the eastern parts and winter rainfall in the western parts.

Vegetation Vegetation types consist of Macchia (Veld Type 69), False Macchia (Veld Type 70), Knysna Forest (Veld Type 4), Coastal Renosterbosveld (Veld Type 46), Mountain Renosterbosveld (Veld Type 43) and Karroid Broken Veld (Veld Type 26). The most western occurrence of relatively large remnants of indigenous evergreen forest with more than 90% of the area is dominated by mountain fynbos. Characteristic families are Ericaceae, Restionaceae, and Proteaceae. Economically important species: various Proteaceae, Ericaceae and Restionaceae and others which are harvested for the flower trade. Endemic species: endemics which are numerous in the Cape floral kingdom are well represented.

Fauna Caracal *Felis caracal*, klipspringer *Oreotragus oreotragus*, grysbok *Raphicerus melanotis*, grey rhebok *Pelea capreolus*, and chacma baboon *Papio ursinus*. Threatened mammals: leopard *Panthera pardus* (V); reptiles: geometric tortoise *Psammobates geometricus* (V), Cape mountain lizard *Lacerta australis* and Fisk's house snake *Lamprophis fiskii*; fish: Burchell's redfin *Barbus burchelli* (R); birds: Booted eagle *Hieraaetus pennatus*, protea canary *Serinus leucopterus*, peregrine falcon *Falco peregrinus* (V), martial eagle *Polemaetus bellicosus*, Cape vulture *Gyps coprotheres* (V), forest buzzard *Buteo oreophilus*, Cape eagle owl *Bubo capensis*, and Victorin's warbler *Bradypterus victorini*.

Conservation Management A management plan exists for this area. Certain areas are intensively harvested for flowers.

Zoning State Forest (3,259ha); State Forest Nature Reserve; (11,429ha) and private land (62,408ha)

Disturbances or Deficiencies The proper control of wild fires is lacking. Invasive plant species such as *Hakea sericea* and *Pinus* species occur on slopes and *Acacia mearnsii* and *Acacia longifolia* along water courses, and need to be controlled. There is limited grazing.

Visitor Facilities Facilities include the Swellendam Hiking Trail with six huts. Numbers: 1,722 per annum. Potential: undetermined.

Scientific Research Resource inventory and monitoring activities is ongoing by management and research staff.

Special Scientific Facilities None on site, but served by the Jonkershoek Forestry Research Station, Stellenbosch

Principal Reference Material

* Policy, Memorandum: Langeberg West Mountain Catchment Area. Directorate of Forestry, Cape Town.

Staff One professional, one technical, one first level supervisors, and 20 labourers

Budget R100,000 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

LANGEBERG EAST MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll), 3.22.12 (South African Highlands) and 3.17.07 (Karoo)

Legal Protection Total

Date Established 1896. Government Notice 459 of 1896, Government Notice 112 of 1978, and Government Notice 2121 of 1981.

Geographical Location 10km from Riversdal in Cape Province. 34°44'-34°02'S, 20°37'-21°41'E.

Altitude 61-1,637m (Lemoenshoek Peak, Grootberg)

Area 71,300ha

Land Tenure 30,369ha (43%) State, administered by the Directorate of Forestry, Department of Environment Affairs and 40,931ha (57%) private, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features Features are dominated by sandstone mountains of the Cape folded belt with a very rocky terrain that has narrow narrow kloofs and steep cliffs derived from sandstone and quartzites of the Table Mountain Group, also from shales of the same group and of the Bokkeveld Series. Tributaries of the Gouritz and Breede Rivers pass through the area. Annual average temperature range minimum: 11°C, maximum: 24°C. Annual rainfall 130mm (foothills) to 2,500mm (high mountain peaks), falling mainly in all year round.

Vegetation Vegetation types consist of Knysna Forest (Veld Type 4), Karroid Broken Veld (Veld Type 26), Coastal Rhenosterbosveld (Veld Type 46), Valley Bushveld (Veld Type 23), Mountain Rhenosterbosveld (Veld Type 43), Macchia (Veld Type 69), and False Macchia (Veld Type 70). More than 90% of the area is dominated by mountain fynbos. Characteristic families are Ericaceae, Restionaceae and Proteaceae. Economically important species: various Proteaceae, Ericaceae, Restionaceae, and other species which are harvested for the flower trade. Endemic species: endemics which are numerous in the Cape floral kingdom are well represented.

Fauna Mammal species include grey rhebok *Pelea capreolus*, bushbuck *Tragelaphus scriptus*, caracal *Felis caracal*, klipspringer *Oreotragus oreotragus*, chacma baboon *Papio ursinus* and grysbok *Raphicerus melanotis*. Threatened species: Mammals: leopard *Panthera pardus* (T); reptiles: armadillo lizard *Cordylus cataphractus*; fish: small-scale redbfin *Barbus asper* (V), Burchell's redbfin *Barbus burchelli* (R) and slender redbfin *Barbus tenuis* (R); birds: protea canary *Serinus leucopterus*, Cape vulture *Gyps coprotheres* (V) peregrine falcon *Falco peregrinus*, forest buzzard *Buteo oreophilus*, Knysna warbler *Bradypterus sylvaticus* and Victorin's warbler *Bradypterus victorini*.

Conservation Management A management plan exists for this area.

Zoning State Forest Wilderness Area (14,200ha)

Disturbances or Deficiencies Proper control of wild fires lacking. Invasive plant species such as *Hakea sericea* and *Pinus* species on slopes and *Acacia mearnsii*, and *A. longifolia* along water courses need to be controlled.

Visitor Facilities Pristine wilderness. Facilities are limited to access points and hiking trails. Numbers: 700 per annum. Potential: unknown.

Scientific Research A resource inventory and monitoring activities are ongoing by management and research staff.

Special Scientific Facilities There are none on site, but the area is served by the Jonkershoek Forestry Research Station, Stellenbosch.

Principal Reference Material

° Policy Memorandum: Groot winterhoek Mountain Catchment Area. Directorate of Forestry, Cape Town

Staff One professional, two technical, two first level supervisors, and 40 labourers

Budget R61,000 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

RIVIERSONDEREND MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection 38% Government-owned and 62% private land

Date Established 1900. Government Notice 285 of 1900 and Government Notice 2121 of 1981.

Geographical Location On boundary from Greyton in Cape Province. 33°52'-34°07'S, 19°17'-20°05'E

Altitude 200-1,654m (Pilaarkop)

Area 69,453ha. Contains the Greyton Nature Reserve (2,220ha).

Land Tenure 26,416ha Government, administered by the Directorate of Forestry, Department of Environment Affairs, and 43,037ha private, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features The terrain is dominated by sandstone mountains of the Cape folded belt; it is very rocky with narrow kloofs and steep cliffs. Scenically beautiful. Tributaries of the Breede River flow through the reserve. Soils are highly leached acid sands with small pockets of sandy loams. Very rocky. Annual average temperature range minimum: 6°C, maximum: 19°C. Annual rainfall 300-2,000mm, falling mainly in winter (April-September).

Vegetation Vegetation types consist of the Karroid Broken Veld (Veld type 26), Macchia (Veld Type 69), False Macchia (Veld Type 70) and Coastal Renosterbosveld (Veld Type 46). Most of the area is dominated by mountain fynbos. Characteristic families are Ericaceae, Restionaceae and Proteaceae. Economically important species: various Proteaceae, Ericaceae and Restionaceae and other species which are harvested for the flower trade. Endemic species: Endemics, which are numerous in the Cape floral kingdom, are well represented.

Fauna Grey rhebok *Pelea capreolus*, klipspringer *Oreotragus oreotragus*, caracal *Felis caracal*, chacma baboon *Papio ursinus* and grysbok *Raphicerus melanotis*. Threatened mammals: leopard *Panthera pardus* (T); Burchell's redbellied *Barbus burchelli* (R); birds: Booted eagle *Hieraaetus pennatus*, Cape vulture *Gyps coprotheres* (V), peregrine falcon *Falco peregrinus* (V), martial eagle *Polemaetus bellicosus*, forest buzzard *Buteo oreophilus*, Cape eagle owl *Bubo capensis*, Victorin's warbler *Bradypterus victorini*, and protea canary *Serinus leucopterus*.

Conservation Management A management plan exists for this area.

Zoning State Forest 26,416ha, private land 43,037ha

Disturbances or Deficiencies Proper control of wild fires is lacking. Invasive species such as *Hakea sericea*, *H. gibbosa*, *Acacia saligna*, *A. longifolia*, and *A. mearnsii* need to be controlled.

Visitor Facilities No facilities; visitors use management footpaths. Numbers: around 300 per annum. Potential: undetermined.

Scientific Research Resource inventory and monitoring activities ongoing by management and research staff.

Special Scientific Facilities None on site, but the area is served by the Jonkershoek Forestry Research Station, Stellenbosch.

Principal Reference Material

° Policy memorandum: Riviersonderend Mountain Catchment Area. Directorate of Forestry, Cape Town.

Staff One professional, one technical, two first level supervisors, and 35 labourers

Budget R220,000 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

WALKER BAY STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1895. Government Notice 525 of 1895

Geographical Location On the boundary from Hermanus in Cape Province. 34°23'-34°48'S, 19°17'-19°44'E.

Altitude 0-40m

Area 7,118ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The area comprises low sand dunes, partly covered with vegetation and partly open drift sands and undeveloped coastline. It borders on the estuaries of the Klein and Uitenkraal Rivers. Soils are pure white, calcareous drift sands with a very low nutrient content. Annual average temperature range minimum: 12°C, maximum: 22°C. Annual rainfall 450-700mm, falling mainly in winter (May-September).

Vegetation Vegetation types consist of Coastal Macchia (Veld Type 47). Characteristic families are Ericaceae, Restionaceae, and Proteaceae. Economically important species: none. Endemic species: endemics which are numerous in the Cape floral kingdom are well represented.

Fauna Common duiker *Sylvicapra grimmia*, steenbok *Raphicerus campestris*, bushbuck *Tragelaphus scriptus*, caracal *Felis caracal* and grysbok *Raphicerus melanotis*. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning No zoning, all State Forest

Disturbances or Deficiencies Control of *Acacia cyclops*. Control of four-wheel drive recreational vehicles entering the area illegally. Control of drift sands. The area is very sensitive to wind erosion if the vegetation is disturbed.

Visitor Facilities There is no provision for visitors. Numbers: nil. Potential: undetermined.

Scientific Research Drift sand reclamation experiments are undertaken

Special Scientific Facilities None

Principal Reference Material

- ° Walsh, B.N. (1968). Some notes on the incidence and control of drift sands along the Caledon, Bredasdorp and Riversdale coastline of South Africa. *Bulletin 44*, Department of Forestry, Government Printer, Pretoria.
- ° Policy Memorandum: Walker Bay State Forest. Directorate of Forestry, Cape Town.

Staff Two professionals, one technical, two first level supervisors, and 20 labourers

Budget R165,000 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

SANDVELD STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1966. Government Notice 2753 of 1979.

Geographical Location On the boundary from Ysterfontein in Cape Province. 32°13'-33°20'S, 18°05'-18°25'E.

Altitude 0-20m

Area 3,624ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features Features include low sand dunes, partly covered with vegetation, and partly open drift sands. Soils are comprised of white calcareous drift sands with a very low nutrient content. Annual average temperature range minimum: 12.5°C, maximum: 21.5°C. Annual rainfall 360mm, falling mainly in winter (May-September).

Vegetation Vegetation types consist of Coastal Macchia (Veld Type 47). Characteristic species are ericoid low evergreen shrubs, restioid reeds, and proteoid medium to tall shrubs with broad leathery leaves. Economically important species: none. Endemic species: endemics, which are numerous in the Cape floral kingdom are well represented.

Fauna Common duiker *Sylvicapra grimmia*, steenbok *Raphicerus campestris*, grysbok *Raphicerus melanotis*, and ostrich *Struthio camelus*. Threatened species: none.

Conservation Management A management plan exists for this area.

Zoning No zoning, all State Forest

Disturbances or Deficiencies Control of drift sands. Control of four-wheel drive recreational vehicles entering the area illegally.

Visitor Facilities There is no provision for visitors. Numbers: nil. Potential: unknown.

Scientific Research Drift-sand reclamation experiments are undertaken

Special Scientific Facilities None

Principal Reference Material

° Policy Memorandum for drift sand reclamation at Ysterfontein and Elandsbaai. Directorate of Forestry, Cape Town.

Staff One professional, one technical, two first level supervisors, and 33 labourers

Budget R169,180 per annum (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9005, Cape Town, 8000.

Date August 1983

GROOT SWARTBERG/SWARTBERG EAST MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection 81.8% Government. 18.2% private.

Date Established 1912. Government Notice 334 of 1912 and Government Notice 1938 of 1978.

Geographical Location 8km from Prince Alfred in Cape Province. 33°16'-33°28'S, 21°38'-23°19'E.

Altitude 650-2,085m (Blesberg)

Area 121,002ha

Land Tenure 99,010ha (81.8%) Government administered by the Directorate of Forestry, Department of Environment Affairs and 21,992ha (18.2%) private, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features The basic structure of the mountains comprises oval domes, formed by strong north-south orientated pressure, which folded the rocks of Cape Super Group with the Meirings and Gamkaspoorte river canyons. The most outstanding features of the reserve are the tributaries of the Olifants River. The soils are predominantly shallow, rocky, poorly developed, sandy soils overlying rock. Generally, they are structureless, acid and have a low base saturation. Annual average temperature range minimum: 5-15°C, maximum: 18-30°C. Annual rainfall Groot Swartberg 572 mm; Swartberg East 480mm, falling all year round.

Vegetation Vegetation types consist of Karroid Broken Veld (Veld Type 26), Spekboomveld (Veld Type 25), Mountain Renosterbosveld (Veld Type 43) and False Macchia (Veld Type 70). Approximately 80% of the area is covered by fynbos communities, while Karoo communities occur over the remaining area. Fynbos communities are dominated by *Protea* shrublands, and Karoo communities by a heterogeneous mosaic of medium to sparse shrublands (high number of succulents), and renosterbosveld. Economically important species: honey tea *Cyclopia* spp., and flowers for the floral trade on a limited scale. Endemic species: *Protea venusta*, *P. montana*, and *Leucadendron dregei*.

Fauna The typical large mammal spectrum of the southern Cape mountains occurs here including: common duiker *Sylvicapra grimmia*, steenbok *Raphicerus campestris*, and grysbok *Raphicerus melanotis*. The vervet monkey *Cercopithecus aethiops* occurs in wooded kloofs on the Swartberg East. Population densities: klipspringer *Oreotragus oreotragus*, (0.49/sq.km) and grey rhebok *Pelea capreolus* (0.75/sq.km, but 4.6/sq.km after a fire). Key species are pollinators belonging to the families Nectariniidae (*Nectarinia* spp.) and Promeropidae (Cape sugar bird *Promerops cafer*) and seed dispersers (ant species). Threatened mammals: Cape spiny mouse *Acomys subspinosus*, Verreaux's mouse *Praomys verreauxii*, spectacled dormouse *Graphiurus ocularis*, leopard *Panthera pardus* (T) and honey badger *Mellivora capensis*; birds: booted eagle *Hieraaetus pennatus*, martial eagle *Polemaetus bellicosus*, Cape eagle owl *Bubo capensis*, Victorin's warbler *Bradypterus victorini* and protea canary *Serinus leucopterus*; fish: slender redbfin.

Conservation Management Actively managed for water and nature conservation

Zoning Demarcated State Forest, (99,010ha); private land proclaimed; and Mountain Catchment Area (21,992ha).

Disturbances or Deficiencies Very limited grazing on private land

Visitor Facilities None

Scientific Research Resource inventory and monitoring activities ongoing by regional management and research staff.

Special Scientific Facilities None on site, but the area is served by Saasveld Forestry Research Station, George.

Principal Reference Material

- ° Seydack, A.H.W. and Horne, I.P. (1980). Bestuursplan Swartberg-Oos. Directorate of Forestry, Knysna. Unpublished.
- ° Seydack, A.H.W., Horne, I.P. and Gehrmann, R. (1982). Bestuursplan Groot-Swartberg. Directorate of Forestry, Knysna. Unpublished.

Staff Resident forester, assistant resident forester, two first level supervisors, and 50 labourers at Swartberg State Forest. The area is the responsibility of the District Forest Officer in Knysna.

Budget R340,000 per annum, jointly for this area and for a portion of the Outeniqua Mountain Catchment Area (including salaries).

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X12, Knysna, 6570.

Date July 1983

OUTENIQUA MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection 14% Government-owned and 86% private land

Date Established 1936. Government Notice 294 of 1936 and private land pending declaration under the Mountain Catchment Areas Act 63 of 1970.

Geographical Location 10km from George in Cape Province. 33°46'-33°55'S, 21°39'-23°26'E.

Altitude 400-1,521m (Engelseberg)

Area 158,515ha (see also point 14 below)

Land Tenure 72,761ha Government. Administered by the Directorate of Forestry, Department of Environment Affairs and 85,754ha private, but to be administered in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features The Outeniqua Mountains are formed by a series of anticlines and synclines forming mountains and valleys of decreasing elevation extending to the Karoo. Gouritz and Keurbooms Rivers and tributaries of the Kammanassie River flow through the area. Derived from sandstones and quartzites of the Table Mountain Group, soils are moderately deep, rocky, loamy sands overlying hard rock or saprolite, and are very acidic. Annual average temperature range minimum: 8-15°C, maximum: 19-21°C. Annual rainfall 860 mm, ranging from 1,100mm on high peaks to 400mm on northern foothills, falling mainly all year round.

Vegetation Vegetation types consist of Gouritz River Scrub variation of Valley Bushveld (Veld Type 23), Mountain Renosterbosveld (Veld Type 43), and False Macchia (Veld Type 70). Gouritz River Scrub is an extremely dense, semi-succulent, thorny scrub, about 2m tall. Renosterbos veld is a shrubland dominated by *Elytropappus rhinocerotis* (renosterbos). Most of the area is covered by proteoid shrublands, heathlands and restiod-shrublands. Economically important plant species: various Proteaceae are harvested for the florist trade on a small scale. Endemic species: a good representation of endemics which are numerous in the Cape floral kingdom.

Fauna The typical mammal spectrum of the southern Cape mountains occurs here and includes: klipspringer *Oreotragus oreotragus*, grey rhebok *Pelea capreolus*, common duiker *Sylvicapra grimmia*, steenbok *Raphicerus campestris*, and grysbok *Raphicerus melanotis*. Key species are pollinators belonging to the families Nectariniidae (*Nectarinia* spp) and Promeropidae (Cape sugarbird *Promerops cafer*) and seed dispersers (ant species). Threatened mammals: Verreaux's mouse *Praomys verreauxii*, Cape spiny mouse *Acomys subspinosus*, honey badger *Mellivora capensis* and leopard *Panthera pardus* (T); birds: Victorin's warbler *Bradypterus victorini* and protea canary *Serinus leucopterus*; fishes: eastern cape redbin *Barbus afer* (R), small redbin *Barbus asper* (V) and Burchell's redbin *Barbus burchelli* (R).

Conservation Management No management plan. Prescriptions for the eradication of invasive weed species are contained in the annual plans of operation for State land.

Zoning Demarcated State Forest, (13,409ha), undemarcated State Forest, and (341ha), proposed Mountain Catchment Area, (85,754ha)

Disturbances or Deficiencies The invasive alien species *Pinus pinaster* and *Hakea sericea* cover large areas of the Outeniqua Mountains. Burning and grazing of veld is carried out on private land.

Visitor Facilities None. Numbers: nil. Potential: unknown

Scientific Research Resource inventory and monitoring activities ongoing by regional management and research staff

Special Scientific Facilities None on site, but the area is served by Saasveld Forestry Research Station, George

Principal Reference Material

- ° Bond, W. (1981). Vegetation gradients in Southern Cape Mountains. M.Sc. Thesis, University of Cape Town.
- ° Southwood, A.J. (1983). Policy Memorandum, Outeniqua Catchment Area. Directorate of Forestry, Knysna. Unpublished.

Staff Swartberg, two resident foresters, two first level supervisors, and 53 labourers. Towerkop, one resident forester, two first level supervisors, and 50 labourers. The area is the responsibility of the District Forest Officer in Knysna.

Budget R276,000 per annum, jointly for this area and the Kammanassie Mountain Catchment Area (including salaries).

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X12, Knysna, 6570.

Date July 1983

ANYSBERG/KLEIN SWARTBERG MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection 40.7% Government-owned and 59.3% private land

Date Established 1912. Government Notice 334 of 1912 and Government Notice 1938 of 1979.

Geographical Location 3km from Ladismith in Cape Province. 33°19'-33°28'S, 20°52'-21°38'E; Anysberg MCA, 33°29'-33°32'S, 20°32'-20°45'E.

Altitude 670-2,325m (Seweweekspoortpiek)

Area 58,785ha

Land Tenure 23,010ha Government. Administered by the Directorate of Forestry, Department of Environment Affairs and 35,775ha private, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features This area is located in the drainage system of the Gouritz River and comprises Ooal, dome-shaped, asymmetrical folded mountains with Towerkop, a high mountain peak. Soils are derived from sandstones and quartzites of the Table Mountain Group and are shallow, rocky, poorly developed sandy loams, leached and acid. Annual average temperature range minimum: 5-15°C, maximum: 18-32°C. Annual rainfall 654mm (Klein Swartberg) and 370mm (Anysberg), falling all year round.

Vegetation Vegetation types consist of Mountain Rhenosterbosveld (Veld Type 43), Karroid Broken Veld (Veld Type 26), Spekboomveld (Veld Type 25), and False Macchia (Veld Type 70). Two major communities can be identified: fynbos and Karoo communities. Karoo communities are located on rocky, lower southern and northern foothills. A complex mosaic of small trees, shrubs and succulents is characteristic. The remainder of the mountains is covered by fynbos, dominated by *Protea* spp., *Erica* spp., and *Restio* spp.. Economically important species: flowers, especially *Protea* spp., are picked for the florist trade. Honey tea (*Cyclopia* spp.) is harvested on a limited scale. Endemic species: local speciation has occurred in the area and a number of endemic species are present, namely, *Protea pruinosa* and *Leucospermum secundifolium*.

Fauna Mammals: baboon chacma *Papio ursinus*, steenbok *Raphicerus campestris*, common duiker *Sylvicapra grimmia*, klipspringer *Oreotragus oreotragus*, grysbok *Raphicerus melanotis*, and grey rhebok *Pelea capreolus*. Key species: pollinators belonging to the families Nectariniidae (*Nectarinia* spp.), Promeropidae (Cape sugar bird *Promerops cafer*) and seed dispersers (ant species). Threatened mammals: Cape spiny mouse *Acomys subspinosus*, Verreaux's mouse *Praomys verreauxii*, spectacled dormouse *Graphiurus ocellaris*, leopard *Panthera pardus* (T) and honey badger *Mellivora capensis*; fish: slender redbfin *Barbus tenuis* (R); birds: booted eagle *Hieraaetus pennatus*, martial eagle *Polemaetus bellicosus*, Cape eagle owl *Bubo capensis*, Victorin's warbler *Bradypterus victorini*, protea canary *Serinus leucopterus*.

Conservation Management There is a management plan for the area and it is actively managed for water and nature conservation.

Zoning Demarcated State Forest (23,010ha); private land proclaimed a Mountain Catchment Area (35,775ha)

Disturbances or Deficiencies Sporadic emergency grazing with large and small stock

Visitor Facilities None. Numbers: nil. Potential: unknown

Scientific Research Resource inventory and monitoring activities ongoing by regional management and research staff

Special Scientific Facilities None, but the area is served by Saasveld Forest Research Station, George.

Principal Reference Material

- ° Seydack, A.H.W., Horne, I.P. and Gehrman, R. (1981). Bestuursplan, Klein-Swartberg/Anysberg. Directorate of Forestry, Knysna. Unpublished.
- ° Seydack, A.H.W. and Odendaal, P.B. (1980). Beleidsmemorandum Anysberg, Klein-Swartberg, Groot-Swartberg, Swartberg-Oos. Department of Environment Affairs, Knysna. Unpublished.

Staff Two resident foresters at Towerkop State Forest Station, one first level supervisor, and 41 labourers. The area is the responsibility of the District Forest Officer at Knysna.

Budget R258,000 per annum jointly for this area and the Rooiberg Mountain Catchment Area (including salaries).

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X12, Knysna, 6570.

Date July 1983

KAMMANASSIE MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection 47% Government-owned and 53% private land

Date Established 1923. Government Notice 1531 of 1923 and Government Notice 1938 of 1978.

Geographical Location 8km from Uniondale in Cape Province. 33°34'-33°41'S, 22°27'-23°01'E.

Altitude 700-1,965m (Mannetjiesberg)

Area 45,508ha

Land Tenure 22,464ha Government. Administered by the Directorate of Forestry, Department of Environment Affairs, and 23,044ha privately owned, but administered in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features The area is located in the Cape folded belt, and is structurally a long, oval dome, asymmetrical with steep southern slopes, in the drainage region of the Olifants and Kammanassie Rivers. Soils are derived from sandstones and quartzites of the Table Mountain Group; shallow, infertile, acid, minimal B-horizon development, and low water retention capacity (lithosols). Annual average temperature range minimum: 5-15°C, maximum:

18-32°C. Annual rainfall 276mm-815mm, increasing with increasing altitude, falling mainly in late summer, autumn, and spring.

Vegetation Vegetation types consist of Mountain Rhenosterbosveld (Veld Type 43) and False Macchia (Veld Type 70). Valley thicket occurs on foothills and in large valleys: a mosaic of *Acacia karroo*, *Olea africana*, other trees or tall shrubs, dense thicket, and shrubveld. The remainder of the mountain is predominantly covered by *Protea* shrublands and knee height shrub-restio-grassveld. Economically important species: various *Protea* species harvested for the florist trade.

Fauna The typical mammal spectrum of the southern Cape mountains occurs here. Two breeding herds of five and three animals each and also one stallion and one more of the rare Cape mountain zebra *Equus zebra zebra* (T) occur in the area. Population densities: klipspringer *Oreotragus oreotragus* (1,41 per sq.km), and grey rhebok *Pelea capreolus* (1 per sq.km). Key species are pollinators belonging to the families Nectariniidae (*Nectarinia* spp.), Promeropidae (Cape sugarbird *Promerops cafer*), and seed dispersers (ant species). Threatened species: Cape mountain zebra *Equus zebra zebra* (T), Cape spiny mouse *Acomys subspinosus*, Verreaux's mouse *Praomys verreauxii*, spectacled dormouse *Graphiurus ocularis*, leopard *Panthera pardus* (T) and honey badger *Mellivora capensis*; Victorin's warbler *Bradypterus victorini* and protea canary *Serinus leucopterus*.

Conservation Management A management plan exists, and the area is actively managed for fire control and watershed protection.

Zoning Demarcated State Forest 17,661ha, undemarcated State Forest 4,803ha, and Mountain Catchment Area 23,044ha

Disturbances or Deficiencies Burning and grazing veld on private land

Visitor Facilities None

Scientific Research Resource inventory and monitoring activities ongoing by regional management and research staff

Special Scientific Facilities None on site, but the area is served by Saasveld Forestry Research Station, George.

Principal Reference Material

- ° Odendaal, P.B., Horne, I.P. and Barnard, W.H. (1979). Beleidsmemorandum, Kammanassie Bergopvanggebied. Directorate of Forestry, Knysna. Unpublished.
- ° Southwood, A.J. (1983). Bestuursplan, Kammanassie Bergopvanggebied. Directorate of Forestry, Knysna. Unpublished.

Staff Resident forester and staff at Swartberg State Forest. Two first level supervisors and 53 labourers. The area is the responsibility of the District Forest Officer at Knysna.

Budget R276,000 per annum, jointly for this area and the Outeniqua Mountain Catchment Area (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X12, Knysna, 6570.

Date July 1983

KNYSNA INDIGENOUS FORESTS

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection 62% Government-owned and 38% private land

Date Established 1894. Government Notice 1049 of 1894, Government Notice 316 of 1900 and Government Notice 714 of 1901.

Geographical Location 10km from Knysna in Cape Province. 33°46'-34°06'S, 22°01'-23°24'E.

Altitude Sea level-1,000m (Spitskop Peak, Outeniqua Mountains)

Area 44,230ha

Land Tenure 27,388ha Government. Administered by the Directorate of Forestry, Department of Environment Affairs and 16,842ha private.

Physical Features Severe north-south orientated compressive stresses produced the Cape Fold Belt with the resistant strata forming the prominent Outeniqua Mountain Range running from east to west. Outstanding features of the area are the southern Cape coastal lakes. Kaaiman and Touws River and many others flow through the area. Quartzite and sandstones of the Table Mountain Group have weathered from light textured, leached, acid sandy loams to sandy clayey loams. The shales have generally weathered deeply. Several superficial deposits have been laid down on the plateau area such as clay deposits, dune sands, fluvial washes, ferricrete, stonelines, talus beds, and loess. Annual average temperature range minimum: 11°C, maximum: 20°C. Annual rainfall 650mm at coast to 1,200mm towards the mountains. Falling all year round with peaks in February/March and August to October.

Vegetation Vegetation types consist of Knysna Forest (Veld Type 4). Sites are generally ecologically complex and the following six forest types are approximate, artificial groupings of sites with similar features: (i) Very dry Scrub-Forest occurs on shallow soils and on hot, dry aspects with thorny shrubs such as *Maytenus heterophylla*, *Carissa bispinosa*, *Scutia myrtina*, and *Dovyalis rhamnoides*. (ii) Dry High-Forest occurs on well-drained or shallow soils with warm aspects and especially on steep slopes, with *Cassine peragua*, *Rhus chirindensis*, *Maytenus acuminata*, and *Canthium inerme*. (iii) Medium-moist High-Forest occurs on a generally poorly drained soils, with *Olea capensis* ssp. *macrocarpa*, *Podocarpus latifolius* and *P. falcatus*, *Pterocelastrus tricuspidatus*, and *Apodytes dimidiata*. (iv) Moist High-Forest occurs on moist, deep loamy soils on southerly aspects with *Ocotea bullata*, *Maytenus peduncularis*, *Ilex mitis*, and *Platylophus trifolius*. (v) Wet High-Forest occurs on cooler aspects with wet soils, often shallow, but with relatively good drainage where *Cunonia capensis* and *Ocotea bullata* form a main canopy. (vi) Very wet Scrub-Forest occurs on steep, wet slopes with shallow soils where *Cunonia capensis* is the dominant species, while *Ocotea bullata*, *Podocarpus latifolius* and *Virgilia oroboides* also occur. Economically important species: various species are harvested for the furniture trade, the most important being *Ocotea bullata*, *Podocarpus latifolius*, *P. falcatus*, *Platylophus trifolius*, *Rapanea melanophloeos*, and *Olinia ventosa*. *Rumohra adiantiformis* is harvested for the florist trade. Endemic species: *Strelitzia alba* occurs between Knysna and Humansdorp, especially in the Grootrivier Pass.

Fauna The estimated three remaining Knysna elephants *Loxodonta africana* (T). Other conspicuous large mammals include: bushbuck *Tragelaphus scriptus*, bushpig *Potamochoerus porcus*, chacma baboon *Papio ursinus*, and caracal *Felis caracal*. Threatened mammals: leopard *Panthera pardus* (T), honey badger *Mellivora capensis*, blue duiker *Cephalophus monticola*, and lesser woolly bat *Kerivoula lanosa*; amphibians: Arum lily frog *Hyperolius horstockii*; birds: Cape eagle owl *Bubo capensis*, Knysna warbler *Bradypterus sylvaticus*, and Victorin's warbler *B. victorini*.

Conservation Management A management plan exists but is presently under revision.

Zoning Undemarcated State Forest (466ha); demarcated State Forest (26,922ha); private land (16,842ha)

Disturbances or Deficiencies Indigenous forest vegetation is threatened primarily by invasive *Acacia melanoxylon* and, to a limited extent, by *A. mearnsii* which occurs mainly in the river courses.

Visitor Facilities Facilities include the Outeniqua Hiking Trail and various day walks. Numbers: hiking trail (visitor nights) 10,000 a year. Potential: day walks 4,400 visitors a year, fishing 330 visitors a year, hiking trail 97,200 visitor-nights a year. Data for day walks and numbers of visitors picnicking a year at the many picnic sites are not complete.

Scientific Research Resource inventory and monitoring activities ongoing by regional management and research staff

Special Scientific Facilities Saasveld Forestry Research Station, George is situated within the area

Principal Reference Material

- Phillips, J.F.V. (1931). Forest succession and ecology in the Knysna region. Government Printer, Pretoria.
- Von, Breitenbach F. (1974). Southern Cape Forests and Trees. Government Printer, Pretoria.

Staff Nineteen resident foresters and ten labourers. The area is the responsibility of three District Forest Officers at Knysna.

Budget R345,000 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X12, Knysna, 6570.

Date August 1983

ROOIBERG MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll), 3.22.12 (South African highlands), 3.17.07 (Karoo)

Legal Protection 51% Government-owned and 49% private land

Date Established 1934. Government Notice 289 of 1934 and Government Notice 1938 of 1978.

Geographical Location 15km from Ladismith in Cape Province. 33°35'-33°43'S, 21°20'-21°40'E.

Altitude 600-1,490m (Trigonometrical Beacon number 54)

Area 25,344ha (see also point 14 below)

Land Tenure 12,928ha Government. Administered by the Directorate of Forestry, Department of Environment Affairs and 12,416ha privately owned, but managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features Extensively folded mountains dominate the area. The reserve falls in the catchment area of the Groot and Gamka Rivers. Derived from sandstones and quartzites of the Table Mountain Group, dominant soils are shallow and sandy, with minimal B horizon development (lithosols). Annual average temperature range minimum: 5-15°C, maximum: 18-32°C. Annual rainfall 200mm, increasing to 500mm with altitude falling all year round.

Vegetation Vegetation types consist of Mountain Rhenosterbosveld (Veld Type 43), Karroid Broken Veld (Veld Type 26), and False Macchia (Veld Type 70). Fynbos is characterised by sclerophyllous and small-leaved shrubs of the Ericaceae, Rutaceae, etc., relatively broad-leaved proteoid shrubs (mostly Proteaceae), and sclerophyllous cylindrical or tufted or rhizomatous herbs, mostly Restionaceae. Karroid vegetation is characterised by narrow-leaved shrubs, succulents and small clumps of evergreen trees. Economically important species: honey tea (*Cyclopia* spp.) is harvested on a limited scale. Endemic species: *Paranomus roodebergensis* is endemic to this mountain range.

Fauna The typical large mammal spectrum of the southern Cape mountains occurs here and includes: klipspringer *Oreotragus oreotragus*, grey rhebok *Pelea capreolus*, common duiker *Sylvicapra grimmia*, steenbok *Raphicerus campestris*, and grysbok *Raphicerus melanotis*. Key species: pollinators belonging to the families Nectariniidae (*Nectarinia* spp.), Promeropiidae (Cape sugar bird *Promerops cafer*), and seed dispersers (ant species). Threatened mammals: leopard *Panthera pardus* (T), Verreaux's mouse *Praomys verreauxii*, Cape spiny mouse *Acomys subspinosus*; birds: booted eagle *Hieraetus pennatus*, martial eagle *Polemaetus bellicosus*, Cape eagle owl *Bubo capensis*, Victorin's warbler *Bradypterus victorini*, and protea canary *Serinus leucopterus*.

Conservation Management A management plan exists for this area and the reserve is actively managed for water and nature conservation.

Zoning Demarcated State Forest (12,928ha); private land, proclaimed a Mountain Catchment Area (12,416ha)

Disturbances or Deficiencies Very limited grazing on private land

Visitor Facilities None. Numbers: nil. Potential: unknown

Scientific Research Resource inventory and monitoring activities ongoing by regional management and research staff

Special Scientific Facilities None, but the area is served by Saasveld Forest Research Station, George.

Principal Reference Material

- ° Odendaal, P.B. (1979). Policy Memorandum: Rooiberg Mountain Catchment Area. Directorate of Forestry, Knysna. Unpublished.
- ° Seydack, A.H.W. (1980). Management Plan, Rooiberg Mountain Catchment Area. Directorate of Forestry, Knysna. Unpublished.

Staff Resident forester and staff at Towerkop State Forest, one first level supervisor, and 41 labourers. The area is the responsibility of the District Forest Officer at Knysna.

Budget R258,000 per annum, jointly for this area and the Anysberg/Klein Swartberg Mountain Catchment Area (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X12, Knysna, 6570.

Date July 1983

KOUGA/BAVIAANSKLOOF MOUNTAIN CATCHMENT AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1923. Government Notice 1973 of 1923.

Geographical Location 10km from Patensie in Cape Province. 33°28'–33°50'S, 21°50'–23°25'E.

Altitude 400–1,758m (Cockscomb and Smutsberg)

Area 172,208ha; (with 157,829ha a proposed wilderness area).

Land Tenure State. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The topography of the area is extremely rugged; that of rejuvenated, maturely dissected mountain land. Both ranges arose from anticlinal folding, which originated from the south. The outstanding feature of the reserve is the Baviaanskloof, a deeply eroded valley, in places virtually a canyon. The Cockscomb consists of tall rugged sandstone peaks. Paul Sauer Dam on Kouga River is in the area as well as Baviaanskloof, Groot, Duraas and Wit Rivers, and various tributaries. Soils are derived from sandstones and quartzites of the Table Mountain Group and mainly leached and acid. Annual average temperature range minimum: 5°C, maximum: 32°C. Annual rainfall 547mm (Kouga) and 451mm (Baviaanskloof), falling all year round.

Vegetation Vegetation types consist of Valley Bushveld (Veld Type 23), Spekboomveld (Veld Type 25), Mountain Renosterbosveld (Veld Type 43), Karroid Broken Veld (Veld Type 26), and False Macchia (Veld Type 70). Valley Bushveld an extremely dense, semi-succulent, thorny scrub about 4m high, *Euphorbia grandidens*; Spekboomveld, a dense scrub dominated by *Portulacaria afra*; Mountain Renosterbosveld scrub dominated by *Elytropappus rhinocerotis*; Karroid Broken Veld characterised by narrow-leaved shrubs, succulents and small clumps of evergreen trees; Fynbos (False Macchia) is characterised by sclerophyllous and small-leaved shrubs of the Ericaceae and Rutaceae, relatively broad-leaved shrubs, mostly Proteaceae, and sclerophyllous cylindrical or rhizomatous herbs, mostly Restionaceae and Poaceae. Economically important species: *Aloe ferox* leaves are harvested for the sap and *Cyclopia subternata* used as tea.

Fauna Bushbuck *Tragelaphus scriptus*, grey rhebok *Pelea capreolus*, mountain reedbuck *Redunca fulvorufula*, greater kudu *Tragelaphus strepsiceros* and lesser kudu *Tragelaphus imberbis*, and chacma baboon *Papio ursinus*. Threatened mammals: honey badger *Mellivora capensis*, aardwolf *Proteles cristatus*, leopard *Panthera pardus* (V), striped weasel *Poecilogale albinucha*, Cape spiny mouse *Acomys subspinosus*, Verreaux's mouse *Praomys verreauxii*, and spectacled dormouse *Graphiurus ocellaris*; birds: 18 species are rare or endangered; reptiles: water monitor *Varanus niloticus*.

Cultural Heritage Bushman paintings in various caves

Conservation Management A management plan is being drafted.

Zoning Demarcated State Forest, 155,323ha; undemarcated State Forest, 16,885ha

Disturbances or Deficiencies Disturbances include: lack of fences, and uncontrolled grazing of veld by stock from neighbouring farms. Invasive alien species include *Opuntia ficus-indica*, *Opuntia aurantiaca*, *Hakea sericea*, *Acacia mearnsii*, and *Nerium oleander*. Wild donkeys

overgraze the area, causing erosion.

Visitor Facilities Facilities are very primitive. There is some hiking on jeep tracks and footpaths (not marked), and fishing at undeveloped sites. Numbers: 1,000 per annum. Potential: 6,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None

Staff Two resident foresters, two foremen, and 59 labourers at Willowmore, Joubertina and Patensie for Baviaanskloof and Cockscomb Forest Stations respectively. The area is the responsibility of the District Forest Officer at Humansdorp.

Budget R660,000 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X537, Humansdorp, 6300.

Date August 1983

TSITSIKAMMA MOUNTAINS

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.6 (Cape Sclerophyll)

Legal Protection 61% Government-owned and 39% private land.

Date Established Not yet proclaimed. Proposals to declare this area a Mountain Catchment Area are being compiled.

Geographical Location 3km from Joubertina in Cape Province. 33°45'-34°03'S, 23°20'-24°30'E.

Altitude 1,300-1,675m (Formosa Peak, Tsitsikamma Mountains)

Area 80,000ha

Land Tenure 39,869ha Government. Administered by the Directorate of Forestry, Department of Environment Affairs and 40,131ha private and, in future, to be managed in terms of the Mountain Catchment Areas Act 63 of 1970.

Physical Features Features are dominated by anticlinal, folded mountains, folding forces originated in the south. The Krom, Krakeel and Louterwater Rivers flow through the area. Sandstones and quartzites derived from the Table Mountain Group, produce sandy soils, which are leached and acidic (lithosols). Annual average temperature range minimum: 10°C, maximum: 26°C. Annual rainfall 800mm falling all year round.

Vegetation Vegetation types consist of Knysna Forest (Veld Type 4) and False Macchia (Veld Type 70). Afromontane forest occurs in most protected valleys and include *Podocarpus*, *Ocotea* and *Cunonia* forests. The remainder of the area is covered by proteoid shrublands, which vary

from open, tall *Protea mundii*-*Leucadendron eucalyptifolium* shrublands. Economically important species: *Protea neriifolia* and *Protea cynaroides*.

Fauna The typical faunal spectrum of the southern Cape mountains occurs here. This includes a few klipspringer *Oreotragus oreotragus* and grysbok *Raphicerus melanotis*, as well as various small mammals. Birds include: black eagle *Aquila verreauxii* and jackal buzzard *Buteo rufofuscus* as well as various *Nectarinia* spp. Threatened species: leopard *Panthera pardus* (T) and blue duiker *Cephalophus monticola*, and Victorin's warbler *Bradypterus victorini*.

Conservation Management A management plan is being drafted. Management consists primarily of the preparation of fire breaks and the control of *Hakea* spp. and *Pinus pinaster*.

Zoning State Forest 39,869ha; private land, to be proclaimed Mountain Catchment Area of 40,131ha.

Disturbances or Deficiencies Extensive areas are covered by the invasive plant *Pinus pinaster* and *Hakea sericea*. Limited burning by private landowners, also some uncontrolled grazing.

Visitor Facilities None

Scientific Research Resource inventory activities and monitoring of biological control of *Hakea* spp..

Special Scientific Facilities None on site. The area served by Saasveld Forestry Research Station, George.

Principal Reference Material Unpublished departmental records

Staff One resident forester, one clerk, two foremen, and 50 labourers at Formosa State Forest, Joubertina. The area is the responsibility of the District Forest Officer at Humansdorp.

Budget R100,000 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X537, Humansdorp, 6300.

Date August 1983

GROENDAL WILDERNESS AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1896. Government Notice 869 of 1896 and Government Notice 212 of 1976.

Geographical Location 15km from Uitenhage in Cape Province. 33°43'S, 25°18'E.

Altitude 90-1,180m (Strydomsberg)

Area 25,047ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The northern portion of the area forms part of the eastern outliers of the Groot winterhoek Mountains, which fall steeply south to a plateau intersected by deep ravines. The Groendal Dam falls within the wilderness area. Swartkops River flows through the area. Soils are derived from sandstones and quartzites of the Table Mountain Group, mostly sandy, acid, and leached. Annual average temperature range minimum: 11°C, maximum: 26°C. Annual rainfall 500-800mm, falling all year round.

Vegetation Vegetation types consist of Valley Bushveld (Veld Type 23) and False Macchia (Veld Type 70). Valley Bushveld is restricted to lower lying areas and is a dense thicket from 1.5m to 6m in height. *Euphorbia coerulescens* is dominant. Fynbos can be divided into three groups: (i) high moist fynbos, occurring on steep moist slopes and dominated by *Leucadendron eucalyptifolium*; (ii) *Protea neriifolia* tall fynbos adjacent to moist high fynbos and valley bushveld; (iii) *Leucadendron cuneiforme* short fynbos, the most common fynbos, distinguished by *L. cuneiforme* and *L. salignum* and a ground layer dominated by grasses. Economically important species: none. Endemic species: no information available.

Fauna Bushbuck *Tragelaphus scriptus*, grey rhebok *Pelea capreolus*, mountain reedbuck *Redunca fulvorufula*, chacma baboon *Papio ursinus*, and samango monkey *Cercopithecus mitis*. Threatened species: leopard *Panthera pardus* (V) and blue duiker *Cephalophus monticola*.

Cultural Heritage Bushman paintings in cave

Conservation Management No management plan exists for this area.

Zoning State Forest Wilderness Area (21,793ha); demarcated State Forest (1,063ha); and undemarcated State Forest (2,191ha)

Disturbances or Deficiencies There is a lack of fences, resulting in leopards causing problems by catching stock on neighbouring farms. There is also some poaching.

Visitor Facilities Facilities include showers and toilets at office, and three hiking trails of 18km, 8km and 10km respectively. There are no overnight huts. Numbers: 3,645 per annum. Potential: 4,000 per annum.

Scientific Research Monitoring activities are carried out by a forester in collaboration with the University of Port Elizabeth, and by Saasveld Forestry Research Station.

Special Scientific Facilities None

Principal Reference Material

° Kruger, F.J. (1974). Report on conservation management proposals. Groendal State Forest. Directorate of Forestry, unpublished report.

Staff Resident forester and staff of one clerk and 14 labourers. The area is the responsibility of the District Forest Officer at Humansdorp.

Budget R70,000 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X537, Humansdorp, 6300.

Date August 1983

TSITSIKAMMA INDIGENOUS FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection 86% Government-owned and 14% private land

Date Established 1890. Decree number: Government Notice 701 of 1890 and Government Notice 116 of 1902.

Geographical Location 10km from Plettenberg Bay in Cape Province. 33°48'-34°-5'S, 23°24'-24°25'E.

Altitude Sea level-1,000m (Formosa Peak, Tsitsikamma Mountains)

Area 15,615ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features Severe north-south orientated compressive stresses produced the so-called Cape Fold Belt with the resistant strata forming the prominent Tsitsikamma Mountain Range, running from east to west. Keurbooms, Bobbejaans, Groot, Bloukrans, Elandsbos, Kleinbos and Storms Rivers flow through the area. The Table Mountain Sandstone has weathered to sandy loams in the mountainous areas and the higher altitudes of the upper plateau and to loam soils throughout the lower plateau. These soils are acidic. Clayey soils are found in the lower plateau where the parent material belongs to the Bokkeveld Series. Annual average temperature range minimum: 11°C, maximum: 20°C. Annual rainfall from 650mm (on the coast) to 1,200mm (in the mountain range), falling all year round with peaks in February/March and from August to October.

Vegetation Vegetation types consist of Knysna Forest (Veld Type 4). Sites are generally ecologically complex and the following six forest types are approximate, artificial groupings of sites with similar features: (i) Very dry Scrub-Forest occurs on shallow soils and on hot, dry aspects with thorny shrubs such as *Maytenus heterophylla*, *Carissa bispinosa*, *Scutia myrtina*, and *Dovyalis rhamnoides*. (ii) Dry high-forest occurs on well-drained or shallow soils with warm aspects and especially on steep slopes, with *Cassine peragua*, *Rhus chirindensis*, *Maytenus acuminata*, and *Canthium inerme*. (iii) Medium- moist high-forest occurs on a generally poorly drained soils, with *Olea capensis* ssp. *macrocarpa*, *Podocarpus latifolius* and *P. falcatus*, *Pterocelastrus tricuspidatus* and *Apodytes dimidiata*. (iv) Moist high-forest occurs on moist, deep loamy soils on southerly aspects with *Ocotea bullata*, *Maytenus peduncularis*, *Ilex mitis* and *Platylophus trifolius*. (v) Wet high-forest occurs on cooler aspects with wet soils, often shallow, but with relatively good rainage where *Cunonia capensis* and *Ocotea bullata* form a main canopy. (vi) Very wet scrub-forest occurs on steep, wet slopes with shallow soils where *Cunonia capensis* is the dominant species, while *Ocotea bullata*, *Podocarpus latifolius* and *Virgilia oroboides* also occur. Economically important species: various species are harvested for the furniture trade, the most important being *Ocotea bullata*, *Podocarpus latifolius*, *P. falcatus*, *Platylophus trifolius*, *Rapanea melanophloeos*, and *Olinia ventosa*. *Rumohra adiantiformis* is harvested for the florist trade. Endemic species: *Strelitzia alba* occurs between Knysna and Humansdorp especially in the Grootrivier Pass.

Fauna Conspicuous large mammals include: bushbuck *Tragelaphus scriptus*, bushpig *Potamochoerus porcus*, chacma baboon *Papio ursinus*, and caracal *Felis caracal*. Threatened species: leopard *Panthera pardus* (T), honey badger *Mellivora capensis*, blue duiker *Cephalophus monticola* and lesser woolly bat *Kerivoula lanosa*. Arum lily frog *Hyperolius horstockii*; Cape eagle owl *Bubo capensis*, Knysna warbler *Bradypterus sylvaticus*, and Victorin's warbler *Bradypterus victorini*. Birdlife is prolific and some restricted forest species occur.

Conservation Management There is a management plan, but this is presently under revision. Natural area with low density tourism.

Zoning Undemarcated State Forest 220ha, demarcated State Forest 14,289ha, private land 2,351ha

Disturbances or Deficiencies Indigenous forest vegetation is threatened primarily by invasive *Acacia melanoxylon* and to a limited extent by *Acacia mearnsii*, which occurs mainly in the river courses.

Visitor Facilities Facilities include the Tsitsikamma Hiking Trail, a camp site and a day walk at Groot River. Numbers: hiking trail (visitor nights) 12,163 per annum. Potential: camping (visitor nights) 11,392 per annum, Walks (visitors) 15,659 per annum, Fishing (visitors) 1,403 per annum, Mountain climbing (visitors) 365 per annum, Picnic (visitors) 845 per annum, Hiking trail (visitor nights) 54,000 per annum.

Scientific Research Resource inventory and monitoring activities ongoing by regional management and research staff

Special Scientific Facilities None on site, but the forest is served by Saasveld Forestry Research Station, George.

Principal Reference Material

- ° Phillips, J.F.V. (1931). Forest Succession and Ecology in the Knysna Region. Government Printer, Pretoria.
- ° Von Breitenback, F. (1974). Southern Cape Forest and Trees. Government Printer, Pretoria.

Staff Resident foresters and staff at each of the six forest stations. The area is the responsibility of two District Forest Officers at Humansdorp.

Budget R78,500 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X537, Humansdorp, 6300.

Date August 1983

STORMS RIVER NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1925

Geographical Location 90km from Plettenberg Bay in Cape Province. 33°51'–33°58'S, 23°50'–24°07'E

Altitude 275–1,232m (Bakonkop)

Area 13,700ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The terrain is comprised of the foothills and southern slopes of the folded Tsitsikamma Mountains with high peaks, long radiating ridges, and the Kruis and Elands Rivers. The soils, derived from sandstone and quartzites of the Table Mountain Group, are mainly leached, sandy and acid. Annual average temperature range minimum: 5°C, maximum: 18°C. Annual rainfall 1,200mm, falling all year.

Vegetation Vegetation types consist of the Knysna Forest (Veld Type 4) and False Macchia (Veld Type 70). *Podocarpus*, *Ocotea*, and *Cunonia* forests. Tall mid-dense *Leucadendron-Berzelia* shrubland. Economically important species: none. Endemic species: none.

Fauna Mammal species include chacma baboon *Papio ursinus*, klipspringer *Oreotragus oreotragus*, and caracal *Felis caracal*. Bird life is prolific and includes various *Nectarinia* spp. Threatened mammals: honey badger *Mellivora capensis*, leopard *Panthera pardus* (T), and blue duiker *Cephalophus monticola*; birds: Victorin's warbler *Bradypterus victorini* and protea canary *Serinus leucopterus*.

Conservation Management A management plan is being drafted.

Zoning None, all demarcated State Forest

Disturbances or Deficiencies Presence of invasive plants such as *Hakea sericea* and *Pinus pinaster*.

Visitor Facilities None. Numbers: nil. Potential: unknown

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Unpublished departmental reports

Staff Nine foresters, 12 foremen, and 227 labourers at Storms River, Blue Lilliesbush and Witelsbos, all spending only a portion of their work time in this area. The areas are the responsibility of the District Forest Officer at Humansdorp.

Budget R25,000 per annum (excluding salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X537, Humansdorp, 6300.

Date August 1983

OTTERFORD STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1896. Government Notice 869 of 1896 and the Mountain Catchment Areas Act 63 of 1970.

Geographical Location 20km from Hankey in Cape Province. 33°40'S, 25°00'E.

Altitude 100-1,106m (Stinkhoutberg)

Area 11,467ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features A fairly low mountain range, the Elandsberg, which arose from folding, is the easternmost extension of the Baviaanskloof Mountains: the Noagas, Boskloof, Heuningkloof, Diepkloof, Klein, Maartens and Loerie Rivers flow through the area. Soils are mainly sandy, acid and leached (lithosols) and are derived from sandstones and quartzites of the Table Mountain Group.. Annual average temperature range minimum: 10°C, maximum: 27°C. Annual rainfall 700mm, falling mainly in all year round.

Vegetation Vegetation types consist of False Macchia (Veld Type 70). This is the most easterly remnant of typical fynbos, ie characteristic fynbos genera unmixed with grassy subtropical elements, especially in mesic proteoid communities. The dominant community is a *Protea neriifolia* shrubland. Economically important species: *Protea neriifolia*, *P. cynaroides*, *P. repens* and *P. eximia*. Endemic species: *Paranomus reflexus*, a member of the Proteaceae family.

Fauna A comparatively rare lacertid lizard of the *Nucras* spp. occurs. Also occurring are chacma baboon *Papio ursinus*, vervet monkey *Cercopithecus aethiops*, klipspringer *Oreotragus oreotragus*, and caracal *Felis caracal*. Threatened reptiles: chameleon *Bradypodion taeniobronchum* (possibly endemic).

Conservation Management A management plan is being drafted

Zoning The area comprises State Forest, a Mountain Catchment Area, and a plantation.

Disturbances or Deficiencies There has been a limited invasion by *Pinus pinaster* and lack of fences allows illegal grazing in areas.

Visitor Facilities None. Numbers: 5 per annum. Potential: 2,500 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Bond, W. (1981). Conservation areas in Longmore State Forest and vicinity. Directorate of Forestry, unpublished report.

Staff Four resident foresters, five foremen, two clerks, and 126 labourers at Otterford Forest Station. Area is the responsibility of the District Forest Officer in Humansdorp. The Forester and staff are also responsible for a plantation area of 6,000ha adjoining this conservation area.

Budget R6,000 per annum (excluding salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X537, Humansdorp, 6300.

Date August 1983

DE VASSELOT NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 21 June 1974. Decree number: Government Notice 1053 of 1974.

Geographical Location 2km from Nature's Valley in Cape Province. 33°58'-34°00'S, 23°29'-23°35'E.

Altitude Sea level-120m

Area 2,560ha

Land Tenure State. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features Soils are strongly influenced by deposits of marine clay on the coastal plateau with duplex soils. Sout, Brak and Groot Rivers flow through the area. Seasonally waterlogged soils (Nestleigh, Kroonstad) are dominant on the plateau, associated with dry soils on the verge of the plateau, with clay (often structured) sub-soils (Estcourt, Sterkspruit, Swartland). Annual average temperature range minimum: 5°C, maximum: 18°C. Annual rainfall 1,011mm, falling all year, with peaks in March, August, and October.

Vegetation Vegetation types consist of Knysna Forest (Veld Type 4), and False Macchia (Veld Type 70). Indigenous forests occur in lower lying areas and kloofs, with the following dominant species occurring: *Virgilia oroboides*, *Podocarpus latifolius*, *Podocarpus falcatus*, *Olinia ventosa*, *Rapanea melanophloeos*, and *Sideroxylon inerme*. Proteaceae, Ericaceae and Restionaceae are typical of the fynbos and include *Protea neriifolia*, *P. cynaroides*, *Leucadendron salignum*, and *Erica densifolia*. Economically important species: none. Endemic species: various.

Fauna Bushbuck *Tragelaphus scriptus*, grysbok *Raphicerus melanotis* and klipspringer *Oreotragus oreotragus*. A number of pairs of African fish eagle *Haliaeetus vocifer* occur, and many bird species typical of the forest and fynbos habitats. Threatened mammals: leopard *Panthera pardus* (T) and blue duiker *Cephalophus monticola*; birds: Victorin's warbler *Bradypterus victorini*.

Conservation Management A management plan exists for this area.

Zoning None

Disturbances or Deficiencies Boating activities in the Sout River mouth prove difficult to control as the Directorate of Forestry has no jurisdiction between the high and low water marks.

Visitor Facilities Facilities include a Hiking trail (day trips). Numbers: 500 per annum. Potential: undetermined.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Unpublished management plan for the area.

Staff Two resident foresters, three foremen and 50 labourers at Bloukrans and Keurbooms Rivers. The area is under the control of the District Forest Officer at Humansdorp.

Budget R30,000 per annum (excluding salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X537, Humansdorp, 6300.

Date August 1983

ALEXANDRIA STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.11.06 (Cape Sclerophyll)

Legal Protection Total

Date Established 1896. Government Notice 869 of 1896 and Government Notice 346 of 1915.

Geographical Location 8km from Alexandria in Cape Province bordered in the east by the Bushmans River and in the west by the Sundays River. 33°37'-33°48'S, 25°52'-26°42'E.

Altitude 0-362m

Area 23,566ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features A system of ancient and recent both mobile and fixed dune ridges, some of which have been transformed into cliffs and sheets of dune rock. A portion of area consists of a vast mobile dune system (possibly the best example of such a system in the world). The dune rock cliffs at Cape Padrone and Woody Cape are impressive. Several blind streams end against the main barrier dune. Mobile sand, Tertiary limestone and aeolianite overlies the Cape System. Annual average temperature range minimum: 9.2°C, maximum: 25.5°C. Annual rainfall 392mm from (Sundays River mouth) to 934mm (Alexandria Forest Station), falling every month with three peaks in March, May, and September/October.

Vegetation Vegetation types consist of Alexandria Forest (Veld Type 2) and Eastern Province Thornveld (Veld Type 7). Predominant community is Alexandria Forest, the structure of which varies between thicket and forest proper. Community in younger dunes is dune thicket with isolated patches of coastal fynbos. The dune slacks support a characteristic dune slack community made up of 10 to 20 different species. The hummock dunes inland of high water mark are colonized by dune pioneers. A plant species list is available. Economically important species: not applicable. Endemic species: no information available.

Fauna Bushbuck *Tragelaphus scriptus*, vervet monkey *Cercopithecus aethiops*, bushpig *Potamochoerus porcus*, large-spotted genet *Genetta tigrina*, grysbok *Raphicerus melanotis*, porcupine *Hystrix africae australis*, and black-backed jackal *Canis mesomelas*. Breeding colony of Damara terns *Sterna balaenarum* (R) found in Alexandria dunefield. Threatened species: leopard *Panthera pardus* (T).

Conservation Management A drift sand reclamation plan exists for problem areas in the main dunefield. There is no management plan for the indigenous forest areas.

Zoning Demarcated State Forest

Disturbances or Deficiencies The area is largely unspoilt in spite of many potential management problems. The department does not have control over the intertidal zone with the result that beach vehicles cause a certain amount of disturbance. Registered Rights of Access of neighbours is a problem. *Acacia cyclops* is a major plant invader.

Visitor Facilities No facilities have been developed, but fishermen make considerable use of the beach and unmarked forest paths are used by the public. There is also a picnic site in the forest. A section of the National Hiking Way System is being planned for the Alexandria State Forest to include both forest and beach. Numbers: 500 per annum. Potential: 750 per annum.

Scientific Research Research projects include dunefield studies undertaken by the Zoology Department, of the University of Port Elizabeth, and an archaeological investigation done by the Albany Museum, Grahamstown.

Special Scientific Facilities None

Principal Reference Material

- ° McLachlan, A., Sieben, P.R. and Ascaray, C. (1982). Survey of a major coastal dunefield in the eastern Cape. Zoology Department Report No 10., University of Port Elizabeth.
- ° Stehle, T.C. (n.d.). Waaisandbestuursplan vir die Alexandriakusstaatsbos. Unpublished departmental report.

Staff One District Forest Officer, one resident forester, two foremen and 72 labourers

Budget Approximately R350,000 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X432, King William's Town, 5600.

Date August 1983

SUURBERG STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established Government Notice 869 of 1896

Geographical Location 20km from Addo in Cape Province. 33°17'-33°23'S, 25°17'-25°58'E.

Altitude 250-970m (Olifantskop)

Area 21,121ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features Major geological formations are the folded quartzite, sandstone and shales of the Witteberg Series and the tillite and shales of the Dwyka Series. The mountain folds are the most outstanding physical feature of the area. The Kabouga and Wit Rivers flow through the area. Soils comprise sandy and clayey loams - shallow on the ridges and deeper in the

valleys and on the lower slopes. Annual average temperature range minimum: 4.7°C, maximum: 30.3°C. Annual rainfall 722mm, falling throughout the year, peaks in early and late summer.

Vegetation Vegetation types consist of False Macchia (Veld Type 70). The following communities have been identified: *Tristachya-Themeda* veld on ridges above 800m, *Festuca-Myrsine* veld on southern moist slopes, *Cliffortia* veld on southern slopes, dry scrub forest on southern slopes and sheltered valleys, *Themeda-Setaria* veld on northern, drier slopes, *Bobartia-Trachypogon* veld on the broad ridge plateau, and very dry scrub forest on the southern Suurberg foothills (northern and western aspects). Economically important species: none. Endemic species: no information available.

Fauna Bushbuck *Tragelaphus scriptus*, caracal *Felis caracal*, bushpig *Potamochoerus porcus*, common duiker *Sylvicapra grimmia*, chacma baboon *Papio ursinus*, black-backed jackal *Canis mesomelas*, greater kudu *Tragelaphus strepsiceros* and lesser kudu *T. imberbis*, grey rhebo *Pelea capreolus* and vervet monkey *Cercopithecus aethiops*. Threatened species: leopard *Panthera pardus* (T) thought to occur.

Conservation Management A management plan exists for this area. Efforts being made to declare the area a Wilderness Area.

Zoning Ordinary Demarcated State Forest

Disturbances or Deficiencies Prickly pear *Opuntia aurantiaca*, jointed cactus *Opuntia ficus-indica* and *Acacia mearnsii* are the most important invasives.

Visitor Facilities Facilities include two marked day walks and picnic site. The main section open for hiking with no marked routes. Numbers: 1,654 per annum. Potential: underutilised at present.

Scientific Research Limited botanical survey by Department of Plant Sciences, Rhodes University.

Special Scientific Facilities None

Principal Reference Material

° Stehle, T.C. (1979). Suurbergstaatsbos Brandbeskermings-en Beheerdebrandplan. Unpublished departmental report.

Staff One District Forest Officer, one resident forester, and 12 labourers

Budget Approximately R57,500 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X432, King William's Town, 5600.

Date August 1983

BATHURST STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1897. Government Notice 182 of 1897.

Geographical Location 5km from Bathurst in Cape Province. 33°16'-33°33'S, 26°42'-27°07'E.

Altitude 0-827m (Governorskop)

Area 5,315ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The major geological formation is the Bokkeveld Series, with pronounced dipping and folding. The terrain is hilly with steeply sloped valleys. Witteberg quartzite is evident at Beggar's Bush. There are both mobile and fixed coastal dunes with dune rock in places. The oxbow in the tidal Kowie River is visible from the viewpoint in the Waters Meeting Nature Reserve; various other rivers flow through the reserve. The dunes consist of unconsolidated aeolian sand with little profile development. The soils of the other areas of Bathurst consist of weakly developed stony soils on the slopes with deeper, well-drained alluvial soils in the valleys. Annual average temperature range minimum: 12.7°C, maximum: 23.3°C. Annual rainfall 650mm falling mainly in autumn and spring.

Vegetation Vegetation types consist of Alexandria Forest (Veld Type 2), Valley Bushveld (Veld Type 23) and False Macchia (Veld Type 70). Most of the vegetation is Valley Bushveld, represented by two basic variations - that of the hill tops and slopes and that found along the river and stream courses (defined as mesic woodland and thicket or Kaffrarian Succulent Thicket). Beggar's Bush, located on quartzite shale, supports a fynbos community with forest pockets. The dune vegetation contains typical pioneer, intermediate and climax dune thicket species (drift sand reclamation has been carried out using indigenous species; invasives are being eradicated). A plant species list available. Economically important species: none. Endemic species: little information available. The following are south-east Cape endemics: *Aloe ciliaris*, *Asparagus crassiladus*, *Combretum caffrum*, *Euphorbia grandidens*, *Scadoxus puniceus*, and *Strelitzia reginae*.

Fauna Bushbuck *Tragelaphus scriptus*, bushpig *Potamochoerus porcus*, chacma baboon *Papio ursinus*, and vervet monkey *Cercopithecus aethiops*. Threatened species: leopard *Panthera pardus* (T) thought to occur.

Conservation Management No management plan exists for this area.

Zoning Nature Reserve (986ha); demarcated State Forest (3,824ha) and undemarcated State Forest (505ha)

Disturbances or Deficiencies Suspected poaching and stock trespassing create certain problems. *Opuntia aurantiaca* and *Acacia cyclops* are major plant invaders. The construction of a dam within Waters Meeting Nature Reserve is expected to cause major environmental disturbance.

Visitor Facilities Facilities include unmarked walks and three picnic sites in the Waters Meeting Nature Reserve. A trail is being planned for the area. Numbers: 3,545 per annum. Potential: close to desired limit.

Scientific Research Brief botanical survey of Waters Meeting Nature Reserve by the Department of Plant Sciences, Rhodes University

Special Scientific Facilities None

Principal Reference Material

- ° Heydorn, A.E.F. and Grindley, J.R. (1982). Estuaries of the Cape, Part II. Synopses of Available Information on Individual Systems. Report No 10, Kowie, CSIR Research Report, 409 pp.
- ° Lubke, R.A., Court, G.D., Palmer, A.R., Wilken, St.E. and Lang, C. (1983). Report on the Conservation of the Riparian Woodland of the Valley Bushveld, (with specific objections to the construction of an off-channel reservoir on the Bathurst Stream to augment the fresh water supply to Port Alfred Municipality). Unpublished representation to the Minister of Environment Affairs.

Staff One District Forest Officer, one resident forester, one foreman, and 42 labourers.

Budget R155,000 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X432, King William's Town, 5600.

Date August 1983

EAST LONDON COAST STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African woodland/savanna)

Legal Protection Total

Date Established 1887. Government Notice 1029 of 1887 and Government Notice 1108 of 1904.

Geographical Location 5km from East London in Cape Province. 32°42'-33°18'S, 27°26'-28°23'E.

Altitude 0-349m

Area 4,369ha

Land Tenure Government owned, administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The coastal strip consists of both mobile and fixed dune ridges aligned parallel to the coast with vegetation. Ruins of Fort Grey and Fort Pato are located within the so-called coastal belt. Several kilometres of unspoilt coastline are a feature of the Border Region. Geological formation is mainly Beaufort Series of the Karoo System, which has been cut by the Buffalo River valley. Keiskamma River mouths and various other rivers are also in the area. Soils along the coast consist of unconsolidated dune sand with very limited profile development. Other soils (such as at Fort Grey and Fort Pato) are derived from Beaufort Sandstones and shales and doleritic intrusions. These soils can be grouped as red doleritic clays, black doleritic clays, and gray sandy loams. Annual average temperature range minimum: 10,2°C, maximum: 25,6°C. Annual rainfall 862mm, falling in all months. Peaks in March and October.

Vegetation Coastal Forest and Thornveld (Veld Type 1) and Valley Bushveld (Veld: Type 23). The area is dominated by coastal vegetation and consists of pioneer dune communities and

the various successional stages towards climax dune forest or dune thicket. The vegetation of Fort Pato and Fort Grey is a mixture of grassland, invasive thornveld, and dry forest. A plant species list is available. Economically important species of plants: none. Endemic species of plants: *Umtiza listerana*.

Fauna Mammals: bushbuck *Tragelaphus scriptus*, vervet monkey *Cercopithecus aethiops*, bushpig *Potamochoerus porcus*, porcupine *Hystrix africae australis*, caracal *Felis caracal*, and antbear *Orycteropus afer*. Birds are numerous and include a breeding pair of crowned eagle *Stephanoaetus coronatus*. Threatened species: Samango monkey *Cercopithecus mitis* and tree dassie *Dendrohyrax arboreus*, blue duiker *Cephalophus monticola*.

Conservation Management No management plan exists for this area.

Zoning Nature Reserves (Fort Pato and Fort Grey, 889ha); demarcated State Forest (2,023ha); undemarcated State Forest (1,457ha).

Disturbances or Deficiencies Beach vehicles cause a certain amount of disturbance. Usual problems in dealing with the public are encountered; trespassing, making of fires, littering, etc. Invasive plants include *Acacia cyclops*, *A. cyanophylla*, *A. mearnsii*, *Lantana* spp. and *Sesbania* spp..

Visitor Facilities Walks in Nature reserves, picnic sites along coast, caravan park at Double Mouth. Numbers: 1,450 per annum. Potential: maximum almost reached.

Scientific Research Dune studies by regional management staff, and limited study on birdlife by the East London Museum.

Special Scientific Facilities None

Principal Reference Material

° Board, C. (1962). The Border Region, Natural Environment and Land Use in the Eastern Cape. Edited by E.D. Mountain and J.V.L. Rennie, Oxford University Press, 238 pp.

Staff One District Forest Officer, one resident forester, two foremen, and 47 labourers

Budget Approximately 225,000 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X432, King William's Town, 5600.

Date August 1983

THE DRAKENSBERG STATE FORESTS

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African highlands)

Legal Protection Total

Date Established 1930. Gazette Notice 781 of 1973 and Gazette Notice 1563 of 1979.

Geographical Location From north to south: 40km from Winterton, 50km from Mooi River, 40km from Nottingham Road, 13km from Himeville, 50km from Underberg in Natal. 29°40'-30°55'S, 28°55'-29°45'E.

Altitude 1,350m-3,377m (Champagne Castle)

Area 190,000ha; Cathedral Peak State Forest (31,500ha); Monk's Cowl State Forest (20,500ha); Highmoor State Forest (30,500ha); Mkhomazi State Forest (41,000ha); Cobham State Forest (39,000ha); Garden Castle State Forest (27,500ha). Together with the Natal Parks Board areas and Sehlbathebe National Park, a composite natural area of over 2,000km exists. The State forests and the Natal Parks Board areas together constitute the largest natural area in Natal.

Land Tenure Government owned, administered by the Directorate of Forestry, Department of Environment Affairs

Physical Features It comprises a mountain range of horizontally bedded strata. The underlying sedimentary layers (Molteno, Elliot and Clarens formations) rise in clearly defined steps, constituting the foothills and the Little 'Berg. These are covered by basalt layers nearly two kilometers thick. The scarps of the Little and Main 'Berg were formed by valley head erosion, resulting in landscapes not found in any other mountain system. The Drakensberg escarpment forms one of the major natural spectacles of the sub-continent. All the major tributaries of the Tugela, Mkhomazi and Mzimkulu Rivers flow through the areas. Soils are principally dystrophic, highly weathered, shallow ferriferous oxisols, highly acid, with low fertility, and is characterised by high (near toxic) levels of aluminium and manganese in the B horizon. Seepage and wet areas contain gleyed or organic soils. Detrital and valley bottom areas carry a variety of transported soils. Annual average temperature range minimum: 9.3°C, maximum: 16.4°C. Annual rainfall 1,300mm, falling mainly in summer rainfall (80%), but with snowfalls and some rain in winter (20%). This is the most important catchment area in Natal.

Vegetation Highland Sourveld (Veld Type 44(a)), *Themeda-Festuca* Alpine Veld (Veld Type 58), and Southern Tall Grassveld (Veld Type 65). The only alpine vegetation to be found in southern Africa is found in the high-altitude areas of the Drakensberg and the Maluti mountains. A narrow belt of alpine vegetation occurs throughout the high areas of these reserves, with a wider belt of sub-alpine vegetation below this. The vegetation of the Alpine and Sub-alpine Belts consists of tussock grasslands, heathland and extensive watersource wetlands consisting of bogs and vleis. The Afro-montane region vegetation is composed of forests and associated savannas, shrublands and both fire-climax and edaphic grasslands, and related communities such as vleis and shallow-soil areas. The Drakensberg mountain archipelago has been identified as an important regional centre of endemism, while the entire area is a localised centre of speciation of outstanding importance, with an estimated 300 endemics out of a total of about 1,800 plant species present. The *Passerina*, *Erica*, *Cliffortia* dwarf alpine heathlands found at between +/- 2,900 and 3,400m are dominated by *Erica* and ericoid species, and contain a number of endemic species not yet identified. The *Passerina*, *Philippia* and *Widdringtonia* heathlands are found at altitudes of between +/- 1,800 to 2,900m. The high elevation Afro-alpine grassland communities lie at altitudes above 1,800m, and occur on very shallow soils which frequently freeze, even in summer. The veld is characteristically short and dense. The Highland Sourveld dominants include: *Themeda triandra*, *Tristachya leucothrix*, *Heteropogon contortus*, and *Diheteropogon filifolius*. *Podocarpus* forest dominants include: *Podocarpus latifolius*, *Pterocelastrus echinatus*, *Celtis africana* and *Curtisia dentata*. Economically important species: none. Endemic species: the approximately 300 endemic plants include a number of ericoid and asteraceous species. These are principally found in the alpine and sub-alpine communities. There are also a limited number of Afro-montane endemics present.

Fauna Porcupine *Hystrix africaeaustralis*, bushbuck *Tragelaphus scriptus*, grey rhebok *Pelea capreolus*, mountain reedbuck *Redunca fulvorufula*, common reedbuck *Redunca arundinum*, common duiker *Sylvicapra grimmia*, chacma baboon *Papio ursinus*, black-backed jackal *Canis mesomelas*, red hartebeest *Alcelaphus buselaphus*, klipspringer *Oreotragus oreotragus*, black wildebeest *Connochaetes gnou* (O), and eland *Taurotragus oryx*. About 100 species of birds

have been recorded in the area. Threatened species: fourteen species of rare and endangered birds occur in the area; mammals include: leopard *Panthera pardus* (T), (T) serval *Felis serval* and oribi *Ourebia ourebi*.

Cultural Heritage Caves along the length of the Drakensberg are home to some important Stone Age rock art, in the form of Bushman paintings. Localised concentrations, such as in the Ndedema, and the high quality of the art work make these paintings a heritage of world significance.

Conservation Management Yes. Area is actively managed with a burning programme, control of wildfire, and for protection of the water resources and natural communities.

Zoning Existing areas: Mdedelelo Wilderness Area (27,000ha); Mkhomazi Wilderness Area (48,600ha); Mzimkulu Wilderness Area (28,400ha); and Mzimkulwana Nature Reserve (23,000ha); Proposed areas: Mlambonja Wilderness Area (5,000ha); and new nature reserves (58,000ha).

Disturbances or Deficiencies Frequent wildfire of natural and human origin in the past, now mainly prescribed burns occur. Invasive plant species include *Acacia mearnsii*, *Rubus cuneifolius* and some *Pinus* species, mainly *Pinus patula*.

Visitor Facilities Primitive wilderness and related facilities include mountaineering. The Giant's Cup Section of the National Hiking Way provides a total of 60km of trail with four overnight huts. Camp facilities with ablution blocks are available at two forest stations (Cathedral Peak and Monk's Cowl). Primitive camp sites are also available at three other stations. There are many hotels and hatted camps adjacent to the state forests from which visitors may undertake walks or hikes. Access is through a number of entry gates. Many popular day or part day walks are available. Numbers: 70,000 per annum. Potential: 150,000 per annum.

Scientific Research Intensive long-term research programmes are undertaken to provide a sound scientific basis for management of the catchments and the natural communities. A part of the programme provides intensive monitoring of water yield and quality from a number of gauged catchments. Ecological programmes investigate a variety of grassland and woody communities, to provide information for management prescriptions of the burning programme. An environmental monitoring programme is currently being designed.

Special Scientific Facilities There are streamflow and rainfall gauges in the research catchments at Cathedral Peak, supplemented by a meteorological station. Meteorological measurements are also undertaken at each forest station, for the fire model.

Principal Reference Material

- ° Hilliard, O.M. (1978). Notes from the Royal Botanic Garden, 36(2): 407-425. Edinburgh.
- ° Hilliard, O.M. (1980). A preliminary list of plants endemic to the Drakensberg or, in Natal, confined to the Drakensberg. University of Natal.
- ° Killick, D.J.B. (1963). Ecology of Cathedral Peak Area. *Botanical Survey of South Africa Memoirs* No 34, Pretoria, Botanical Research Institute.
- ° Killick, D.J.B. (1978). Biogeography and Ecology of Southern Africa. In: Werger M.J.A. (Ed). The Hague, W. Junk.
- ° White, F. (1978). Biogeography and Ecology of Southern Africa. In: Werger M.J.A. (Ed). The Hague, W. Junk.

Staff The office of the Regional Director, Natal Forest Region, Pietermaritzburg houses resource management and planning staff (five professional and three technical officers). One at each of the six stations, one or two technical management staff control approximately 25,000 to 30,000ha each. A force of six to 12 guards per station and approximately 25 labourers is also maintained on each station. At Cathedral Peak, a permanent research staff of three professional officers and three technical staff are maintained.

Budget R750,000 per annum (including research and salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag X9029, Pietermaritzburg, 3200.

Date April 1984

PORTION OF WEZA STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1904. Government Notice 60

Geographical Location 20km from Kokstad in Natal. 30°31'–30°41'S, 29°34'–29°43'E.

Altitude 960–2,268m (iNgeli Peak in iNgeli Mountain Range)

Area Approximately 9,000ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The geological formations of Weza State Forest are classified as the Karoo System, Ecce Series, which consist of sandstones and shales. Numerous doleritic dykes and sills have intruded into the area to form the iNgeli Mountain Range and eastward-running ridges of the foothills. There are various streams of which the Mtamvuna is the largest. On the slopes and foothills of the iNgeli Mountain Range, the soils are doleritic and of good depth, except along ridges and certain areas of sheet rock, where they are shallow. Soils are typically yellow and apedal, freely drained and dystrophic. Soils of the Southern Tall Grassveld Veld Type are of doleritic nature, shallow and tend to be very erodable. Annual average temperature range minimum: 9°C, maximum: 19°C. Annual rainfall 1,000mm, increasing to 1,500mm on iNgeli Mountain Range, falling mainly in summer (October to May).

Vegetation Vegetation types consist of the Highland Sourveld (Veld Type 44(a)), Natal Mist Belt 'Ngongoni Veld (Veld Type 45), and Southern Tall Grassveld (Veld Type 65). Dominant species of the Highland Sourveld include *Themeda triandra*, *Tristachya hispida*, *Trachypogon capensis*, *Heteropogon contortus*, *Eragrostis calcantha*, and *Eragrostis capensis*. The Natal Mist Belt 'Ngongoni Veld is *Themeda* dominated sourveld, relatively sparse, and today largely replaced by *Aristida junciformis*. Dominant species include: *Trachypogon capensis*, *Tristachya leucothrix*, *Eragrostis calcantha*, and *Heteropogon contortus*. The Southern Tall Grassveld is dominated by *Themeda* and *Hyparrhenia*, typical in an open savanna of *Acacia sieberana* var. *woodii*, with plentiful patches of *Hyparrhenia hirta*. Two major and a complex of minor *Podocarpus* forests also occur on the reserve. Afromontane forests are dominated by *Podocarpus falcatus*, *P. latifolius*, *P. henkelii*, *Calodendrum capense*, and *Ocotea bullata*, etc. Economically important species: *Podocarpus* spp., *Ocotea bullata*, and others. Endemic species: *Dioscorea brownii* and *Macowania conferta*. *Streptocarpus johannis* is endemic from Port St Johns to the iNgeli area.

Fauna Bushbuck *Tragelaphus scriptus* (750), common duiker *Sylvicapra grimmia* (750), caracal *Felis caracal*, large spotted genet *Genetta tigrina*, large grey mongoose *Herpestes ichneumon*, water mongoose *Atilax paludinosus*, Cape clawless otter *Aonyx capensis*, chacma baboon *Papio ursinus*, vervet monkey *Cercopithecus aethiops*, reedbuck *Redunca arundinum*, and grey rhebok *Pelea capreolus*. Birdlife is abundant and includes a number of interesting raptor and forest species. Threatened species: serval *Felis serval* and samango monkey *Cercopithecus mitis* (large populations in each main forest area). Various species of endangered birds occur in the area, including the Cape vulture *Gyps coprotheres*, and several raptor species.

Conservation Management There is no management plan and the reserve is only serviced by the Weza State Forest fire protection plan for the plantation as a whole.

Zoning Ordinary demarcated State forests inclusive of proposed protected natural area cover 21,703ha. The proposed nature reserve will cover about 9,000ha, which will include most of the iNgeli Mountain plus two of the largest forests in south-west Natal (the iNgeli and the Mpetyene). A high proportion of the latter is in near pristine condition.

Disturbances or Deficiencies Natural fire caused mainly by lightning is frequent in grassland areas. Encroachment of alien weed bramble *Rubus* spp., setting of snares and poaching of wildlife in indigenous forests, ringbarking of stinkwood *Ocotea bullata* and other species in indigenous forests by local tribesmen for medicinal purposes, unlawful grazing by domestic cattle, and the Ingele National Hiking Way which passes through area. Exotic trout *Salmo* spp. were introduced in the 1920s. Deposits of bauxite were discovered in the area, but it is not known whether or not they are economically exploitable.

Visitor Facilities Facilities include 92km of National Hiking Way trail, which includes four overnight huts. There is no visitor access during fire season (June to August) to the adjacent Weza plantation. Numbers: 2,100 per annum. Potential: 25,000 per annum.

Scientific Research A forest inventory was undertaken in 1979. The biology and management of bushbuck and common duiker are being studied at present.

Special Scientific Facilities Temporary laboratory for latter research programme

Principal Reference Material

- ° Cyrus, D.P. and Robson, N.F. (1980). *Bird Atlas of Natal*. Pietermaritzburg, University of Natal Press.
- ° Various unpublished departmental reports.

Staff One special grade control forester, seven foresters, 18 foremen, and 450 labourers at Weza Forest Station. The area is the responsibility of a District Forest Officer at iNgeli, Pietermaritzburg.

Budget R2,000,000 per annum for the entire plantation area (including salaries)

Local Park or Reserve Administration The Regional Director, Directorate of Forestry, Private Bag 9029, Pietermaritzburg, 3200.

Date July 1983

SODWANA/CAPE VIDAL STATE FORESTS

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total. The Defence Force has rights to the area and uses it for weapons testing and training.

Date Established 1956. Decree number: Government Notice 1408 of 1956

Geographical Location 40km from St Lucia in Natal. 27°32'-28°08'S, 32°25'-32°40'E.

Altitude 5-172m

Area 57,954ha (Cape Vidal State Forest, 10,684ha and Sodwana State Forest, 47,270ha)

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs. Natal Parks Board have permanent rights as well as responsibility for administration of a 0.8km strip bordering on Lake St Lucia.

Physical Features The reserve comprises a large coastal barrier dune system with spectacular high forested dunes reaching a height of 172m and separating the sea from a coastal lake-estuarial system. It borders on the largest estuarial system in Africa, which includes Lake St Lucia, an inland fresh water lake. Soil survey is being undertaken at present. Annual average temperature range minimum: 17°C, maximum: 25°C. Annual rainfall 1,157mm, falling mainly in summer (67% of rainfall from October to March).

Vegetation Vegetation types consist of Coastal Forest and Thornveld (Veld Type 1). This area contains one of the three prime dune conservation sites on the Natal coast as well as large expanses of hygrophilous grassland and a large undisturbed *Phragmites-Cyperus papyrus* swamp system. Dune forest on coastal dune with *Mimusops caffra*, *Diospyros natalensis* and *Ziziphus mucronata*. Coastal grassland dominated by *Themeda triandra*, *Aristida junciformis*, and hygrophilous species such as *Sporobolus subtilis* and *Acroceras macrum*. Swamp forest dominants include *Barringtonia racemosa* and *Syzygium cordatum*. Pans, reed and sedge swamp dominated by *Eleocharis dregeana* and *Fuirena* spp.. Economically important species: *Juncus kraussii* (reedmats). Endemic species: not known.

Fauna Reedbuck *Redunca arundinum* (5,000), hippopotamus *Hippopotamus amphibius*, bushpig *Potamochoerus porcus*, buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus* and vervet monkey *Cercopithecus aethiops*. Threatened mammals: samango monkey *Cercopithecus mitis*, and large grey thick-tailed bushbaby *Galago crassicaudatus*; reptiles: veld monitor *Varanus exanthematicus albigularis*, water monitor *Varanus niloticus*, crocodile *Crocodylus niloticus* (V), Southern African python *Python sebae natalensis* and gaboon adder *Bitis gabonica*. Threatened birds include: pink-backed pelican *Pelecanus rufescens*, white pelican *Pelecanus onocrotalus*, woolly-necked stork *Ciconia episcopus*, Ayres' eagle *Hieraetus dubius* and southern banded snake-eagle *Circaetus fasciolatus*, as well as various forest species, not rare within the forest, but threatened by loss of habitat elsewhere.

Conservation Management There is a preliminary management plan.

Zoning Central section proposed as Wilderness Area under the Forest Act and the remainder as a nature reserve.

Disturbances or Deficiencies A portion of the area is used for the testing of military missiles, which has led to problems with wild fires. Military use in the northern area has damaged the vegetation.

Visitor Facilities There are no visitor facilities in the State Forest as such. Some developments may be carried out in the future. Numbers: none. Potential: unknown.

Scientific Research Hippopotamus, reedbuck and ecology of the coastal dune systems.

Special Scientific Facilities None

Principal Reference Material

° Taylor, R.H. (1980). A land capability study for hippopotamuses at Lake St Lucia, Zululand. M.Sc. Thesis, University of Natal.

Staff Three professional, three technical and 20 labourers a combination of a Forestry and Natal Parks Board personnel. The area is the responsibility of the District Forest Officer at Eshowe, and is served by a professional planning team from Pietermaritzburg.

Budget R50,000 per annum (excluding salaries)

Local Park or Reserve Administration Regional Director, Private Bag 506, Eshowe, 3815.

Date July 1983

PORTION OF DUKUDUKU STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Not fully protected. Only 85% Government-owned. The remainder is on lease and will revert to Government control in 1989.

Date Established 1930. Government Notice 1479 of 1930. The indigenous forest area will probably be declared a nature reserve in 1984/1985.

Geographical Location 16km from Mtubutuba in Natal. 28°17'-28°27'S, 32°14'-32°24'E.

Altitude 4-70m

Area 15,055ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs. A portion of the forest is at present being leased from the Government by a private farmer. This area will revert to Government control in 1989, when the lease expires.

Physical Features The area consists of a number of parallel dune ridges and troughs. Clayey soils occur on the eastern dunes and in the troughs. The rest of the soils are grey to red sands. Water bodies include the Mfutululu Lake, Umfolozi River and Mpate stream (on borders). A soil survey is presently under way. Annual average temperature range minimum: 13.4°C, maximum: 30°C. Annual rainfall 1,000mm, falling mainly in summer (60% of rainfall from October to March).

Vegetation Vegetation types consist of the Typical Coast-belt Forest (Veld Type 1(a)). The area is dominated by coastal Lowland Forest with natural grassland tongues in between the forest patches. The average canopy height ranges between 12 and 18 metres. Dominant

canopy species in the various forest communities are, *Strychnos decussata*, *S. madagascariensis*, *Celtis africana*, *Trichilia dregeana*, *Harpephyllum caffrum*, *Hymenocardia ulmoides*, and *Apodytes dimidiata* in places. A very limited patch is dominated by *Chrysophyllum viridifolium* and *Cavacoa aurea*. Other species of interest are *Manilkara discolor*, *Tapura fischeri*, *Croton sylvaticus*, *Balanites maughanii*, and *Podocarpus falcatus*. Swamp forest has limited distribution in the area and it is dominated by *Ficus trichopoda*, *Schefflera umbellifera*, *Voacanga thouarsii*, and *Syzygium cordatum*. Economically important species: *Phragmites* spp., and *Juncus kraussii* for reed mats. Endemic species: unknown.

Fauna Bushbuck *Tragelaphus scriptus*, nyala *T. angasi*, porcupine *Hystrix africaeaustralis*, vervet monkey *Cercopithecus aethiops*, bushpig *Potamochoerus porcus*, reedbuck *Redunca arundinum*, and hippopotamus *Hippopotamus amphibius*. This forest is an important breeding area for long-crested eagle *Lophaelus occipitalis*, crowned eagle *Stephanoaetus coronatus*, southern banded snake eagle *Circus fasciolatus*, black sparrowhawk *Accipiter melanoleucus*, broadbilled roller *Eurystomus glaucurus* and white-eared barbet *Smilornis leucotis*. These birds have been recorded nesting or displaying in the area. Threatened mammals: red duiker *Cephalophus natalensis*, samango monkey *Cercopithecus mitis*, thick-tailed bushbaby *Galago crassicaudatus*; birds: forest species, many of which appear in the South African Red Data Book (Brooke, 1984), are well represented.

Conservation Management A mangement plan is in the process of being drawn up.

Zoning Wilderness Area and proposed nature reserve under the Forest Act

Disturbances or Deficiencies Disturbances include poaching, cutting of saplings, alien plant invasion, and the presence of timber research plots in between indigenous forest patches.

Visitor Facilities There is a picnic site only. Numbers: undetermined. Potential: unknown.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- ° Gordon, I.G. (1983). 4th year report, College for Foresters, Saasveld, typescript.
- ° Henkel, J.S., St Ballenden, S.C., and Bayer, A.W. (1936). An account of the plant ecology of the Dukuduku forest reserve and adjoining areas of the Zululand coast belt. *Annals of the Natal Museum* 8: 95-125.
- ° Brooke, R.K. (1984). *South African Red Data Book - Birds*. South African National Scientific Programme Report No. 97.

Staff There is one District Forest Officer, one resident forester, and six forest guards, who spend a portion of their time in the natural area and the rest in the forestry plantation.

Budget R20,000, 00 per annum (excluding salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag 503, Eshowe, 3815.

Date July 1983

NTENDEKA WILDERNESS AREA

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African highlands)

Legal Protection Total

Date Established 1905. Government Notice 53 of 1905 Government Notice 1870 of 1975.

Geographical Location 62km from Vryheid in Natal. 27°47'S-27°54'S, 31°21'E-31°27'E.

Altitude 500-1,200m

Area 5,230ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features Dolerite and sandstone cliffs bisect the area. The Landscape above and below the cliffs is undulating. Cliffs are subject to parallel retreat through granular disintegration and rock fall. The cliffs are spectacular and produce waterfalls. The headwaters of Umfolozi River flow through the reserve. Soils are red ferriferous, highly leached and deeply weathered acidic soils of mixed dolerite and sandstone origin. Annual average temperature range minimum: 14°C, maximum: 23°C. Annual rainfall 1,500mm, falling mainly in summer (October to March).

Vegetation Vegetation types consist of North-eastern Mountain Sourveld (Veld Type 8). Cooper, who has just completed a survey of the forests of Natal, regards Ngome as an excellent example of a transitional forest from the Indian Ocean Coast Belt Type (Coastal Escarpment sub-type) to the Afro-Montane type (Mist Belt Mixed Podocarpus sub-type). Trees are more typical of the Coastal Escarpment forests. The following have been recorded at Ngome *Protorhus longifolia*, *Croton sylvaticus*, *Trichilia dregeana*, *Eugenia natalitia*, *Schefflera umbellifera*, *Rauvolfia caffra*, *Trema orientalis*, *Anastrabe integerrima*, *Harpephyllum caffrum*, *Trichocladus grandiflorus*, *Cassinopsis tinifolia* and *Dalbergia armata*. On the other hand, trees more typical of the Mist Belt Mixed Podocarpus forests, which occur at Ngome include: *Xymalos monospora*, *Cryptocarya myrtifolia*, *Rinorea angustifolia*, *Ficus craterostoma*, *Podocarpus latifolius*, *Indigofera natalensis*, and *Olea capensis* var. *macrocarpa*. The six most abundant large forest trees at Ngome are: *Syzygium gerrardii*, *Combretum kraussii*, *Brachylaena discolor* spp. *transvaalensis*, *Cryptocarya myrtifolia*, *Rhus chirindensis*, and *Zanthoxylum davyi*. Highland Grassland of Acocks Veld Type 8 includes *Themeda triandra*, *Loudetia simplex*, *Tristachya leucothrix*. Dominant Lowland Savanna Grasslands: *Themeda triandra*, *Eragrostis capensis*, and *Cymbopogon excavatus*. Economically important species: local people utilised many of the plants found here for medicinal and other purposes. Valuable timber trees include species such as *Podocarpus latifolius*. Endemic species: *Helichrysum ngomense*, *Schizochilus gerrardii*, and *Brachystelma ngomense*.

Fauna Threatened mammals: red duiker *Cephalophus natalensis*, samango monkey *Cercopithecus mitis*, blue duiker *Cephalophus monticola*. Birds: white stork *Ciconia ciconia*, martial eagle *Polemaetus bellicosus*, mountain buzzard *Buteo oreophilus*, wattled crane *Bucconas carunculatus* (of special concern), Gurney's sugarbird *Promerops gurneyi*, bald ibis *Geronticus calvus* (R) and various others included in the South African Red Data Book (Brooke, 1984). Vervet monkey *Cercopithecus aethiops*, chacma baboon *Papio ursinus*, common duiker *Sylvicapra grimmia*, bushbuck *Tragelaphus scriptus*, porcupine *Hystrix africae australis*, and bushpig *Potamochoerus porcus*.

Conservation Management Investigations are under way to identify suitable land surrounding the area for acquisition and subsequent enlargement of the wilderness area. A policy memorandum is to be completed by December 1984.

Zoning Entire 5,230ha is gazetted Wilderness Area under the Forest Act. An additional area is proposed as a nature reserve.

Disturbances or Deficiencies Overgrazing and injudicious burning practises in the past cause problems. Erosion scars are clearly visible. Invasive plants *Acacia melanoxylon*, *Caesalpinia decapetala*, *Solanum mauritianum*, and *Rubus* spp. are present.

Visitor Facilities Management trails are used by visitors. Numbers: 100 per annum. Potential: 300 per annum.

Scientific Research Resource inventory

Special Scientific Facilities None available

Principal Reference Material

° Brooke, R.K. (1984). *South African Red Data Book - Birds*. South African National Scientific Programme Report No. 97.

Staff One professional, one technical and 15 labourers. The area falls under responsibility of the District Forest Officer at Eshowe. The area is served by a professional conservation planning team from Pietermaritzburg.

Budget R31,100 per annum (excluding salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag 506, Eshowe, 3815.

Date 1984

MAPHELANA NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African woodland/savanna)

Legal Protection Total (100% Government-owned)

Date Established No information. Undemarcated State Forest, to be declared a Nature Reserve during 1984.

Geographical Location 50km from Kwambonambi in Natal. 32°24'-32°26'S, 28°24'-28°29'E.

Altitude 0-188m (188m)

Area 1,102ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features Maphelana consists of a very high coastal barrier dune system separating the sea from a large coastal wetland area and is one of only three macro-dune areas on the Zululand coast. The area includes the highest forested dune in South Africa. The Mfolozi River flows along the western boundary. The soils consist of unconsolidated white to grey-brown sand with a topsoil pH of between 6.7 and 7. Annual average temperature range

minimum: 17.5°C, maximum: 25.4°C. Annual rainfall 1,288mm, falling mainly in summer (October to March) 60% of rainfall.

Vegetation Vegetation types consist of Coastal Forest and Thornveld (Veld Type 1). The forest exhibits two clearly distinguishable communities due to the influence of salt sea spray, is thought to be one of the best preserved dune forests in Natal and exhibits a high species richness. The most extensive of these is the *Diospyros natalensis* community, which covers the lee dune. The other occurs on the foredune, where the salt spray damage is intense. *Mimusops caffra* and *Strelitzia nicolai* are the most conspicuous trees in the foredune. Economically important species: small quantities of *Phragmites australis*, but otherwise none recorded. Endemic species: none recorded.

Fauna Vervet monkey *Cercopithecus aethiops* and bushbuck *Tragelaphus scriptus*. Birdlife is prolific and includes many forest species. Threatened mammals: thick tailed bushbaby *Galago crassicaudatus* and samango monkey *Cercopithecus mitis*; birds: cuckoo hawk *Aviceda cuculoides*, long crested eagle *Lophaetus occipitalis*, Ayres' eagle *Hieraaetus dubius*, crowned eagle *Stephanoaetus coronatus*, southern banded snake-eagle *Circaetus fasciolatus*, African fish eagle *Haliaeetus vocifer*, crested guineafowl *Guttera pucherani*, green coucal *Ceuthmochares aereus*, Rudd's apalis *Apalis ruddi*, Woodward's batis *Batis fratum*, wattle-eyed flycatcher *Platysteira peltata*, and green twinspot *Mandingoa nitidula*.

Conservation Management A policy memorandum is to be completed in mid 1984. This area originally formed a part of a dune mining lease but, due to public pressure, the mining companies agreed not to mine the area.

Zoning Area not zoned

Disturbances or Deficiencies The only real disturbance is due to off-road vehicles on the beach and sand dune area. This is not a major problem at this stage.

Visitor Facilities There are none within the area, but Natal Parks Board camp on northern border. Numbers: not applicable. Potential: low.

Scientific Research A description of the forest has been completed and a dune vegetation inventory and ordination is being undertaken at present.

Special Scientific Facilities None

Principal Reference Material

- ° Weisser, P.J. (1978). A vegetation study of the Zululand dune areas. Natal Town and Regional Planning Commission Report No. 38, Pietermaritzburg.
- ° Venter, H.J.T. (1976). An ecological study of the dune forest at Mapelana, Cape St Lucia, Zululand. *Journal of South African Botany* 42(2): 211-230.

Staff One District Forest Officer, one forester on a part-time basis, and two forest guards. The area is served by a conservation planning team from Pietermaritzburg.

Budget R13,000 per annum (excluding salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag 503, Eshowe, 3815.

Date July 1983

NELSHOOGTE/BERLIN STATE FORESTS

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1923. Government Notice 1958 of 1923 and Government Notice 756 of 1936.

Geographical Location 40km from Nelspruit (Berlin), 42km from Barberton (Nelshoogte) in Transvaal. 25°30'-25°55'S, 30°40'-30°55'E.

Altitude 855-1,717m (Nelsberg)

Area 3,500ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The escarpment provides scenic viewpoints on the escarpment and there is a cave system on Berlin State Forest. Tributaries of the Elands River on Berlin and catchments for the Queens and Suidkaap Rivers on Nelshoogte flow through the area. Avalon and Hutton forms. Hornblende granites of the Cape Valley type comprise the geology of the area. Annual average temperature range minimum: 12°C, maximum: 21°C. Annual rainfall from 1,144mm (Berlin) to 1,099mm (Nelshoogte), falling mainly in summer (September-April).

Vegetation Vegetation types consist of North-Eastern Mountain Sourveld (Veld Type 8), Lowveld Sour Bushveld (Veld Type 9), and Lowveld (Veld Type 10). Lowveld bushveld on the lower areas passing into Lowveld Sour Bushveld on the slopes. Patches of indigenous forest in the cooler wet kloofs with dry scrub forest in the warmer dry kloofs. Montane grassveld on the higher slopes and on top of the escarpment. Dominant plant species include *Nuxia floribunda*, *Celtis africana*, *Fagara davyi*, *Acacia caffra*, *Curtisia dentata*, *Cussonia spicata*, *Faurea galpinii*, *Diospyros whyteana*, *Ficus ingens* and *F. sycomorus*. Various scarce plants are found in higher lying areas, such as *Encephalartos laevifolius*, and *E. humilis*. Economically important species: no information available. Endemic Species: *Encephalartos humilis*, *Protea roupelliae* ssp. *hamiltonii*.

Fauna Mammals: bushbuck *Tragelaphus scriptus*, mountain reedbuck *Redunca fulvorufula*, klipspringer *Oreotragus oreotragus*, vervet monkey *Cercopithecus aethiops*, chacma baboon *Papio ursinus*, caracal *Felis caracal* and small spotted genet *Genetta genetta*. Threatened species: leopard *Panthera pardus* (T), serval *Felis serval*, oribi *Ourebia ourebi*, and red duiker *Cephalophus natalensis*.

Conservation Management There is a management plan for this area. It is managed at this stage for species protection and fire protection.

Zoning Nelshoogte Nature Reserve (211ha); D.R. Hamilton Protea Nature Reserve (25ha); Starvation Creek Nature Reserve (353ha); and demarcated State land (2,911ha)

Disturbances or Deficiencies Frequent burning may lead to degradation of the vegetation. Burning is carried out in blocks to combat this problem. Part of a planned road threatens Ngodwana kloof on the Berlin plantation.

Visitor Facilities There is one picnic site at Nelshoogte. Numbers: less than 50 per annum. Potential: can be developed.

Scientific Research Population dynamics research on *Encephalartos laevifolius*.

Special Scientific Facilities None on site; research is done from the D.R. de Wet Research Station, Sabie.

Principal Reference Material Various unpublished departmental reports

Staff One professional forest officer doing planning from Regional Office at Nelspruit and four plantation foresters who carry out burning on a rotational basis

Budget No figures available

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag 11201, Nelspruit, 1200.

Date August 1983

UITSOEK STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna) and 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1953. Government Notice 361 of 1953.

Geographical Location 55km from Nelspruit in Transvaal. 25°13'-25°22'S, 30°32'-30°39'E.

Altitude 975-2,135m (Makobolwane)

Area 2,270ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features Facilities include an escarpment with rocky krantzies, patches of indigenous forest, kloofs, waterfalls and the Houtbosloop River, a tributary of the Crocodile River. Annual average temperature range minimum: 14°C, maximum: 28°C. Annual rainfall 895mm, falling mainly in summer (September-April).

Vegetation Vegetation types consist of North-Eastern Mountain Sourveld (Veld Type 8), Lowveld Sour Bushveld (Veld Type 9), and Lowveld (Veld Type 10). Three veld types follow one on the other up the kloof to the top of the escarpment. A wide variety of species occur in this area, of which *Encephalartos humilis* is the most important. Prominent trees include *Pterocarpus angolensis* and *Faurea speciosa*. Indigenous forests are found in kloofs along the escarpment. Economically important species: no information available. Endemic species: *Encephalartos humilis*.

Fauna Include the above endangered species, and also bushbuck *Tragelaphus scriptus*, mountain reedbuck *Redunca fulvorufula*, klipspringer *Oreotragus oreotragus*, vervet monkey *Cercopithecus aethiops*, chacma baboon *Papio ursinus*, caracal *Felis caracal*, and small spotted genet *Genetta genetta*. Birds: 97 species have been recorded. Two pairs of blue cranes *Anthropoides paradisea* breed in the area. Threatened species: leopard *Panthera pardus*, serval *Felis serval*, oribi *Ourebia ourebi*, and red duiker *Cephalophus natalensis*.

Conservation Management A management plan exists for this area.

Zoning Wonderkloof Nature Reserve (723ha); Flora Nature Reserve (47ha); Demarcated State land (1,500ha)

Disturbances or Deficiencies None

Visitor Facilities Facilities include a picnic site. Numbers: 50 per annum. Potential: high potential for development

Scientific Research Hydrological research

Special Scientific Facilities None on site, but the forest is served by the D.R. de Wet Forest Research Station, Sabie

Principal Reference Material Various unpublished departmental reports

Staff One professional forest officer at the Regional Office in Nelspruit responsible for planning two plantation foresters who carry out rotational burning

Budget No figures available

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag 11201, Nelspruit, 1200.

Date August 1983

CEYLON STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1935. Government Notice 485 of 1935 and Government Notice 856 of 1936.

Geographical Location 10km from Sabie in Transvaal. 25°00'-25°10'S, 30°37'-30°43'E.

Altitude Approximately 1,525-2,285m (Mount Anderson)

Area 3,500ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features Features include waterfalls and Sabie and Blyde Rivers. Annual average temperature range minimum: 12°C, maximum: 21°C. Annual rainfall 1,183mm, falling mainly in summer (September-April).

Vegetation Vegetation types consist of North-Eastern Mountain Sourveld (Veld Type 8). Indigenous forests in kloofs, but the vegetation is mostly open grassland. Dominant species

include: *Rapanea melanophloeos*, *Xymalos monospora*, *Podocarpus latifolius*, *Syzygium gerrardii*, *Combretum kraussii*, and *Cussonia spicata* in the forests. The grassland is *Themeda triandra* dominated with *Loudetia simplex* and *Rendlia altera*. Economically important species: no information available. Endemic species: no information available.

Fauna Bushbuck *Tragelaphus scriptus*, mountain reedbuck *Redunca fulvorufula*, klipspringer *Oreotragus oreotragus*, vervet monkey *Cercopithecus aethiops*, chacma baboon *Papio ursinus*, caracal *Felis caracal*, and the spotted genet *Genetta genetta*. Threatened species: leopard *Panthera pardus* (T), oribi *Ourebia ourebi*, and red duiker *Cephalophus natalensis*.

Conservation Management A management plan exists for this area. An investigation to have this area proclaimed a Nature Reserve is under way.

Zoning Open grassland (3,250ha); indigenous forest: (250ha)

Disturbances or Deficiencies Potato Board lands on top of the mountain destroy oribi habitat. Some areas are leased to farmers for winter grazing.

Visitor Facilities Facilities include a hiking trail with an overnight hut. Numbers: 5,500 per annum. Potential: 10,950 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None yet

Staff One professional forest officer at the Regional Office in Nelspruit responsible for planning and three plantation foresters who carry out rotational burning

Budget No figures available

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag 503, Sabie, 1260.

Date August 1983

MORGENZON STATE FOREST

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1978. Government Notice 2186 of 1978.

Geographical Location 20km from Pilgrims Rest in Transvaal. 24°44'-24°50'S, 30°41'-30°46'E.

Altitude Approximately 1,300-2,035m (Eldorado Peak)

Area 1,264ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features No information is available on the topography and geomorphology of the area. The Blyde River and Ohrigstad River flow through the reserve. Annual average temperature range minimum: 12°C, maximum: 21°C. Annual rainfall 773mm, falling mainly in summer (September to April).

Vegetation Vegetation types consist of North-Eastern Mountain Sourveld (Veld Type 8); small patches of indigenous forest, but mostly open grassland. Dominant species include: *Rapanea melanophloeos*, *Xymalos monospora*, *Podocarpus latifolius*, *Syzygium gerrardii*, *Combretum kraussii*, and *Cussonia spicata* in the forests. The grassland is *Themeda triandra* dominated by with *Loudetia simplex* and *Rendlia altera*. Economically important species: no information available. Endemic species: no information available.

Fauna Bushbuck *Tragelaphus scriptus*, mountain reedbuck *Redunca fulvorufula*, klipspringer *Oreotragus oreotragus*, vervet monkey *Cercopithecus aethiops*, chacma baboon *Papio ursinus*, caracal *Felis caracal*, and small spotted genet *Genetta genetta*. Threatened species: leopard *Panthera pardus* (T), serval *Felis serval*, oribi *Ourebia ourebi*, and red duiker *Cephalophus natalensis*.

Conservation Management A management plan exists for this area.

Zoning None, all a natural area

Disturbances or Deficiencies None specified

Visitor Facilities None. Numbers: no visitors in this area. Potential: undetermined.

Scientific Research Monitoring of grassveld burning

Special Scientific Facilities None

Principal Reference Material None

Staff One professional forest officer at the Regional Office in Nelspruit responsible for planning and two plantation foresters who carry out rotational burning

Budget No figures available

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag 503, Sabie, 1260.

Date August 1983

SERALA STATE FOREST (INCLUDING WOLKBERG WILDERNESS AREA)

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total; this reserve is very scenic and has the highest possible conservation status according to the Forest Act.

IUCN Directory of Afrotropical Protected Areas

Date Established 28 October 1977. Government Notice 5789 of 1977 (Section 7a of the Forest Act).

Geographical Location 80km from Pietersburg in Transvaal. 23°58'-24°11'S, 30°0'-30°10'E.

Altitude 795-2,050m (Serala Kop)

Area 21,998ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The reserve is at the Junction of northern Drakensberg and Strydpoort Mountain Ranges with mountains, deep valleys, and high peaks. Outstanding features include caves and Tufa formation, and many waterfalls and the Mohlapietse River (tributary of the Olifants River) and its tributaries. On a higher elevation, shallow soils of quartzitic material originating from Black Reef Series, can be found. The rest are derived from granite- gneiss formation and very little dolomite. Annual average temperature range minimum: 7°C, maximum: 21°C. Annual rainfall 500-1,350mm, falling mainly in summer (October-February).

Vegetation Vegetation types consist of North-eastern Mountain Sourveld (Veld Type 8) and Lowveld Sour Bushveld (Veld Type 9). The Wolkberg Wilderness area is the only wilderness area set aside in accordance with the Forest Act in the Transvaal Province and it has representative communities of diverse vegetation types. Ten percent evergreen montane high forest with approximately 40 species, 8% semi-deciduous indigenous forest, thorn-veld, riparian forests, montane grassland with and without *Protea* spp., sub-montane wooded savanna with *Faurea saligna*, *F. speciosa*, and *Pterocarpus angolensis*. Economically important species: none. Endemic species: none.

Fauna Mainly bushbuck *Tragelaphus scriptus* and common duiker *Sylvicapra grimmia*. More than 150 bird species have been recorded. Threatened species: leopard *Panthera pardus* (T) and samango monkey *Cercopithecus mitis*.

Conservation Management A management plan exists for this area.

Zoning State Forest Wilderness Area (17,390ha); Ordinary Demarcated State Forest (4,608ha).

Disturbances or Deficiencies Local population responsible for frequent uncontrolled fires, poaching and growing of *Cannabis sativa*. Some invasive plant species grow along jeep tracks and rivers.

Visitor Facilities Showers, toilets, and parking facilities at Serala. No hiking trails, but visitors allowed into area with a map indicating jeep tracks and management paths. Visitors may stay overnight in area, although no facilities provided. Numbers: 893 per annum. Potential: 3,000 per annum.

Scientific Research Resource inventory and monitoring activities by management staff

Special Scientific Facilities Small plant collection

Principal Reference Material Unpublished departmental reports

Staff One resident and one assistant forester at Serala State Forest

Budget R115,000 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X2413, Louis Trichardt, 0920.

Date July 1983

WOODBUSH/DE HOEK STATE FORESTS

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1916. Government Notice 982 of 1916.

Geographical Location 28km from Tzaneen in Transvaal. 23°41'-23°57'S, 30°59'-30°05'E.

Altitude 1,200-1,834m (Pypkop)

Area 6,626ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The reserve is in the most northern extension of Drakensberg Mountain Range with hilly country on the ridge, a steep escarpment and Helpmekaar and Broederstroom Rivers which form the Great Letaba River outside this area flowing through it. Soils comprise deep sandy loams derived from granite formations. Annual average temperature range minimum: 10°C, maximum: 24°C. Annual rainfall 1,884mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of North-eastern Mountain Sourveld (Veld Type 8). The montane evergreen high forest is the largest indigenous forest in the Transvaal. There are also a few open patches on rocky outcrops. Major tree species include: *Podocarpus falcatus*, *P. latifolius*, *Celtis africana*, *Combretum kraussii*, and *Olea capensis*. A checklist of the trees is available on request.

Fauna Bushbuck *Tragelaphus scriptus*, common duiker *Sylvicapra grimmia*, bushpig *Potamochoerus porcus*, and several other forest species. Birds are plentiful. Threatened species: leopard *Panthera pardus* (T), samango monkey *Cercopithecus mitis*, and red duiker *Cephalophus natalensis*. Economically important species: none.

Zoning Ordinary Demarcated State Forest, 6,626ha

Disturbances or Deficiencies Invasive species present on fringes of forest

Visitor Facilities Dokolewa circular route of Magoebaskloof Hiking Trail. Numbers: 1,200 per annum. Potential: 6,000 per annum.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material Various unpublished departmental reports

Staff Two resident state foresters at De Hoek and Woodbush

Budget R15,000 for forest inventory and hiking trail (including part of salaries).

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X2413, Louis Trichardt, 0920.

Date August 1983

ENTABENI STATE FOREST (INCLUDING THREE SMALL NATURE RESERVES)

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.22.12 (South African Highlands)

Legal Protection Total

Date Established 1924. Government Notice 1615 of 1924.

Geographical Location 45km from Louis Trichardt in Transvaal. 22°59'-23°03'S, 30°10'-30°18'E.

Altitude 700m-1,469m (Matiwa)

Area 1,924ha

Land Tenure Government. Administered by the Directorate of Forestry, Department of Environment Affairs.

Physical Features The reserve is in the Soutpansberg Mountain Range, which runs in an east-westerly direction with steep southern slopes. Latanandwa and Mutshindudi tributaries to Levubu River flow through the area. Soils comprise sandy loams with quartzitic outcrops. Annual average temperature range minimum: 13°C, maximum: 25°C. Annual rainfall 1,700mm, falling mainly in summer (October-March).

Vegetation Vegetation types consist of North-eastern Mountain Sourveld (Veld Type 8). The largest evergreen indigenous high forest is in the Soutpansberg mountain range occurs in this area with species such as *Podocarpus latifolius*, *Celtis africana*, *Xymalos monospora*, *Cryptocarya liebertiana*, *Prunus africana*, *Trichilia dregeana*, *Croton sylvaticus*, *Cassipourea gerrardii*, *Combretum kraussii*, *Syzygium gerrardii*, *Cussonia spicata*, *Schefflera umbellifera*, *Olea capensis* ssp. *macrocarpa*, and *Nuxia floribunda*. Economically important species: none.

Fauna Bushbuck *Tragelaphus scriptus*, common duiker *Sylvicapra grimmia*, and bushpig *Potamochoerus porcus*. Threatened species: leopard *Panthera pardus* (T), samango monkey *Cercopithecus mitis*, and red duiker *Cephalophus natalensis*.

Conservation Management No management plan exists for this area.

Zoning Declared nature reserves (the Ratomba, Veraskop and Entabeni); proposed Matiwa Nature Reserve (800ha); and demarcated State Forest (1,124ha).

Disturbances or Deficiencies Invasive alien plants grow along water courses. Also previously disturbed semi-deciduous forest types.

Visitor Facilities Facilities include the Soutpansberg Hiking Trail. Numbers: 1,400 per annum. Potential: 6,000 per annum.

Scientific Research Ecology of samango monkey *Cercopithecus mitis*

Special Scientific Facilities None

Principal Reference Material Unpublished departmental reports

Staff Resident state forester at Entabeni and one research forester

Budget R21,000 per annum (including salaries)

Local Park or Reserve Administration Regional Director, Directorate of Forestry, Private Bag X2413, Louis Trichardt, 0920.

Date August 1983



U.K. - ST. HELENA

Area 122 sq.km

Population 5,499 (1982)

Parks and Reserves Legislation Forestry Ordinance Cap. 40 was enacted as Ordinance No. 4 of 1937. This ordinance made provision for the constitution of forest reserves on Crown and private lands. By Order-in-Council No. 6 of 1938, three such reserves were constituted, with the object of protecting areas containing indigenous flora. This legislation was regarded as ineffective and replaced by Ordinance No. 9 of 1954, amended by Ordinance No. 10 of 1955, No. 6 of 1959 and by Statutory Rules and Order No. 4 of 1967. The Governor in Council has powers to constitute National Forests on Crown land. Other areas are classified as Dedicated Forests (on privately owned lands), Protected Private Forests (to be managed by the owner), and Controlled Areas where no trees are to be cut down or forest produce removed without written permission of the Agriculture and Forestry Officer. The Ordinance makes provision for protection and management of the three categories of forest. Nine endemic species of trees and other plants are protected under Ordinance No. 15 of 1959 which was revised in 1977 to include all angiosperms and the tree fern *Dicksonia arborescens*. The Agriculture and Forestry Department was made responsible for their protection.

Parks and Reserves Administration The Forestry Division of the Department of Agriculture and Forestry was first established in 1934. The United Kingdom Overseas Development Administration (ODA) has made important contributions to the organization of forestry on St Helena. There is also a Forestry Advisory Committee which comprises elected members of the Legislative Council with the Agricultural and Forestry Officer (from ODA) as ex-officio member. This officer is replaced every 18 months to three years.

Address Agriculture and forestry Department, Scotland, St Helena.

Additional Information Originally the island was covered in vegetation, with an interior described as an entire forest of gumwood *Commidendrum robustum* and other indigenous trees. Today the worst problem is erosion, which is a consequence of vegetation clearance by man for fuel and timber, and clearing for farming operations. Another major contributor to the present coastal barrenness was the goat, but this feral species has now been almost eradicated. Degradation of the 'crown wastes' is exacerbated by water and wind erosion in coastal areas and flood damage in valley bottoms. Destruction of the tree and shrub vegetation of the higher peaks has also probably resulted in reduced precipitation, mainly because of fall-off in mist interception.

The other disturbance to the natural environment is the spread of exotic species of plant introduced from the Cape of Good Hope, Australia, and America. The greatest single development on St Helena - Flax *Phorium tenax* - is no longer viable but this species has severely encroached most peaks and ridges. In addition, it has been the practice in the past to revegetate areas with exotics such as *Acacia* and *Eucalyptus*. To alleviate the problem of erosion and lack of self-sufficiency in timber produce, Henry (1974) recommended development of the Forest Estate of Helena with various exotic species. He also described the need for conservation of endemic flora.

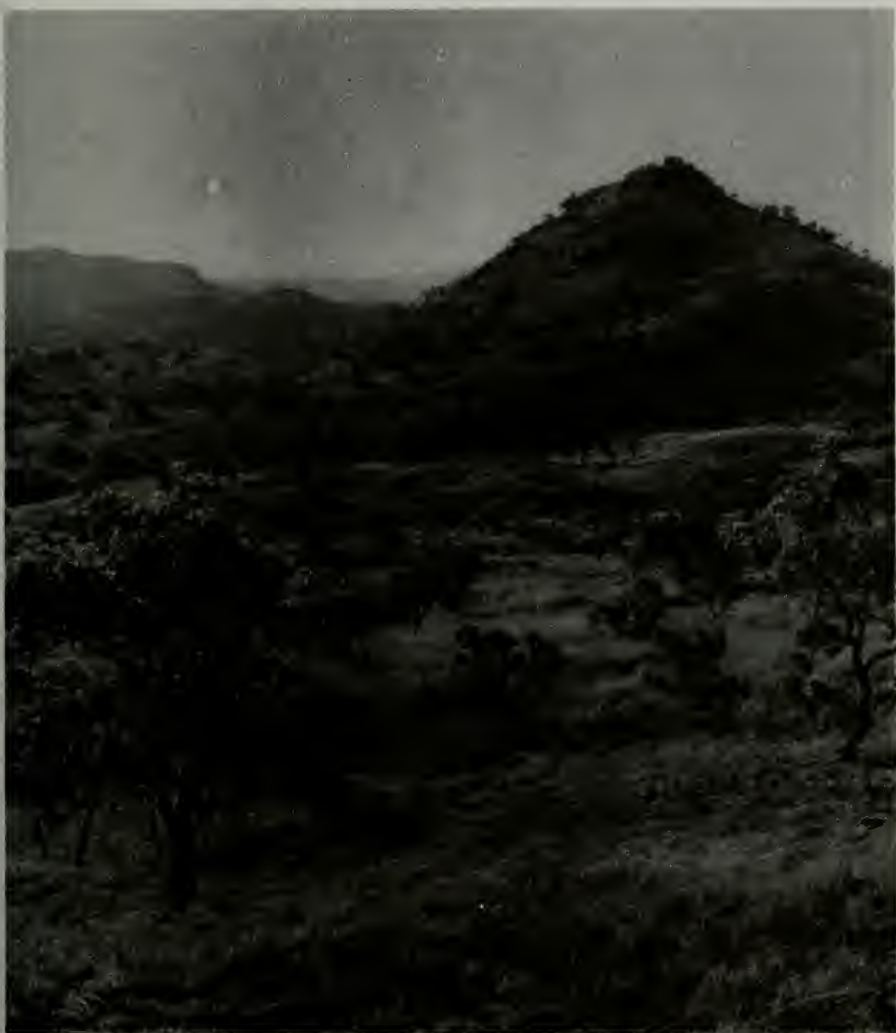
Goodenough (1983) discovered that most endemics are verging on extinction, but that species such as scrubwood *Commidendrum rugosum* had a huge potential for stabilizing and reconstituting soil. However, natural regeneration is slow (limited by exposure) and endemic species are mostly found as individuals or in small enclaves of limited species diversity, with considerable encroachment by exotics. He recommended propagation of species and initiated and improved propagation programmes, and also, where indigenous species thrive, programmes of expansion.

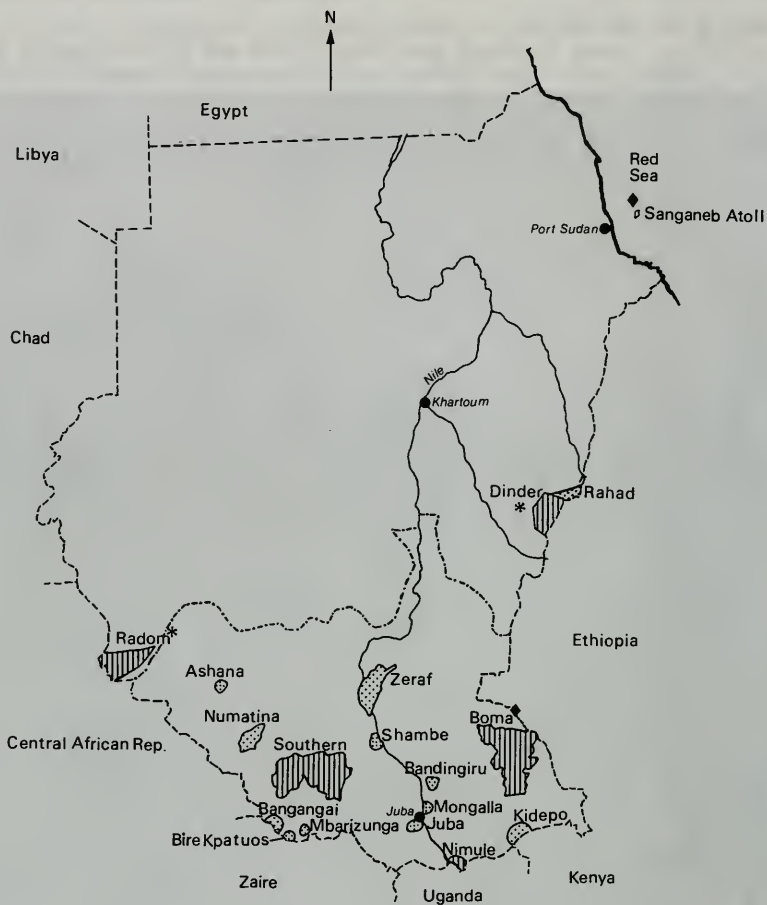
Recent rains have caused excellent regeneration, especially on protected sites, and a WWF funded propagation unit is now able to provide large numbers of plants. In 1983 the Agriculture and Forestry Department proposed to re-establish discrete areas of endemic forest (five initially) both for conservation purposes and to evaluate endemic trees for potential economic utility. Planting has been in progress in four areas since July 1985. A Forestry Programme (1985-1990) has been accepted by the St Helena Government. This is concentrating on endemic planting, fencing, and removal of exotics.






Four national forests have been designated conservation areas for protection of the endemic tree and shrub flora of the Island. These are Dianas National Forest (which comprises 1.21ha of Crown land (1955) and 4.66ha of Private Dedicated Forest (1957) along the Central Ridge) and Old Joan Point National Forest (comprising 19.44ha of Crown land), both nature reserves for endemic species, High Peak National Forest (1955) (a Protection area of 5.38ha on Crown land), and Casans and Hardings National Forest (1955) (primarily a production forest covering 31.3ha of Crown land - 2ha of which is managed for native trees/shrubs).

References

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 - Goodenough, S. (1983). Saint Helena: A Plant Propagation Project and Recommendations for the Conservation of the Endemic Flora of the Island. Mimeo Report. Royal Botanic Gardens, Kew, UK.
 - Henry, P.W.T. (1974). Forestry on St. Helena. Project Report 8, 1974. Land Resources Development Centre, Surrey, England.
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- Key
-  National Parks
 -  Game Reserves
 -  Biosphere Reserves
 -  proposed
 -  North-South border

Sudan

SUDAN

Area 2,505,813 sq.km

Population 20,560,000 (1983); comprising 500 ethnic groups

Parks and Reserves Legislation Wildlife is protected and protected areas established and managed under the Preservation of Wild Animals Ordinance of 1935 (as amended), and the National Parks, Sanctuaries, Reserves and Game Regulations dated 1935 onwards. These legislative instruments were apparently the first such attempts to conserve Sudan wildlife. The Ordinance enables the Minister to establish National Parks, Game Sanctuaries, and Game Reserves. Hunting is prohibited within the first two types of area, but not within game reserves where it may be permitted under licence. Exploitation of resources within national parks is only allowed with the permission of the Minister, but cultivation and grazing of domesticated animals is allowed within game reserves under permit. More recently Southern Sudan has been given a measure of autonomy (Southern Provinces Regional Self-Government Act, 1972), and the Wildlife Conservation and Parks Act 1975, of the Southern Regional Government (1976, Provisional Order No. 2) deals with wildlife conservation policy, administration, protected areas, protected animals hunting methods and licences, wildlife trade, etc. within the Southern Region. Three types of protected area are defined under this act, National Parks (which can only be created or abolished by the President), Game Reserves, and Controlled Areas. Within national parks in the south all disturbance of both animals and habitat is prohibited, and weapons, domestic animals, etc. are not permitted. Within game reserves hunting is forbidden, and settlement or cultivation is allowed only under permit, while within Controlled Areas animals may be hunted, but only under permit. All forms of tourism within such areas can only take place with the permission of the Ministry. It can therefore be seen that there are wide differences between protection in the north and south of the country. The Marine Fisheries Regulations of 1937, amended in 1975, cover fishing activity within Sudan. The Sudanese Marine Conservation Committee (SMCC) have drafted a new Marine Fisheries Act in consultation with IUCN to create a legal instrument enabling establishment of marine parks and reserves, and to regulate construction in or near the sea (a national marine park has been proposed for Sanganeb Atoll for example).

Parks and Reserves Administration In 1972, when wildlife resources within the Southern Region of Sudan became the responsibility of that region, the Department of Wildlife, Conservation, Fisheries and Tourism was created. This was elevated to Ministry status in 1977. Within the Northern Region the governmental agency responsible for executing wildlife policies and enforcing legislation is the Administration of Wildlife Conservation Forces. The Forestry Department grants licences for use of forest produce. Marine conservation in Sudan is controlled by the Sudanese Marine Conservation Committee (SMCC).

Address

- Wildlife Conservation Forces, Central Administration, PO Box 336, Khartoum.
- Regional Ministry of Wildlife Conservation and Tourism, PO Box 77, Juba.
- Central Forests Administration, Ministry of Agriculture and Natural Resources, PO Box 658, Khartoum.

Additional Information Current political changes within the Sudan have made jurisdiction over wildlife and reserves unclear. Poaching is at an extremely high level, although it is believed that the political unrest may be maintaining status quo, with soldiers reportedly protecting resources within particular areas for their own use (Cobb, 1981). However, game reserves have never received very much protection and have consequently suffered from settlement, cultivation and livestock grazing (Dasmann, 1972). Like the reserves, the game sanctuaries are also very seldom patrolled. Many of the protected areas have therefore lost much of their wildlife (Hassaballa and Nimir, 1985).

Recent events in Sudan have presented further problems in wildlife management, and most expatriate advisors have left the country. However, it is reported that the wildlife conservation

forces in the Equatorial region have done remarkably well, including the training of 140 new officers in paramilitary techniques and wildlife skills. Apparently anti-poaching operations are keeping poaching within this region to a minimum (Guillet, 1986).

There has been considerable trade in ivory, skins and live animals. An FAO estimate numbered Sudan's elephant population at 134,000, but the dramatic increase in poaching over the last few years has reduced this and a new census is needed (Hassaballa and Nimir, 1985). Exports of raw ivory were banned in 1983 and the 1936 wildlife law was supposed to be more strictly enforced but lack of patrols and funds have prevented this being effective. Sudan was also seeking agreements with neighbouring countries to prevent smuggling of ivory poached in Sudan with the aid of IUCN/WWF Project 1950.

The Southern Sudan Regional Ministry of Wildlife Conservation plans to establish a national park in the Shambe area, five times the size of the present game reserve, in particular for protection of northern white rhino. Poaching and drought are affecting animal numbers in this region and IUCN/WWF Project 1949 was set up to help combat poaching in particular and help in setting up the park.

Although loss of habitat through human agency and poaching are both serious problems for nature conservation, the biggest single threat is undoubtedly desertification, particularly in the north. The most serious aspect for conservation management is the loss of vegetation through misuse of the land. The government, with assistance from outside the country, is trying to cope with this problem.

Wildlife Education was begun in southern Sudan in 1979 when the first Wildlife Club was established. In 1982 the African Wildlife Foundation supplied an expatriate adviser and a four-wheel drive vehicle and other equipment to expand the programme, and over a dozen Wildlife Clubs have now been established. The Sudan Wildlife Society was founded (in the north) in 1982. Despite these efforts public awareness about conservation is still limited.

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- * Hillman, J.C. (1982). *Department of Wildlife Management, Wildlife Information Booklet on the Southern Sudan*. New York Zoological Society, USA.
- * Hillman, J.C. (1985). *Wildlife research in relation to conservation and management*. Seminar on wildlife conservation and management in the Sudan, Khartoum, 16-21 March 1985.
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- * IUCN/WWF Project 1259. *Sudan, Coral Reefs and Sanganeb Marine National Park*.
- * IUCN/WWF Project 1634. *Sudan, Training of wildlife personnel*.
- * IUCN/WWF Project 1949. *Sudan, Conservation of white rhinos and other large mammals*.
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- * IUCN/WWF Project 3172. *Sudan, Support for wildlife personnel*.

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Protected Areas

	(hectares)
<i>National Parks</i>	
Dinder	890,000
Nimule	41,000
Radom	1,250,970
Southern	2,300,000
Subtotal	4,481,970
<i>Game Reserves</i>	
Ashana	90,000
Bandingiru	
Bangangai	17,000
Bire Kpatuos	500
Chelkou	550,000
Fanyikango Island	48,000
Juba	20,000
Kidepo	140,000
Mbarizunga	1,300
Mongala	
Numatina	210,000
Rahad	
Shambe	62,000
Zeraf	970,000
Subtotal	2,108,800
<i>Biosphere Reserves</i>	
Dinder National Park	650,000
Radom National Park	1,250,970
Subtotal	1,900,970
<i>Proposed areas</i>	
Boma National Park	2,280,000
Lantoto National Park	76,000
Port Sudan	
Sanganeb Atoll	100
Boro Game Reserve	150,000
Meshra Game Reserve	450,000

DINDER NATIONAL PARK

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.13.07 (Eastern Sahel)

Legal Protection Within the buffer zone charcoal licences are granted by the Forestry Department and concessions for mechanised farming are given by the Ministry of Agriculture in the wet season.

Date Established 1935 as a National Park, May 1979 as a Biosphere Reserve. Extended to include a buffer zone in 1980.

Geographical Location The area lies in the north-eastern corner of the Blue Nile Province adjacent to the frontier with Ethiopia. 11°45'-12°50'N, 34°46'-36°12'E.

Altitude 700-800m

Area 890,000ha, with a 277,300ha buffer zone; Biosphere Reserve 650,000ha.

Land Tenure Government

Physical Features Much of the park is low-lying flood plain sloping gently from the Ethiopian Highlands with the meandering Rahad and Dinder rivers flowing north-westerly towards the Blue Nile. A number of tributary streams and ox-bow lakes (or mayas) cover a great deal of the total area towards the Ethiopian highlands, and in the southern corner of the park there are a few rocky hills. Precipitation ranges from 800mm in the south to 600mm in the north and falls mainly between June and October. Temperatures range from 20°C in January to 44°C in May.

Vegetation There is *Acacia seyal*-*Balanites aegyptiaca* thornbush savanna, with tall, coarse grasses including *Sorghum* species in the north, and *Combretum hartmannianum* woodland in the south. Along the banks of rivers is *Hyphaene thebaica* or multi-layered gallery forest of *Acacia sieberana*, *Tamarindus indica* and *Ficus* species, with *Ziziphus abyssinica* and *Mimosa pigra* underneath. Again, the dominant grasses are *Sorghum* species and *Brachiaria* species. In swampy areas or shallow lakes, *Nymphaea* spp. and *Ipomoea* spp. are dominant. Open grass plains are composed of *Themeda triandra*, *Panicum* spp., *Hyparrhenia* spp. and *Cynodon* spp. The ox-bow lakes, which gradually silt up, provide the main source of nutritious grasses, particularly *Echinochloa* species, for wildlife during the most severe part of the dry season.

Fauna There was a rich fauna including giraffe *Giraffa camelopardalis*, buffalo *Syncerus caffer*, reedbuck *Redunca arundinum*, roan antelope *Hippotragus equinus*, waterbuck *Kobus ellipsiprymnus*, greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, topi *Damaliscus lunatus*, oribi *Ourebia ourebi*, elephant *Loxodonta africana* (T), lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), striped hyena *Hyaena hyaena* and spotted hyena *Crocuta crocuta*. Numbers have been reduced over the last two decades. There was also a rich variety of birdlife including ostrich *Struthio camelus*.

Conservation Management No information

Zoning The whole 650,000ha Biosphere Reserve area is considered as core, fully protected, but with limited tourism allowed. The large buffer zone which lies to the west may include some wet-season grazing areas.

Disturbances or Deficiencies The park only includes dry-season habitat for many ungulates and ostrich. Illegal mechanized farming is threatening the whole buffer zone and the traditional grazing lands outside the reserve are being lost. Burning, both by rangers and nomadic herdsman, disturbs about 60% total area each year. The combination of the effect of this activity and grazing has caused remarkable changes in the vegetation. In addition, the livestock herds are thought to be responsible for the serious outbreaks of disease that have decimated the wild herds. Poaching is a serious threat. Surveys have shown that numbers of animals decreased by up to 50% between 1971-1977. Phase II of the Rahad Agricultural Project envisages a canal from Roseires Dam across the south-western buffer zone close to the park, which would block the wet season migration of many species as the agriculture does.

Surveys were carried out in 1971-72 on migratory habits, and longer-term studies initiated. These surveys recommended that the canal be re-aligned to interfere less with migration routes and that a new game reserve be established to the west of the park to cover part of the wet season ranges of many animals (Dasmann 1972).

Visitor Facilities No information

Scientific Research Surveys from 1971-1977 by the Institute of Environmental Studies and the Wildlife Research Section at the University of Khartoum.

Special Scientific Facilities No information

Principal Reference Material

- ° Abushama, F.T. (1981). Dinder besieged. *Sudan Environment* 1(2): 4-5.
- ° Allam, T.M.H. (1981). Wildlife in Dinder: poaching our heritage. *Sudan Environment* 1(2): 3-4.
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- ° Whitney, J.B. and el Moghraby, A.I. (1982). Dinder National Park, Sudan: Development versus Preservation. *Environmental Conservation* 9(3): 248-250.

Staff Three game officers and 11 rangers. Research staff visit the park seasonally.

Budget No information

Local Park or Reserve Administration Wildlife Administration, PO Box 336, Khartoum.

Date May 1985

NIMULE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Totally protected under the Sudan Game Law of 1975 and Ordinance of 1935.

Date Established 1975

Geographical Location In the south of Eastern Equatoria province, on the border with Uganda. Approximately 3°35'N, 32°10'E.

Altitude 650-700m

Area 41,000ha

Land Tenure Government

Physical Features The park is in hilly country, with the Bahr El Jebel (White Nile) along about 48km of the eastern boundary. The River Kayu flows through the park from the Uganda border until it meets the Bahr El Jebel. There are hill ranges on the east and west of the park which also includes the Fula Rapids.

Vegetation Much of the park has savannah woodland of *Acacia* spp., *Balanites aegyptiaca*, and *Combretum hartmannianum*.

Fauna The park had a very rich fauna which has declined considerably in recent years. There are still some elephant *Loxodonta africana* (T), patas monkey *Cercopithecus patas*, eastern black-and-white colobus *Colobus guereza*, kob *Kobus kob*, waterbuck *Kobus ellipsiprymnus*, oribi *Ourebia ourebi*, Bohor reedbuck *Redunca redunca*, bushbuck *Tragelaphus scriptus*, sitatunga *Tragelaphus spekei*, hippopotamus *Hippopotamus amphibius*, warthog *Phacochoerus aethiopicus*, crocodile *Crocodylus amphibius* and ostrich *Struthio camelus*.

Zoning None

Disturbances or Deficiencies No human settlement or other activities are allowed. The park suffered severely during the political unrest in Uganda and elephant populations were decimated and the population of white rhinoceros *Ceratotherium simum* was poached out. Poachers from Uganda still cause a problem. It is at present the most stable of the parks in Sudan.

Visitor Facilities There is a rest house, Nimule Park Lodge, for visitors. This area is used predominately by Juba people.

Scientific Research The area has high scientific potential, but no extensive research has been done yet. Various brief studies by Juba University students.

Special Scientific Facilities None

Principal Reference Material

- ° Harrison, M.N. and Jackson, J.K. (1958). Ecological Classification of the Vegetation of the Sudan.
- ° Hillman, J.C. (1982). Department of Wildlife Management, Wildlife Information Booklet on the Southern Sudan. New York Zoological Society, USA.
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- ° Kock, D. (1961). A visit to the Nimule National Park in the Southern Sudan. *African Wildlife* 15(4): 323-329.

Staff A Game Officer, two game rangers, 15 game scouts and 15 labourers

Budget The park receives an allocation of 15,000,000LS from the regional government annually for reinforcement of the law and limited development of the area.

Local Park or Reserve Administration Regional Ministry of Wildlife, Conservation, Fisheries and Tourism, PO Box 77, Juba.

Date May 1985

RADOM NATIONAL PARK

Management Category II and IX (National park and Biosphere Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Hunting is prohibited by the Sudan Game Regulation in force since 1960. No hunting, tree felling, agriculture, or new human settlements are allowed.

Date Established 1979 as a Biosphere Reserve. National Park status in 1980

Geographical Location Located in the south-western corner of southern Darfur Province, 300km from Nyala, bordering the Central African Republic. Approximately 9°50'N, 24°45'E.

Altitude Average of 450m

Area 1,250,970ha

Land Tenure Government

Physical Features There is broken hilly country, with two main rivers and numerous smaller streams flooding only during the wet season. The mountain range within the reserve constitutes a watershed dividing the Central African and Sudanese hydrographical system. Rainfall occurs mainly between April and November and varies between 630mm in the north and 900mm in the south.

Vegetation The savanna woodland is dominated by *Terminalia brownii*, *Combretum* spp., *Anogeissus leiocarpus* and *Isoberlinia doka*. Important for wildlife are the wet meadows (dahls) which provide water and fodder during the dry season.

Fauna The park had a rich fauna which has become depleted. It includes elephant *Loxodonta africana* (T), hartebeest *Alcelaphus busephalus* (T), waterbuck *Kobus ellipsiprymnus*, kob *Kobus kob*, hippopotamus *Hippopotamus amphibius*, giraffe *Giraffa camelopardalis*, and a number of carnivores including: lion *Panthera leo*, leopard *Panthera pardus* (T), wild dog *Lycaon pictus* (T), and cheetah *Acinonyx jubatus* (T).

Conservation Management No information

Zoning None

Disturbances or Deficiencies For a long time the park was protected from cattle encroachment by the presence of tse-tse fly but recently there have been reports of livestock overgrazing. Poaching, honey collection and fishing have always occurred on a small scale but for a long time organised poaching has been the largest threat to the park. Human settlement is also increasing in and on the periphery of the park (Badawi and Hakim 1985).

Visitor Facilities No information

Scientific Research There is high scientific potential but only two reconnaissance surveys were carried out in 1976 with the assistance of WWF and by the Wild Life Research Institute of Sudan. The area may become important as a site for desertification studies within MAB Project 3 and studies on feeding habits and migratory routes within MAB Project 8.

Special Scientific Facilities No information

Principal Reference Material

- ° El Badawi, M.A. and Hakim, S. (1985). The role of protected areas in wildlife conservation. Seminar on wildlife conservation and management in the Sudan. Khartoum 16-21 March 1985.

Staff Thirty-four scouts and 12 officers

Budget No information

Local Park or Reserve Administration Wildlife Administration, PO Box 336, Khartoum.

Date May 1985

SOUTHERN NATIONAL PARK

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Totally protected under the Sudan Game Law of 1975 and Ordinance of 1935. However, due to the current political situation, management and protection of this area is extremely difficult.

Date Established 1939

Geographical Location Situated in the south of Tonj district in Lakes Province, with an elongation into the north-eastern part of Tambura district, and the northern tips of Yambio and Maridi districts in Western Equatoria province. Approximately centred 6°25'N, 28°25'E.

Altitude 400-1,000m

Area 2,300,000ha

Land Tenure Government

Physical Features The River Sue, the major tributary of the Bahr El Ghazal or Jur River, forms the western boundary of the park. The river Ibba or Tonj flows through the park and to the east is the river Maridi or Gel. The park is characterised by ironstone laterite and alluvial soils forming Jebels Angeleri, Yarra, and Gubelli. There are two distinct seasons, March being the warmest month, and August the coolest. Average annual rainfall ranges from 994mm to 2418mm in the Rumbek area, with the rainy season lasting nine months in the southern part of the park, but somewhat shorter in the northern areas.

Vegetation Savanna woodland covers much of the area, with a varying mixture of grass and trees. Large-leaved deciduous trees dominate most of the park, although thorny species and tall grasses become dominant in the north.

Fauna The park has had a high faunal diversity. Large mammals remaining include elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, white rhinoceros *Ceratotherium simum* (three records 1985/6), hartebeest *Alcelaphus buselaphus* (T), waterbuck *Kobus ellipsiprymnus*, kob *Kobus kob*, Bohor reedbuck *Redunca redunca*, topi (tiang) *Damaliscus lunatus*, hippopotamus *Hippopotamus amphibius*, giraffe *Giraffa camelopardalis*, red-flanked duiker *Cephalophus rufilatus*, common duiker *Sylvicapra grimmia*, patas monkey *Cercopithecus patas*, eastern black-and-white colobus *Colobus guereza*, lion *Panthera leo*, leopard *Panthera pardus* (V), hunting dog *Lycaon pictus* (T), bushbuck *Tragelaphus scriptus* and sitatunga *Tragelaphus spekei*. Crocodile *Crocodylus niloticus* and ostrich *Struthio camelus* still occur.

Conservation Management A master plan was prepared for the park in 1981 as part of the technical Cooperation Programme between the Democratic Republic of Sudan-Southern Region and the Republic of Italy. Implementation has not occurred.

Zoning None

Disturbances or Deficiencies The park has suffered during 17 years of Civil War, and recently from poachers with automatic rifles. Since the 1980 dry season, the Southern range has been invaded annually by poachers from the north. In March 1983, there were estimated to be 15 to 30 camps of 10 to 300 men each within the park. Illegal honey collecting and uncontrolled fires are also a problem.

Visitor Facilities No information

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- ° Anderson, A.B. (1950). The Sudan's Southern National Park. *Sudan Wildlife and Sport* 1(3): 12-16.
- ° Blower, J.R. (1977). Wildlife Conservation and Management in the Southern Sudan. FAO: DP/SUD/76/021, Rome.
- ° Boitani, Luigi (1981). The Southern National Park: A Master Plan. Istituto di Zoologia, Facolta di scienze dell' Università di Roma, Italy.
- ° Hillman, J.C. (1982). Department of Wildlife Management, Wildlife Information Booklet on the Southern Sudan. New York Zoological Society, U.S.A.
- ° Hofmann, Reinhold R. (1976). Advisory Report to the Regional Government of Southern Sudan. Vet. Anatom. Institute, F.R.G.

Staff Three game officers, five game rangers, 100 game scouts and 30 labourers

Budget No information

Local Park or Reserve Administration No information

Date May 1985

BOMA NATIONAL PARK

Management Category Proposed II (National Park)

Biogeographical Province 3.13.07 (Eastern Sahel)

Legal Protection Protected under the Sudan Game Law of 1975 and Ordinance of 1935, which allows traditional hunting. Due to the current political situation, management and protection of this area is extremely difficult.

Date Established Declared a National Park in 1979, but not gazetted. Established in 1981 to provide year-round protection for a migratory population of kob.

Geographical Location Close to the Ethiopian border in Jonglei province. 5°11'-7°07'N, 33°07'-34°26'E.

Altitude 400-1,100m

Area 2,280,000ha

Land Tenure Government

Physical Features The eastern edge of the park abuts the rugged Ethiopian highlands, while to the west, vast stretches of flat black cotton (gumbo) floodplain make the area inaccessible during the rainy season. The Guom swamps are on the northern boundary. The eastern region of the park is characterised by undulating terrain approaching the Boma plateau to the south-east. Numerous meandering rivers drain across the plains of Boma into the Nile.

Vegetation The park includes several ecological zones. Montane forests followed by deciduous woodlands grading into *Acacia* woodlands mark the descent from highlands to the flat plain of the west. Semi-arid short grass plains, seasonal swamps and tall grass floodplains characterise the southern parts.

Fauna This park had the highest diversity of fauna in the Sudan, (and possibly in Africa) before the recent troubles. Dominant species are white-eared kob *Kobus kob leucotis*, topi (tiang) *Damaliscus lunatus* (the reserve comprises approximately half the topi's migration area), buffalo *Syncerus caffer*, roan antelope *Hippotragus equinus*, giraffe *Giraffa camelopardalis*, zebra *Equus burchelli*, Bohor reedbuck *Redunca redunca*, Thompson's gazelle *Gazella thomsoni*, Grant's gazelle *Gazella granti*, Beisa oryx, *Oryx gazella*, leopard *Panthera pardus* (T), hartebeest *Alcelaphus buselaphus*, and cheetah *Acinonyx jubatus* (T). The Guom swamps are the site of the largest concentration of kob at certain times of the year. Also present are elephant *Loxodonta africana* (T) in very low numbers, and eastern black and white colobus *Colobus guereza*. This area is also considered an important stop-over for European bird migrants and a nesting site for shoebill *Balaeniceps rex* (of special concern) in the Guom swamps. There is a high diversity of raptors with approximately 30 recorded species.

Zoning None

Disturbances or Deficiencies Military activity has resulted in bombing and pitched battles at park headquarters and the kidnapping of park staff. All equipment donated by the Frankfurt Zoological Society was destroyed during battles and staff have been withdrawn. The park is a high security risk area and no recent reports on its status have been received. IUCN has been informed unofficially by the Sudan People's Liberation Movement that elephants must be killed to feed their army, but that conservation activities will be restored when the political situation is resolved. Meanwhile, the plateau exists in a delicate and unmanaged state. There is some hunting by the local Murle tribe, some permanent settlement within the area, and grazing also takes place. The whole of the feeding wetlands for buffalo etc. are not included in the park.

Visitor Facilities Limited tourism was allowed before the recent security problems, but is not advisable at present.

Scientific Research 1980-1983 research was carried out for the New York Zoological Society and National Geographical Society on white-eared kob migration.

Special Scientific Facilities There were limited facilities, however, these were destroyed in the recent surge of political unrest. Three bush airstrips.

Principal Reference Material

- ° Arenson, J. (1982). Murle: Traditional hunters of Sudan. *Swara* 5(2): 29-31.
- ° Hillman, J.C. (1982). Department of Wildlife Management, Wildlife Information Booklet on the Southern Sudan. New York Zoological Society, U.S.A.
- ° CNPPA Summary Status Report (1984). Threatened Protected Areas of the World (draft).

Staff Before the political troubles there was a park warden, an assistant park warden, two game rangers, 15 game scouts, and 20 labourers, while the ability of staff to carry out their duties was limited. The staff situation is now uncertain.

Budget The park has received approximately US\$1,000,000 for its development from the Frankfurt and New York Zoological Societies but this programme has been abandoned to be resumed when security problems are resolved.

Local Park or Reserve Administration None

Date May 1985

PORT SUDAN

Management Category Proposed Marine National Park

Biogeographical Province 3.13.07 (Eastern Sahel)

Legal Protection There are regulations prohibiting collection and trade in shells and corals.

Date Established No information

Geographical Location The proposed park is planned to include the fringing reefs and beaches immediately within as well as north and south of Port Sudan on the Red Sea. 19°38'N, 37°07'E.

Altitude Sea level

Area No information

Land Tenure No information

Physical Features The park is to enclose a 4 km long 'mersa' which forms a natural harbour several tens of metres deep. Within this bay there is a strong down current of lagoonal water when northerly winds prevail and this carries rich oxygen saturated water from the shallows to deeper water. There are some coral formations in the harbour mouth in addition to the offshore fringing reefs to the north (Wingate reefs) and south (Towartit reefs). Outside the harbour the fringing reefs are exposed to prevailing north-west winds, while towards the harbour mouth the reefs face south and are consequently more protected. In these sheltered parts, there are numerous deep crevices in the coral crest, which is undercut at 3m where sediment collects.

Vegetation The fringing reefs are covered with seagrass and algae.

Fauna The fringing reefs to the north and south of Port Sudan are about 1 km wide and have seagrass, algae and coral cover, with a spectacular sloping fore-reef dropping several tens of metres. Vine and Vine (1980) studied the reef 1 km north of the northern point of the harbour entrance. Reef growth at this promontory is accelerated by an abundant food supply in the long-shore current. Corals are found down to 80 m but there is a paucity of marine life, including fish, below 30 m. The reef changes direction at the promontory and is more exposed to prevailing winds to the north and less exposed between it and the harbour entrance. The more exposed northern section has a less acute reef face and a more prolific growth of hermatypic corals, with a reef crest dominated by *Pocillopora* and *Porites*, a zone of *Galaxea* at about 2 m, a shallow reef-edge forming a steep spur and groove system, with numerous corals on the spurs and a deeper reef face dominated by *Xenia* and various sponges. On the less exposed side of the promontory, the reef face has an almost vertical drop-off with a spur and groove system from the crest to about 35 m and has a rich growth of gorgonians, soft coral *Dendronephthya* and at greater depths, antipatharians. Many localities on the reefs inside

the outer barrier in and near the Towartit reef complex have a poor coral fauna with much algae and soft corals, and limited marine life. These and the reefs forming the outer barrier were surveyed at the most southerly point of Wingate reef and on the east side of Wingate barrier reef have been described by Vine and Vine (1980). 59 genera and subgenera of stony corals have been recorded from this area (Schroeder, 1982). On the northern fringing reef, at certain times of the year, such as January, strong down currents of lagoonal water carry plankton towards the deep reef and as a result large numbers of usually shallow water fish are found as deep as 35 m. Reef fish which are not normally plankton feeders, such as parrot fish, are seen to shoal away from the reef and feed on plankton particularly the pteropods. About 60 species of fish were recorded on this reef (Vine and Vine, 1980). Information on fish on the outer reefs is also given in Vine and Vine (1980). 282 species of molluscs have been found on reefs about Port Sudan and Suakin (Mastaller, 1978). Osprey *Pandion haliaetus* have been seen on Harvey reef in the Towartit complex (Vine and Vine, 1980).

Conservation Management A preliminary proposal for the Marine Park has been made and it is suggested that work on this park should run concurrently with the establishment of the Sanganeb Marine National Park. Just to the north of the port, the Abu Hashish Recreation Centre is proposed in a heavily polluted area. It is intended to re-establish circulation of water round the series of fringing reefs to clean up the area.

Zoning No information

Disturbances or Deficiencies Increasing industrialisation in the region and the resulting pollution are a serious threat to the reefs. The main pollutants are: hot water discharge from an electrical power station, oil, chemicals, waste, and a variety of other products ranging from flour to asphalt. Port Sudan harbour has been modernised and extended to cope with ever-increasing shipping activity and the old Suakin harbour is about to be reactivated for coastal shipping with a new port to be built at New Suakin, 10km north, to further relieve some of the pressure on Port Sudan. However, the Towartit and Wingate reefs off Port Sudan currently provide the only anchorages for big ships and are seriously threatened by waste discharges and physical damage. All the more accessible coral reefs are being damaged by excessive visitor pressure. The increase in crown of thorns *Acanthaster planci* starfish populations on Towartit reef during 1971-1974 may have been the result of increased eutrophication due to waste. There is also heavy spearfishing and collecting of coral and shells, particularly by the sailors.

Visitor Facilities The sea is the major source of recreation for the people of Port Sudan. Viewing marine life by means of a glass bottom boat was a major attraction until the 'coral gardens' at the harbour entrance became impoverished. The Red Sea Hotel has scuba equipment and can accommodate 30 divers (Schroeder 1978, 1982).

Scientific Research Detailed survey by Vine and Vine (1980); ecological survey of the Towartit reefs by Head (1980). The Cambridge Group (Dr. Roads, Imperial War Museum) have also done studies on reef communities on the Towartit reefs (Schroeder, 1978). The Institute of Oceanography are mapping and zoning the fringing reef.

Special Scientific Facilities ALECSO support for a marine research station (Rifai, 1980).

Principal Reference Material

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Staff No information

Budget No information

Local Park or Reserve Administration No information

Date No information

SANGANEB ATOLL

Management Category Proposed II (Marine National Park)

Biogeographical Province 3.13.07 (Eastern Sahel)

Legal Protection No official protection as a reserve. Entry to the island unrestricted, although regulations are laid down for overnight stay by tourists. Orders to prevent the collection of corals, shells and fancy fish and the use of spear guns were issued in 1978 by the Red Sea Commissioner, and these are enforced by the local police and followed up by the Sudanese Marine Conservation Committee (SMCC). The Marine Fisheries Regulations of 1937 and 1975 amendment are in force, and a New Marine Fisheries Act will be enacted in the near future and will provide the base for all marine park management and nature protection.

Date Established The SMCC is already involved in working with government departments towards the establishment of the park (as is noted above), and a plan for creating the marine National Park has been drawn up. The site was nominated as a World Heritage Site in 1981, although not at that time inscribed on the World Heritage list.

Geographical Location An atoll 30km north-east of Port Sudan. 19°45'N, 37°25'E.

Altitude Sea level

Area The proposed park covers an area of approximately 100ha.

Land Tenure Public

Physical Features This is the only atoll in the Red Sea. It is characterized by 13 different bio-physiographic reef zones, each providing typical coral reef assemblages. Species diversity is high, within a relatively small area, and the area is largely unaffected by pollution or depletion by collectors. The reef and enclosed lagoons run 6km north-south and 2km east-west. The atoll rises from a steep sea-floor of more than 800m depth, and is characterised by steep slopes on all sides with terraces in their upper parts and occasional spurs and pillars. The rim of the atoll reaches sea surface at all but its western side, where a submerged ridge forms the rim. Outer rim encloses three lagoons: a large one in the north with 51m maximum depth and a wide opening to the west; a small one with 27m maximum depth bordered to the north by a series of patch reefs; and a medium-sized southern one with 9m maximum depth

which is completely enclosed except for a narrow channel leading north, and provides safe anchorage for small boats. The water is extremely clear - visibility of up to 46m has been measured.

Vegetation Limited

Fauna The atoll has a high diversity of corals and fish; the latter include Napoleon wrasse *Cheilinus undulatus*, barracuda *Sphyrnaena* spp., hammerhead shark *Sphyrna* spp., and occasionally tiger shark *Galeocerdo cuvieri* and white-tip shark *Triaenodon obesus*. *Genicanthus melanospilus* (Pomacanthidae), which has a patchy distribution in the Red Sea, occurs on the deep water reefs.

Conservation Management Its position in the open sea, making it comparatively safe from coastal, industrial, and port pollution, makes it particularly suitable for reserve status. The feasibility study and development plan of the Marine National Park urgently needs to be carried out. It should parallel the final phase of enacting the new Marine Fisheries and Marine Environment Act, which is to replace the 1937 Marine Fisheries Ordinance and is to provide the legal instrument to create marine parks. The SMCC will help carry out the feasibility study and a special 'Sanganeb Working Group' is to be formed. It may be practical to include the barrier reef from Le Mercier Shoals north to about Shaab Rumi and the Shaab Rumi Atoll itself, in the park.

Zoning None

Disturbances or Deficiencies There is coral and shell-collecting and anchor damage and other disturbances caused by large numbers of boats and divers. Spearfishing is particularly heavy. There is a lighthouse, constructed in 1965, which consists of a concrete platform (about 800 sq.m) including the tower, adjacent buildings for staff and generators, two store houses, a verandah, and two jetties approximately 80m in length. Now that the light signal is automatic, there is more urgent need for some form of control of tourists.

Visitor Facilities This is the most frequently visited diving site in the Sudanese Red Sea for Europeans. Organized dive tours usually anchor in the inner sheltered lagoon. It is also popular with Sudanese people when boat trips were available. The marine park will therefore be a focal point for tourist activity. Currently, about 500-700 people a year visit the atoll, of which more than 400 are divers. The tourist season is from October to May. Access to the island is free, although special regulations are provided by the Tourist Corporation Office, Port Sudan, for overnight stay.

Scientific Research The Institute of Oceanography has undertaken studies of the three lagoons. Aerial photography at the scale of 1:7,500 has been carried out and the Survey department will participate in hydrographic work.

Special Scientific Facilities A field station is being established on the atoll. A tidal station is to be installed and the Meteorology Department is interested in establishing a weather station.

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- ° Maps: Deutsche Seekarten, Routes Meer, No. 331.

Staff There are no conservation staff. The local police enforce the fishing regulations.

Budget IUCN and WWF have agreed to sponsor and finance the first phase of the feasibility study and development plan of the Marine National Park.

Local Park or Reserve Administration None

Date 1982



Rep. of South Africa



Mozambique

Malolotja

Komati

Mbabane

● Mbabane

Milwane

● Manzini

Hlane

Mbuluti

Mlawula




Ndzindza

● Siteki

Usutu

0 10 20 30km

Key

-  Nature Reserves
-  Wildlife Sanctuary
-  Game Reserve

Swaziland

SWAZILAND

Area 17,366 sq.km

Population 626,000 (1984)

Parks and Reserves Legislation The National Trust Commission Act 1972 provides legislation for the creation of national parks and monuments and matters related to them, and brought into being the Swaziland National Trust Commission. The Forest Legislation (1979) prohibits cutting down, removal, sale or purchase of indigenous timber without permission from the Minister of Agriculture. Earlier legislation included the Game Act of 1 September 1953 (and its many amendments) which covered Game Reserves and Sanctuaries, and the Flora Protection Act of 31 October 1952 which dealt with the establishment of flora reserves.

Parks and Reserves Administration The Swaziland National Trust Commission was founded in 1972 to oversee nature conservation and the preservation of Swazi heritage. This commission is advised by FAO. The Forestry Service is responsible for implementation of the forest legislation.

Address

- ° Swaziland National Trust Commission, PO Box 75, Mbabane.
- ° Forest Service, Ministry of Agriculture and Cooperatives, PO Box 162, Mbabane.

References

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Protected Areas

	(hectares)
<i>Nature Reserves</i>	
Malolotja	18,000
Mbabane	202
Mlawula	12,000
Ndzindza	5,500
Subtotal	35,702
<i>Wildlife Sanctuaries</i>	
Mlilwane	4,545
<i>Game Reserves</i>	
Hlane	14,164

MALOLOTJA NATURE RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African woodland/savanna)

Legal Protection Total

Date Established Established in 1972 for nature conservation and the preservation of Swazi heritage

Geographical Location The park is in the north-west highlands (Ngwenya Hills) on the national border with the Republic of South Africa. Access is by vehicle from Motjane-Pigg's Peak road. 26°00'S, 31°03'E.

Altitude No information

Area 18,000ha

Land Tenure Government; administered by the Swaziland National Trust Commission

Physical Features This highland area is a continuation of the Drakensberg and Libombo mountains, dissected by tributaries of the Komati river. Features include the steep-sided Komati gorge, Malolotja Falls (highest in Swaziland) and the abandoned Ngwenya iron ore mine: an immense pit with terraced sides and deep pools of water at the bottom. Extensive vlei and bog areas remain intact on the southern margin of the park. Two large valley sedge peat areas occur in the headwaters of the Malolotja and Umbuluzi. Rainfall peaks in mid-summer (January/February; monthly maximum 240mm) with a varying dry season severity (May–September).

Vegetation Grassland predominates over all aspects of the rounded hill and valley terrain on substrates with seasonal waterlogging. Thicket and forest is confined to incised valley heads, rocky outcrops, sinkholes and streambanks, where the soil is wetter. The herbaceous bogs support a large diversity of plants including abundant sedges, orchids and lilies. A flowering sequence in which each species or group of species exhibit a temporary visual dominance is typical of these acid bog communities. There are three main sour veldgrass types forming a topographic gradient: 1) montane grassveld on the highest parts of the Ngwenya range including montane grasses such as *Festuca* and *Merxmüllera* (ex *Danthonia*); 2) highveld grassland of the Piet Retief type including *Alloteropsis semilata*, *Brachiaria serrata*, *Harpochloa falx*, *Koeleria capensis*, *Tristachya hispida* and *Urelytrum squarrosus* dotted with termite mounds that are colonised by the nitrophilous kweek grass *Cynodon dactylon*; and 3) medium to tall grassland in moist sites and on valley floors comprising species of *Andropogon*, *Setaria* and thatch grass *Hyparrhenia*. The three main duplex savannoid systems include a high altitude *Protea roupelliae* treeveld with crowns reaching 3m in height, a torfield savanna at medium to low altitudes including trees spaced more than three crown diameters apart, such as, *Bequaertiodendron magalismontanum*, *Ekebergia pterophylla*, *Faurea* spp., *Protea* spp. and *Pterocarpus angolensis*. The valleys contain savanna trees and shrubs such as *Acacia sieberana*, *Acacia karroo*, *Euphorbia ingens*, *Sclerocarya caffra*, and *Bauhinia galpini*. All stages of development from scrub-thicket *Acacia ataxacantha*-*Bauhinia galpini* to forest occur with narrow lines of tall *Breonadia microcephala* (or *Adina*) trees which form a riverine forest in some areas. Some plants occur nowhere else in Africa including three cycads: *Encephalartos paucidentatus*, *E. laevis*, and *E. heenanii*. Other endemics include a small tree *Cassipourea swaziensis* occurring on rocky outcrops and confined totally to western Swaziland, and stemless herbs with tube-shaped flowers, *Streptocarpus davyi*, *S. dunii* and *S. denticulatus*.

Fauna Mammals include: the indigenous oribi *Ourebia ourebi* and bushbuck *Tragelaphus scriptus*; zebra *Equus burchelli*, white rhinoceros *Ceratotherium simum*, buffalo *Syncerus caffer*, blue wildebeest *Connochaetes taurinus* and impala *Aepyceros melampus* (from Hlane Game Reserve); red hartebeest *Alcelaphus buselaphus caama*, black wildebeest *Connochaetes gnou*; and blesbok *Damaliscus dorcas phillipsi* from South Africa. Birds include two resident colonies of bald ibis *Geronticus calvus* (R).

Cultural Heritage On the north-west side of the iron ore mine pit is a smaller mine from which red haematite pigment was removed over 40,000 years ago. Many Middle Stone-Age artefacts have been found in the area.

Conservation Management Some game animals have been translocated from the thriving, but potentially overcrowded Hlane Game Reserve. The reserve is only recently open to the public, and is still under development.

Zoning Zoning is planned: special zones, wilderness zones open to horse/foot trails, natural buffer zones incorporating the main camp and tourist roads, development zone for the administrative centre and two camps, and archaeological and historic zone surrounding the mining excavation.

Disturbances or Deficiencies Roads, tracks, disused homesteads, and weeds.

Visitor Facilities The park is only recently open to the public, and a rest camp is under construction. The reserve has limited roads, and is primarily a walking reserve. Wilderness trails have been marked out and are strictly controlled.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

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Staff No information

Budget No information

Local Park or Reserve Administration Swaziland National Trust Commission, PO Box 100, Lobamba.

Date 1985

MLILWANE WILDLIFE SANCTUARY

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.08.04 (South African woodland/savanna)

Legal Protection Total

Date Established 1960. Opened to the public in 1964; Mlilwane was Swaziland's pioneer reserve

Geographical Location Ezulwini valley south of Mbabane in eastern Swaziland. Access is from the main highway between Mbabane and Manzini. 26°28'S, 31°05'E.

Altitude No information

Area 4,545ha (10 times the original area)

Land Tenure Private

Physical Features The reserve straddles the escarpment that divides the lowveld from the highveld and is centred on Ezulwini valley. There are four rivers including the Little Usutu

with its spectacular Mantenga Falls. Twin sharp-peaked kopjes (rocky outcrops) rise to the north. Flooded mining pits have created dams and vleis, which support waterfowl.

Vegetation Highveld and lowveld vegetation occurs. The sanctuary contains the Gilbert Reynolds Memorial Garden, which has an aloe collection and a variety of planted indigenous trees.

Fauna Before the establishment of the sanctuary, the area contained only steenbok *Raphicerus campestris* and common duiker *Sylvicapra grimmia*. Mammals re-introduced since 1960: are white rhino *Ceratotherium simum*, hippopotamus *Hippopotamus amphibius*, giraffe *Giraffa camelopardalis*, warthog *Phacochoerus aethiopicus*, buffalo *Syncerus caffer*, sable antelope *Hippotragus niger*, eland *Taurotragus oryx*, kudu *Tragelaphus strepsiceros*, blesbok *Damaliscus dorcas phillipsi* and blue wildebeest *Connochaetes taurinus*. There are over 240 recorded bird species including Verreaux's black eagle *Aquila verreauxii*, plum-coloured starling *Cinnyricinclus leucogaster*, sunbirds (Nectariniidae), and numerous waterfowl on the dams including blue crane *Anthropoides paradisea*.

Conservation Management Constant anti-poaching patrols have reduced poaching. Zebra, wildebeest, impala, white rhinoceros and hippopotamus have been re-introduced to this previously farmed area. Old tin mine pits have been flooded to form dams and other mining scars have been allowed to grass-over prior to planting indigenous tree species. A National Environmental Education Centre has been established funded by the Swaziland National Trust Commission and the United States and is visited by parties of school children.

Zoning No information

Disturbances or Deficiencies A nearby hydroelectric development by-passes Mantenga Falls and will reduce water over the falls to a trickle.

Visitor Facilities A large well-equipped rest camp and campsite has a small natural history museum. Facilities include guided horseback or open Land-Rover tours and 100km of good gravel roads with wildlife/bird hides.

Scientific Research Swaziland National Trust Commission is conducting a survey to investigate how the scenic quality of Mantenga Falls can be maintained despite the hydroelectric scheme.

Special Scientific Facilities No information

Principal Reference Material None listed

Staff Team of rangers

Budget No information

Local Park or Reserve Administration Mlilwane Wildlife Sanctuary, PO Box 33, Mbabane.

Date 1983

HLANE GAME RESERVE

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.08.04 (South African woodland/savanna)

Legal Protection Controlled hunting permitted in the Royal Hunting Reserve.

Date Established 1967. First acquired by the king in the 1940s as a private ranch; part of the area is now a Royal Hunting Reserve

Geographical Location Straddling the Lomahasha-Manzini road in north-east Swaziland. 29°14'S, 31°55'E.

Altitude No information

Area 14,164ha. Contiguous with Mlawulu Nature Reserve (12,000ha) and Ndzindza Nature Reserve (5,500ha)

Land Tenure King of Swaziland in trust for the nation

Physical Features The Lowveld country, watered by the Black Mbuluzi River, forms part of the north and north-west boundaries and separates the reserve from Mlawulu and Ndzindza Reserves. It has a dry winter and wet summer.

Vegetation Extensive grassland veld areas with woodland along the watercourses include knobthorn *Acacia nigrescens* and ancient leadwood trees *Combretum imberbe*. Herbaceous species include impala lily *Adenium swazicum*.

Fauna There are over 10,000 mammals including zebra *Equus burchelli*, blue wildebeest *Connochaetes taurinus*, kudu *Tragelaphus strepsiceros*, waterbuck *Kobus ellipsiprymnus*, steenbok *Raphicerus campestris*, and common duiker *Sylvicapra grimmia*. White rhinoceros *Ceratotherium simum*, giraffe *Giraffa camelopardalis*, and cheetah *Acinonyx jubatus* (V) have been introduced. Southern bald ibis *Geronticus calvus* (R) also occur in the area.

Population The Butimba, a week-long hunt in an area adjacent to the Royal Hunting Reserve at Hlane, takes place each year. Hundreds of Swazis in traditional dress, led by the king, enter the area with spears, knobkerries and guns. All game killed is given to the king. The Swaziland game rangers regard this annual event as a valuable way of emphasising traditional values.

Conservation Management Thirty-five white rhinoceros were translocated from Umfolozi Game Reserve in Natal. Giraffe and cheetah have been reintroduced from the Transvaal and Natal. When the area was upgraded from a hunting reserve to game reserve, a team of rangers was employed and poaching has been reduced. Game numbers have risen, but overcrowding is now a threat. The new policy is to translocate to Malolotja Nature Reserve in the west.

Zoning The reserve contains the Royal Hunting Reserve.

Disturbances or Deficiencies A road through the reserve from Lomahasha to Manzini is to be upgraded to a highway. It will effectively divide the reserve in two and degrade it as a sanctuary. The expanding wildlife population continues to threaten the habitat by overgrazing the grassland areas with subsequent bush invasion.

Visitor Facilities Basic campsite facilities are available and Land-Rover tours can be arranged.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material None listed

IUCN Directory of Afrotropical Protected Areas

Staff Team of rangers

Budget No information

Local Park or Reserve Administration Mlilwane Wildlife Sanctuary, PO Box 33, Mbabane.

Date 1983





- Key
- National Parks
 - Proposed National Parks
 - Game Reserves
 - Conservation Area
 - * Biosphere Reserve
 - ** World Heritage Site
 - ▶ shape unknown

Tanzania

TANZANIA

Area 930,700 sq.km (including 53,480 sq.km of water on the mainland)

Population 19,730,000 (1983); 90% rural. Population growth presumably 3.3%

Parks and Reserves Legislation The original Fauna Conservation Ordinance of 1951 was replaced in 1974 by the Wildlife Conservation Act which allows the government to establish protected areas and sets out how those areas are to be organized. Appropriate management of these areas is also outlined in the Forest Ordinance No. 389 of 1959, National Parks Ordinance No. 12 of 1959 and Ngorongoro Conservation Act 1959. National Parks are declared by Act of Parliament after approval by ministry and district/regional authorities, changes are made under the same procedure. Game reserves are declared or altered by the ministry with district/regional approval. Game reserves are areas where no permanent settlement is permitted, hunting is only allowed with written permission, and activities such as licenced hunting, fishing and logging are strictly controlled. Five game reserves have been declared National Projects which increases their status and protection. These areas are considered to be of special importance to the nation. Usually only tourist hunting is allowed and no exploitation such as cattle grazing and cultivation is permitted. There are 49 Game Controlled Areas where unauthorised hunting is prohibited, but as there is no control on land use this is largely ineffective as a conservation measure. Forest reserves, which cover some 10-15% of the country, are declared under the same procedure but established under the Forest Ordinance. About 45% of this area is closed to timber production. Five marine reserves have been declared, but no development of any kind has taken place and these areas appear to receive little protection.

Parks and Reserves Administration All natural resources are administered by the Ministry of Natural Resources and Tourism, which has separate Divisions of Fish, Forests, Tourism and Wildlife. Until the 1950s, all wildlife areas were administered by the Wildlife Division (which at that time was known as the Game Division). The National Parks authority was then created as a semi-autonomous para-statal body answerable to the Minister through a board of directors. One Conservation Area (Ngorongoro) is a multiple use management area, administered and managed by a separate para-statal body the Ngorongoro Conservation Area Authority. Game reserves are managed under regional directorates guided by the Wildlife Division. The five game reserves that are National Projects are managed directly by the Wildlife Division, and the input of manpower and equipment is much higher than for other game reserves.

Address

- ° Tanzania National Parks (TANAPA), PO Box 3134, Arusha.
- ° Wildlife Division, Ministry of Natural Resources and Tourism, PO Box 1994, Dar-es-Salaam.
- ° Forestry Division, Ministry of Natural Resources and Tourism, PO Box 426, Dar-es-Salaam.
- ° Ngorongoro Conservation Area Authority, Box 1, Ngorongoro, Arusha Region.
- ° College of African Wildlife Management, Mweka, PO Box 3031, Moshi.

Additional Information Nature conservation is a major landuse in Tanzania with over 25% of the country within gazetted reserves (including Forest Reserves but excluding Game Controlled Areas). Poaching, particularly of trophy species, has increased in the last decade, resulting at least in part from the 1973 hunting ban and facilitated by the increased availability of automatic weapons. Hunting safaris, developed in the mid 1960s, were economically successful and acted to enhance wildlife conservation by increasing government interest and reducing poaching (through better surveillance of Game Controlled areas and game reserves). With the 1973 ban, mainly to curb elephant poaching, effective patrolling of many reserves had stopped by 1975 due to relative cost increases. Tourist hunting was re-introduced in 1978 for a restricted period of each year (July to December) under the control of the Tanzania Wildlife Corporation. However, due to the low number of safaris, their effect as a poaching deterrent was initially fairly insignificant (Rodgers, 1981). Since 1981 the number of professional hunters and their clients has increased again.

Another major concern is depletion of forest through over-exploitation and invasion by cultivation. As is found elsewhere in Africa, increased fragmentation into tiny forested areas within mountain regions in particular, poses a threat to the continued existence of a number of communities and species. The biological values of Tanzania's montane forests are attracting increasing interest, having very rich floras and faunas with many endemic species. The Mountains are also an important water catchment area and the forest cover needs to be maintained to safeguard regular runoff. The Uzungwa mountains have been proposed as a national park and greater protection has been proposed for the Uluguru and Usambara mountains. IUCN/WWF Project 3024 was to study the invertebrate and bird fauna of the Ulugurus, which have many endemic species, including Loveridge's sunbird *Nectarinia loveridgei* and the extremely rare Uluguru bush shrike *Malaconotus alius*.

The College of African Wildlife Management at Mweka, established in 1963, has trained technical staff from many Anglophone African countries, and is widely recognised as the pioneer training institution of its type in the world. Facilities are fairly extensive, including residential, administrative and teaching buildings, vehicles, field equipment etc. The training programme is directed towards middle-level managers, with the majority of graduates achieving posts of assistant and senior field officers (Mosha and Thorsell, 1984). There is no long-term secure funding arrangement for the college.

In 1982 the Malihai (Wildlife) Clubs of Tanzania were set up under IUCN/WWF Project 1779 as school children previously knew little about their wildlife. Its headquarters and museum are located at Arusha and a magazine is produced. Other publicity about wildlife issues, particularly rhinoceros conservation, was undertaken by IUCN/WWF Project 1933 which also censused rhino populations.

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- ° Rodgers, A. (1981). Few Hunting Safaris in Tanzania despite lifting of ban. *Africana* 8(4).
- ° Thorsell, J.W. (1982). The role of training in effective management: an example of the parks management course at The College of African Wildlife Management, Tanzania. Workshop paper, World National Parks Congress, Bali, Indonesia, 11-22 October 1982.

° Williams, J.G. (1981). *A field guide to the National Parks of East Africa*. Collins, London. (Includes animal species lists for many of the reserves.)

Protected Areas

	(hectares)
<i>National Parks</i>	
Arusha	13,700
Gombe	5,200
Katavi	225,300
Kilimanjaro	75,575
Lake Manyara	32,000
Mikumi	323,000
Ruaha	1,295,000
Rubondo	45,700
Serengeti	1,476,300
Tarangire	260,000
Subtotal	3,751,775
<i>Game Reserves</i>	
Biharamulo	130,000
Burigi	220,000
Ibanda	20,000
Kizigo	400,000
Maswa	220,000
Mkomazi	100,000
Mount Meru	30,000
Moyowosi	600,000
Rumanyika	80,000
Rungwa	900,000
Sadani	30,000
Selous	5,000,000
Ugalla	500,000
Umba	150,000
Uwanda	500,000
Subtotal	8,880,000
<i>Conservation Areas</i>	
Ngorongoro	828,800
<i>Forest Reserves</i>	
Kimboza	385
Magombero	1,500
Mazumbai Natural	300
Pugu	2,200
Usambara Mountains East and West	621,300
Subtotal	625,685
<i>Biosphere Reserves</i>	
Lake Manyara National Park	32,500
Serengeti NP & Ngorongoro CA	2,305,100
Subtotal	2,337,600
<i>World Heritage Sites</i>	
Ngorongoro Conservation Area	828,800
Selous Game Reserve	5,000,000
Serengeti National Park	1,476,300
Subtotal	7,305,100

Proposed areas

Mahale Mountain National Park	161,300
Uzungwa Forest National Park	100,000
Subtotal	261,300

ARUSHA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total

Date Established Established in 1960 as Ngurdoto Crater National Park. Combined with Momela Lakes and renamed as Arusha National Park in 1967. Enlarged in 1973.

Geographical Location On the south-east flank of Mount Meru, 32km by road east of Arusha. Approximately centred at 3°15'S, 36°55'E.

Altitude 1,525-4,565m (summit of Mount Meru)

Area 13,700ha; Mt Meru Game Reserve (30,000ha) constitutes a buffer zone.

Land Tenure Government

Physical Features The volcanic terrain contains the peak and shattered main crater of Mount Meru, the Ngurdoto Crater (the nucleus of the original park) with a swampy lake in the crater floor. In the north is the group of seven Momela lakes formed in subsidiary craters and by the blocking of the drainage lines (of the Ngarenanyuki River) caused by the eruptions. There are spectacular views of Mt Kilimanjaro and Mt Meru from the rim of Ngurdoto Crater.

Vegetation The park comprises mainly dense forest or thicket (excluding the areas in and around craters and the higher elevations of Mount Meru). Dominant tree species include: olive *Olea hochstetteri*, the soft wood *Nuxia congesta*, *Podocarpus gracilior*, and pencil cedar *Juniperus procera*. Small tree and shrub species include: the Masai tea-tree *Cassia didymobotrya*, *Vernonia subuligera* with large panicles of mauve flowers, and purple-flowered *Thunbergia alata*. Scattered stands of *Hagenia abyssinica* or dense belts of bamboo separate the mountain rain forest from the higher shrubland and moorland where *Erica*, *Helichrysum*, *Senecio*, and *Hypericum* species dominate. In open areas at lower levels the most widespread grasses are star grass *Cynodon dactylon* and bamboo grass *Pennisetum clandestinum*. Groves of *Acacia xanthophloea* in various successional stages occur along the existing and obsolete drainage of the Ngarenanyuki River.

Fauna Mammals include: eastern black and white colobus *Colobus guereza*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T) (seriously declining), hippopotamus *Hippopotamus amphibius*, giraffe *Giraffa camelopardalis*, eland *Taurotragus oryx*, and buffalo *Syncerus caffer*. The waterfowl of Momela lakes include greater flamingo *Phoenicopterus ruber*, lesser flamingo *Phoeniconaias minor* (although numbers have reportedly declined as has been observed throughout East Africa), sacred ibis *Threskiornis aethiopicus*, Maccoa duck *Oxyura maccoa*, and Egyptian goose *Alopochen aegyptiacus*. Forest birds include narine trogon *Apaloderma narina* and broadbill *Smithornis capensis*.

Conservation Management An electric fence was erected along part of the boundary, but this proved ineffective. Wardens visit schools and village elders in an attempt to stop poaching.

Zoning The crater constitutes a core zone with complete protection and the Mount Meru Game Reserve area now serves as a buffer zone.

Disturbances or Deficiencies There is heavy population pressure on all sides of the park, cattle trespass, and trees and other vegetation are illegally cut for building poles or fuel. Animals stray into cultivated areas. Poaching, particularly of elephant, buffalo and warthog, is mainly for meat but also for horns and tusks (reportedly by poachers from outside the area). Small game are regularly taken by poachers hunting with dogs. The black rhinoceros population in the park has been reduced by 10 percent and the elephant population almost so. Boundaries of the park encompass only a portion of the total ecosystem. There is a general lack of equipment for the maintenance of facilities, and no interpretative programme exists.

Visitor Facilities Road access is from Arusha. Facilities include special viewpoints and hides (although many of these are inoperable), a network of game viewing tracks and accommodation at Momela Game Lodge. Hotel accommodation is available nearby at Usa River and at Arusha less than an hour away. Access is prohibited to Ngurdoto Crater.

Scientific Research Botanical and zoological research has been carried out within the park, with studies concentrated on rhinoceros, giraffe, elephant, and flamingo. A very comprehensive survey of vegetational changes was completed by the late D. Vesey-FitzGerald, Tanzania National Parks scientific officer, shortly before his death in 1974.

Special Scientific Facilities None

Principal Reference Material

- ° It is hoped that funds will be made available to publish the vegetational survey of the park.
- ° Ecosystems Ltd (1980). Livestock, Wildlife and Land Use Survey. Arusha region, Tanzania. Vol. 1 (text), 103 pp. Vol. 2 (figs and tables), 187 pp.
- ° Ecosystems Ltd (1980). The status and utilization of wildlife in Arusha region, Tanzania. Final Report, 82 pp.
- ° Thorsell, J.W. (1982). Evaluating effective management in protected areas: an application to Arusha National Park, Tanzania. *World National Parks Congress*, Bali, Indonesia. 11-12 October 1982.
- ° Vesey-FitzGerald, D.F. (1974). The changing state of *Acacia xanthophloea* groves in Arusha National Park, Tanzania. *Biological Conservation* 6(1): 40-47.

Staff Park warden, senior park assistant, and a staff of 50 (1977).

Budget 1977, Tanzanian Shs.394,300 (approximately US\$47,880) excluding grants from external sources.

Local Park or Reserve Administration Tanzania National Parks Authority, PO Box 3134, Arusha.

Date 1985

GOMBE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established Gombe Stream Game Reserve established in 1943; given National Park status in 1968 by Government Notice 235.

Geographical Location Eastern shore of Lake Tanganyika; the southern boundary is about 10km north of Kigoma. 4°40'S, 29°35'E.

Altitude 750-1,500m

Area 5,200ha

Land Tenure Government

Physical Features It includes part of the escarpment dominating Lake Tanganyika on the east. A number of watercourses flow into the lake forming wide valleys.

Vegetation The lower slopes are covered by miombo woodland comprising mainly *Brachystegia* spp. There is thicker gallery forest bordering watercourses including the Gombe stream and along the crest of the scarp at cloud level, with oil palm *Elaeis guineensis* as an important constituent. Ridge tops are grass-covered probably maintained by fire.

Fauna The game reserve was established mainly to protect the chimpanzee *Pan troglodytes* (T). Other mammals include: baboon *Papio* sp., diademed monkey *Cercopithecus mitis*, red-tailed monkey *Cecopithecus ascanius* (seems to interbreed with diademed monkey), red colobus *Colobus badius*, leopard *Panthera pardus* (T), bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, and waterbuck *Kobus ellipsiprymnus*. The interesting birdlife includes five species of barbet, palm-nut vulture *Gypohierax angolensis*, and the very localised Forbes's plover *Charadrius tricollaris forbesi*.

Conservation Management A fire break has been constructed on the east side of the park.

Zoning None

Disturbances or Deficiencies Some illegal fishing occurs and there is further disturbance from wildfires (often started by fishermen smoke-drying their catch) and cutting of vegetation for fuel or construction of racks. The villages of Mwamgongo (north) and Kazinga (south) are close to the park boundary and a public road runs along the escarpment. Oil palms remain from cultivation of the area up to 1948. Fire is considered a serious problem, spreading every dry season from the higher cultivated land to the east.

Visitor Facilities Previously no tourism was permitted, due to a decision that was reinforced by the attack on the research centre from Zaire in May 1975. However, it has now been resumed. Local people support tourism because of increased trading. There are facilities in the research camp.

Scientific Research Some of the most intensive and long-term research ever undertaken on chimpanzees and other primates (in particular baboons and red colobus) was carried out in this area. The intensity of research was reduced after the attack on the research centre in 1975.

Special Scientific Facilities The Research Centre at Kasekela has accommodation, a laboratory and other facilities.

Principal Reference Material

- ° Clutton-Brock, T.H. and Gillett J.B. (1979). A survey of forest compilation in the Gombe National Park, Tanzania. *Afr. J. Ecol.* 17(3): 131-158.
- ° Goodall, J. (1971). *In the Shadow of Man*. Collins, London. Contains summaries of some of the chimpanzee studies.

Staff Warden and about 20 rangers mainly working on research (1980)

Budget 1977, Tanzanian Shs.41,860 (approximately US\$5,080)

Local Park or Reserve Administration Tanzania National Parks Authority, PO Box 3134, Arusha.

Date 1984

KATAVI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established The area was gazetted under German rule as a Controlled Area. Katavi Plain Game Reserve was established in 1951 and given National Park status in 1974 by Government Notice 1.

Geographical Location In Western Tanzania near the Zambian border; 6°40'-7°05'S, 30°50'-31°30'E

Altitude 900m

Area 225,300ha; contiguous to Mlele Game Controlled Area (300,00ha) and Nkamba Forest Reserve.

Land Tenure Government

Physical Features The park comprises a high altitude floodplain dominated by Lake Katavi in the north and Lake Chala in the southeast. The lakes are linked by the Katuma River and vast associated swamps which eventually drain into Lake Rukwa. The terrain is flat in the grasslands with black cotton pans (mbuga) and undulating in the north where soils are sandy. Mean annual rainfall is 1100mm falling mainly March to May.

Vegetation The park is situated in the great miombo woodlands with dominant species of *Brachystegia* and *Isoberlinia*. Some areas of short-grass floodplain and scattered stands of *Acacia* spp. occur particularly in the vicinity of Lake Chala (which is fringed with palms).

Fauna The mammals of the drier areas include lion *Panthera leo*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), zebra *Equus burchelli*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, sable and roan antelopes *Hippotragus niger* and *Hippotragus equinus* and topi *Damaliscus lunatus*. There are over 400 recorded bird species in the area. Fauna of the swamp area includes hippopotamus *Hippopotamus amphibius* (numerous), crocodile *Crocodylus niloticus* (V) and large numbers of waterfowl, particularly pelican.

Zoning None

Disturbances or Deficiencies The main problems are illegal hunting, fishing and destruction of trees or other vegetation, aggravated by wildfires during the dry season. Shortage of development funds is particularly serious as the park is in a somewhat remote and inaccessible area.

Visitor Facilities There is a restcamp for shelter but no equipment or facilities so visitors must be self-contained.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Senior park assistant and 12 park rangers (1977)

Budget 1977: Tanzanian Shs. 140,660 (approximately US\$17,000) excluding grants from external sources for the original buildings and other development expenditure

Local Park or Reserve Administration Tanzania National Parks Authority, PO Box 3134, Arusha.

Date 1984

KILIMANJARO NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Total. Access is restricted

Date Established Established as a Game Reserve in 1951. National Park status in 1973 by Government Notice 54.

Geographical Location On the Kenyan border, mainly the upper levels of Mount Kilimanjaro including corridors in the forest belt. 2°50'–3°10'S, 37°20'–37°40'E.

Altitude 1,830m (Marangu Gate) to 5,895m (summit of Kibo)

Area 75,575ha surrounded by a Forest Reserve

Land Tenure Government

Physical Features This volcanic massif has three volcanic peaks on an east-south-east axis which were active in the Pleistocene: Shira (oldest) on the west at 4,000m, the rugged peak of Mawenzi (next oldest) on the east at 5,149m, and Kibo (most recent and still showing minor fumarole activity) in the centre. Kibo, the highest, at 5,895m has an extensive, but slowly shrinking, ice cap and snow fields. Kilimanjaro is the highest mountain in Africa. There are two wet seasons: the short rains from November to December and long rains from March to May. Mean precipitation is 2300mm in the forest belt (1,830m), 1300mm at Mandara hut at the upper edge of the forest (2,740m), 525mm at Horombo hut in the moorland (3,718m), and less than 200mm at Kibo hut (4,630m), producing desert-like conditions. Diurnal temperature range is considerable.

Vegetation The park includes six corridors through the montane forest belt: Geraragua and Shira on the west, Marangu and Mashati on the east and Njara and Rongai on the north. The park, therefore, contains a large amount of montane rain forest whose components are complex and vary greatly with aspect. The wetter southern slopes are dominated by *Podocarpus* spp.

and camphorwood *Ocotea usambarensis* with *Myrica salicifolia* and *Agauria* sp., and an understory of ferns such as tree ferns *Cyathea* spp. and the long-spiked *Lobelia gibberoa*. The drier northern slopes are dominated by cedar *Juniperus procera* and olives *Olea* spp.. Above the forest, the lower and upper moorland zones differ considerably in their flora. Species include: giant groundsels, particularly *Senecio cottonii*, tree heath *Erica arborea*, *Philippia trimera*, *Lobelia deckenii* and 'everlastings' *Helichrysum* spp.. There is no bamboo zone. At 4,600m the plant cover is virtually zero. (See Tomlinson, 1985).

Fauna Mammals include: blue monkey *Cercopithecus mitis*, black and white colobus *Colobus polykomos abyssinicus*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T) (could be in the forested area, but probably now extinct in this area), bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, and Kilimanjaro tree hyrax *Dendrohyrax validus*. Difficult to sight and restricted to Kilimanjaro and some neighbouring mountains is Abbot's duiker *Cephalophus spadix*. The largest game concentration is on the border with Amboseli. The birds of the moorlands are few in species, but of great interest and include occasional lammergeier *Gypaetus barbatus* (mainly on the Shira ridge), hill chat *Cercomela sordida*, Hunter's cisticola *Cisticola hunteri*, and scarlet-tufted malachite sunbird *Nectarinia johnstoni*. The forest has several notable species including one starling of very restricted distribution, Abbot's starling *Cinnyricinclus femoralis*, and the butterfly *Papilio sjoestedti* (R), sometimes known as the Kilimanjaro swallowtail.

Conservation Management There have been discussions between the Wildlife and Forestry Departments to try to organise control of illegal felling in the area. There is a management plan for the mountain but it is out-of-date and does not include the forest reserve. Issuing of timber licences for the south-east area of the forest reserve has been stopped.

Zoning No zoning, but much of the area has 'strict nature reserve' or 'defence' status

Disturbances or Deficiencies Illegal hunting, honey gathering, illegal felling, fuel wood collection, grass burning and incursions by domestic livestock occur, particularly in the south-west. Both honey gathering and grass burning result in outbreaks of uncontrolled fires every year, particularly during the dry season. The forest buffer zone is being maintained in six corridors within the park, but elsewhere it is being felled and replaced with commercial plantations (camphor and *Acrocarpus*) or maize crops.

Visitor Facilities Approximately 67,000 people visit annually. Tourism is restricted mainly to the organized 4-5 night climb to Kibo via the authorised Marangu route which stops at Mandara, Horombo and Kibo huts. Food, bedding and porters are provided. The starting point at Marangu has hotel and hostel accommodation and is 48km from Moshi and 90km from Kilimanjaro International Airport. Visitors are allowed to climb to 4,000m without a guide. Permission is necessary for using the other routes and obtained from the Chief Warden. There is a rescue force of 12 with a leader trained in Europe. Advisors from Europe have also visited to train local officers.

Scientific Research Past scientific work included comprehensive vegetation surveys and some fauna studies. Masters Thesis by B.C. Mwasaga in 1982-1983 from the University of Dar-es-Salaam.

Special Scientific Facilities None but the College of African Wildlife Management at Mweka is situated near the park.

Principal Reference Material

- ° Morris, B. (1970). The zonal vegetation of Kilimanjaro. *African Wildlife* 24 pp.
- ° *Tanzania Notes and Records* No. 64. Special Kilimanjaro, issue March 1965. Obtainable from the Hon. Secretary/Treasurer, The Tanzania Society, PO Box 511, Dar-es-Salaam.
- ° Tomlinson, R. (1985). Observations on the Giant Groundsels of Upper Kilimanjaro. *Biol. Conservation* 31: 303-316.

Staff Senior park warden, park warden, building inspector, and a staff of 80 (1977).

Budget 1977: Tanzanian Shs.598,000 (approximately US\$72,610) excluding grants from external sources. Kilimanjaro was reported in 1984 to be the only park in Tanzania which was self-sufficient.

Local Park or Reserve Administration Park headquarters are at Marangu. Tanzania National Parks Authority, PO Box 3134, Arusha.

Date 1984

LAKE MANYARA NATIONAL PARK

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total. To the north and northeast of the park is the Mto wa Mbu Game Controlled Area, where licenced hunting is permitted. Southwest and contiguous to the park is the Marang Forest Reserve, in which no development is allowed.

Date Established Given National Park status in 1960, having been a Game Reserve since 1957, and before then a Game Controlled Area. Declared a Biosphere Reserve in 1981.

Geographical Location In Arusha Region, 117km southwest of Arusha. 3°30'S, 35°60'E.

Altitude 960-1478m

Area 32,500ha, of which approximately one third is land, the remainder being part of Lake Manyara. The land area includes about 550ha added to the southern end in 1974.

Land Tenure Government

Physical Features The majority of the land area of the park is a narrow strip running between the Gregory Rift wall to the west and Lake Manyara, an alkaline or soda-lake, to the east. Most of the rift wall and in some places the edge of the plateau at its top are included in the park. The escarpment's face is dissected by spectacular gorges from which rivers, some flowing year round, feed into the lake, which is part of a closed drainage system. Porous volcanic rock occurs in the north, where perennial spring-fed rivers emerge from the escarpment base. The south is characterized by non-porous ancient crystalline rock. There are hot springs in the south where the rift wall comes close to the lake edge. Parts of the rift wall are gently sloping and covered in a network of animal trails, while elsewhere the face of the scarp is steep and rugged. Mean annual rainfall is 650mm, varying along the north-south axis of the park and occurring in two seasons, November-December and February-April. Rainfall variation results in marked changes in the level of the lake, which can be reduced to nearly nothing. Mean annual temperature is 22°C.

Vegetation A complex mosaic of habitat types varies with topography. Below the rift wall, perennial springs in the north support a ground water forest, characterized by *Trichelia roka*, *Croton macrostachyus*, a fig *Ficus sycamorus*, and *Tabernaemontana usambarensis*, and edaphic grasslands of *Cynodon dactylon*. The tree species reappear in riverine habitats. At the edges of the ground water forest, yellow fever trees *Acacia xanthophloea* and the palm *Phoenix reclinata* form dense stands. A dense swamp of *Typha angustifolia* has reappeared at the northwest corner of the lake after being absent for many years. The central area of the park contains woodland of *A. tortilis*, *A. sieberiana*, and *Balanites aegyptiaca*. To the south, *Capparis tomentosa*, the sausage tree *Kigelia africana*, and perennial grasses are found. Along the

western lake shore are alkaline grasslands characterized by *Sporobolus spicatus*. The escarpment face is characterized by perennial herb *Ruellia megachlamys* and is distinguished by baobab trees *Adansonia digitata*. Unlike the remainder of the park, the area above the rift wall on the plateau is subject to fires, restrained from moving east by the prevailing southeasterly wind. Here, fire-resistant grasses such as *Themeda triandra* are characteristic. To the south on the plateau, the Marang Forest Reserve is a montane forest resembling the Ngorongoro Crater rim forest to the north; the Marang Forest vegetation is not known to have been studied.

Fauna Manyara has what is possibly the greatest biomass density (weight per area) of mammals in the world. Elephant *Loxodonta africana* (T) (density 6/km) and buffalo *Syncerus caffer* (density 18/km) comprise the bulk of the biomass. Among visitors the park is well known for its lions *Panthera leo* which rest through the day several metres up in the branches of large trees (a habit which could be considered adaptive given the density of the above two species). Black rhinoceros *Diceros bicornis* (T) are still present, although no longer in the great numbers for which Manyara was known by hunters. Other significant species are hippopotamus *Hippopotamus amphibius*, impala *Aepyceros melampus*, giraffe *Giraffa camelopardalis*, and zebra *Equus burchelli*. Among other species are wildebeest *Connochaetes taurinus*, bushbuck *Tragelaphus scriptus*, leopard *Panthera pardus* (T), and baboon *Papio anubis*. In the dry season, large herds of wildebeest and other plains game from the Mto wa Mbu Game Controlled Area enter the park for short periods from the north. Manyara also has exceptional numbers of birds, in terms of both species (seen as of 1984) and populations. Spectacular flocks of water fowl are often present, sometimes breeding. Lesser flamingo *Phoenicopterus minor* can occur in thousands or millions and greater flamingo *P. ruber* in smaller numbers. White pelicans *Pelecanus onocrotalus*, yellow-billed storks *Ibis ibis*, and white-necked cormorants *Phalacrocorax carbo* are common. At least 44 species of diurnal birds of prey occur, including palm-nut vulture *Gypohierax angolensis* and Ayre's hawk eagle *Hieraaetus dubius*. Chestnut-banded sand plovers *Charadrius venustus*, common in the past, are now rarely sighted. The many reptiles include Nile monitor lizard *Varanus niloticus*, often seen near rivers, and several species of cobra.

Population No information

Conservation Management No formal management plan exists, although draft versions have been made by several park wardens. A good relationship between park management and local inhabitants, including a network of informers, helps to keep poaching to a minimum; this is also aided by a high density of ranger patrols. Several techniques have been used to control the movement of animals from the park into contiguous agricultural land: an electric fence was in use along the northern boundary for several years in the 1960's, as was a heavy cable fence along the original southern boundary. Neither is now functional. Crop-raiding elephants and other species and cattle-killing lions are very occasionally shot by the authorities. Since 1970 plans have existed to increase the size of the park, for which approval was given in 1978. WWF/IUCN Project 1935 in 1980 gave funds towards the extension of the park to the south (for development of ranger posts, etc.). The Marang Forest Reserve (20,000ha), in the southwest, is now effectively part of the park. On a smaller scale, galvanized wire mesh wrapped around the trunk of the tree has been used with great effect to prevent elephants from debarking and thus hastening the death of mature *Acacia tortilis*, favored resting places for lions.

Zoning None

Disturbances or Deficiencies The park is too small to be viable. Current boundaries exclude substantial parts of the normal daily range of many of the large mammals, with profound consequences for both the park and those living nearby; elephants are chronic invaders of land are sometimes fatally speared in cultivated land bordering the park, which forms a buffer zone by definition only. Repeated major epidemics (1959: rinderpest-20% mortality buffalo; 1977: (unidentified)-15% mortality elephant; 1984: anthrax-90% mortality impala (same likely in 1965)) since the park was established demonstrate the critical need for allowing some movement of animals between Manyara and other reserves. The proposed extension of the park to the west (the plateau above the scarp) and to the south, and the proposed corridors

from the northeast and southeast to Tarangire National Park would solve several problems at once, by including land regularly used by the resident population, incorporating higher rainfall areas that serve as critical refuges in times of drought, and by allowing for genetic flow. These new boundary lines have been mapped and plans exist for the administration of the enlarged areas and concomitant changes in current practice; for example, once the park is expanded ranger posts which are now only at the base of the escarpment can be shifted to the western boundary on the plateau, a far more effective location from which to patrol and to police the border. While the Marang Forest Reserve can be incorporated into the park easily as an exchange between government bodies, expanding the park to the south and west requires compensating and resettling displaced farmers. Funds are required for this. The park's vegetation and thus its fauna exist as they do in very large part because of rainfall outside the park to the west. Those drainage systems and catchment areas must be safeguarded for the sake of both the park and its agricultural and pastoral neighbours. Steadily increasing sand deposits from rivers is a sign of erosion outside the park. Integration of park and local planning is necessary if either is to succeed and to avoid the repetition of cases such as the ILO rice cultivation and irrigation project in the north that took place with no ecological impact study or liaison with the national park. In part due to the irrigation project, and for an array of other reasons, the human population around the park is steadily increasing. The electric fence in the north could be replaced by an effective low maintenance modern version. Illegal fishing in the park's waters is a problem, in part because poachers may use boats to gain access.

Visitor Facilities Thanks to both its intrinsic appeal and its convenient location close to Arusha on the route to Ngorongoro Crater and Serengeti National Park, Manyara has many visitors (28,000 pa). Accommodation varies from a hotel (100 beds) sited at the edge of the plateau above the rift wall to several campsites near the main gate at the north end of the park. One of the campsites consists of small and simple self-contained cottages or bandas. A hostel at park headquarters is suitable for school parties. There is an airstrip outside the park near the hotel. A small museum is at the main gate. A good all-weather track runs the length of the park; several secondary tracks loop off the main route. Manyara has traditionally been accessed as a cul de sac from the north; the southern gate has recently been opened to encourage movement to and from Tarangire National Park in the southeast.

Scientific Research The vegetation has been catalogued, described, and mapped by several researchers. A longitudinal ongoing study of the elephants began in 1966. The behavior and ecology of the buffalo was investigated from 1981-1985. (See references below).

Special Scientific Facilities Housing for scientists may be found outside the park in the village of Mto wa Mbu and at the bandas. A very small research camp in the centre of the park, built and primarily used by the elephant research project, is under the administration of the Serengeti Wildlife Research Institute. A herbarium of the park is kept at the research camp. Scientists working at Manyara are affiliated with the Seronera Research Centre of the S.W.R.I.

Principal Reference Material

- ° Arens, W. (1972). On the Frontier of Change: Mto wa Mbu, Tanzania.
- ° Douglas-Hamilton, I. (1972). On the ecology and behaviour of the African elephant. D.Phil. thesis, University of Oxford, Oxford.
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Staff Senior park warden, one or two support wardens, administrator/accountant, and park assistant; total staff of 66 (1984).

Budget 1984, 2,603,000 Tanzania shillings (projected).

Local Park or Reserve Administration Lake Manyara National Park, P.O. Box 12, Mto wa Mbu.

Date 1986

MIKUMI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established 1964; extended to connect with Selous Game Reserve in 1975

Geographical Location Eastern Tanzania, north of the main road between Morogoro and Iringa and 280km by road from Dar-es-Salaam. 7°00'-7°50'S, 37°00'-37°30'E.

Altitude 550-1,257m

Area 323,000ha; contiguous to Selous Game Reserve (5,000,000ha)

Land Tenure Government

Physical Features The park comprises two major ecological units, the grassland and wooded savanna of the extensive Mkata River floodplain with hardpan ridges and black cotton soilpans with upland seasonal swamplands (mbuga), and hilly country to the east, west and south covered with miombo vegetation. Rainfall varies with means of 500mm at park headquarters, 625mm at Chamgore waterhole (25km to the north) and over 1,000mm on the highest hills. The wet season extends from November to May, March and April being the wettest months.

Vegetation The miombo woodland is dominated by *Brachystegia* spp.. *Combretum-Terminalia* woodland is common between hill and floodplain. There are scattered thorn *Acacia* spp, baobab *Adansonia digitata*, and mgude (yellow barked) *Sterculia appendiculata* trees on the floodplain and tall gallery forest and dense riverine thicket along the Mgoda, Kikobogo, and Mkata watercourses. Species include: ebony *Dalbergia melanoxylon*, *Sclerocarya caffra*, *Cassia abbreviata*, *Borassus flabellifer* and *Hyphaene ventricosa* palms. *Balanites aegyptiaca* and *Ficus* spp. are common and important for elephant and baboon.

Fauna Mammals include: yellow baboon *Papio cynocephalus*, vervet monkey *Cercopithecus aethiops*, Sykes' monkey *Cecopithecus mitis*, eastern black-and-white colobus *Colobus guereza*, serval *Felis serval*, wild dog *Lycaon pictus* (T), ratel *Mellivora capensis*, leopard *Panthera pardus* (T), lion *Panthera leo*, elephant *Loxodonta africana* (T), rhinoceros *Diceros bicornis* (T), giraffe *Giraffa camelopardalis*, zebra *Equus burchelli*, hippopotamus *Hippopotamus amphibius*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, waterbuck *Kobus ellipsiprymnus*, Bohar reedbuck *Redunca redunca*, sable antelope *Hippotragus niger*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, wildebeest *Connochaetes taurinus*, and impala *Aepyceros melampus*. The bird life is transitional between north and south and is therefore, very varied and about 360 species have been recorded. It includes typically southern species such as Dickinson's kestrel *Falco dickinsoni*, Bateleur eagle *Terathopius ecaudatus* and Boehm's bee-eater *Merops boehmi*, and northern species such as superb starling *Spreo superbus* and straw-tailed whydah *Vidua fischeri*. Other recorded species include: crowned lapwing *Vanellus coronatus*, flappet lark *Mirafraga rufocinnamomea*, southern ground hornbill *Bucorvus* sp., and malachite kingfisher *Alcedo cristata*.

Zoning No zoning has yet been implemented, but there are three distinct types: an area developed for tourism; 'defence zones' needing periodic special protection; and inaccessible areas.

Disturbances or Deficiencies There are low levels of poaching and grazing as this area is fairly inaccessible and the hills are not suitable for grazing. These are not serious and could be easily controlled. The recently rebuilt main Tanzania-Zambia highway bisects the park and will increase ease of access and probably result in some road casualties from animals crossing it.

Visitor Facilities The park is popular being easily accessible from Dar-es-Salaam. Well-equipped tented camp and luxury lodge accommodation is available at Mikumi wildlife lodge and there is an airstrip but this is not for general or tourist use. The southern extension of the park is not yet open to visitors (1976) and it is hoped eventually to establish a second camp for visitors travelling from the capital by rail.

Scientific Research Detailed studies of the yellow baboon (to complement studies at Gombe) have been undertaken in the park by the University of California, Riverside USA .

Special Scientific Facilities The small research station at park headquarters has fallen into disuse, but facilities are available at the University of California's Research Station.

Principal Reference Material

° Mercer, G. (1983). Mikumi National Park. *SWARA* 6(2). East African Wildlife Society.

Staff Chief park warden, one senior and two junior park wardens with support staff of 60 (1977)

Budget 1977: Tanzanian Shs.872,800 (approximately US\$105,980)

Local Park or Reserve Administration Mikumi National Park, P.O. Box 62, Mikumi.

Date 1984

RUAHA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established Originally part of Saba River Game Reserve established in 1910 and then part of Rungwa Game Reserve gazetted in 1946. Ruaha was excised to form the National Park in 1964, although boundaries were changed again in 1973.

Geographical Location West of Iringa in the Southern Highlands. 6°54'–7°57'S, 33°50'–35°24'E.

Altitude 750m (Great Ruaha River valley) – 1,830m (Ikungu)

Area 1,295,000ha; contiguous to Rungwa Game Reserve (900,000ha) and Kizigo Game Reserve (400,000ha)

Land Tenure Government

Physical Features The central spine of the park is the watershed between the Nzombe and Ruaha rivers, the only perennial rivers within the park. The valley of the Great Ruaha River is thought to be an extension of the Great Rift Valley and the Ruaha flows for 160km along the entire eastern boundary through rugged gorges and open plains. Beyond the river and swamps, lies a well-wooded undulating plateau at 1,000m rising to the peaks of Datambulwa (1,700m) in the south, and Ikingu (1,830m) in the west. Much of the rock is metamorphic, particularly gneiss and schist. Several hills comprise precambrian granitic rock. Rainfall varies from a mean of 520mm at Msembe in the valley to over 800mm above the escarpment in the miombo woodland zone. Rainfall is mainly from December to April.

Vegetation The vegetation represents a wide range of physiognomic types from treeless grasslands and swamps to evergreen forests. Typical vegetation of the valleys comprises tall stands of *Acacia* spp., *Ficus* spp., and the tamarind *Tamarindus indica*, clumps of palms and patches of open 'black cotton soil' grassland. Beyond and to the north, the undulating terrain is dominated by baobab *Adansonia digitata* scattered throughout scrubby *Combretum* and *Commiphora* woodland with occasional flat-topped *Acacia tortilis*. This area is bounded by an escarpment, above which *Brachystegia* and other typical miombo species extend over most of the remaining park area. There are also areas of grassland, thornbush and rocky hills with patches of forest. In the far west is an area of evergreen upland/submontane forest dominated

by *Drypetes gerrardii* with *Olea africana*, *Garcinia huillensis*, *Manilkara discolor* and *Cassipourea malosana* as emergent co-dominants. At least 1,512 species of vascular plant have been identified from the park.

Fauna Mammals include: lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), elephant *Loxodonta africana* (T), and a wide variety of ungulates such as zebra *Equus burchelli*, black rhinoceros *Diceros bicornis* (T), greater kudu *Tragelaphus strepsiceros*, lesser kudu *Tragelaphus imberbis* (for which the park is especially noted), bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, Grant's gazelle *Gazella granti* (at the southern limit of its distribution) and Bohar reedbuck *Redunca redunca*. In the *Brachystegia* woodland are roan and sable antelope *Hippotragus equinus* and *Hippotragus niger* and Lichtenstein's hartebeest *Alcelaphus lichtensteini*. Over 370 bird species have been recorded, including the migrant falcon *Falco eleanorae* (observed in few other East African sites) on its way to Madagascar, Pel's fishing owl *Scotopelia peli* in the densely wooded reaches of the Ruaha river, Dickinson's kestrel *Falco dickinsoni*, violet crested turacao *Tauraco porphyreolophus*, pale-billed hornbill *Tockus pallidirostris*, and racquet-tailed roller *Coracias spatulata* in the *Brachystegia* woodland. The crocodile *Crocodylus niloticus* (V) still occurs in the rivers.

Zoning A *de facto* zoning system exists as the only area accessible to visitors is by the network of tracks leading from the headquarters at Msembe along the Ruaha, Mdonya and Mwagusi Sand River valleys. The rest of the park is in effect strict nature reserve as no roads have been built.

Disturbances or Deficiencies Heavy poaching, especially of rhinoceros, occurs due to lack of roads for use by patrols and there is illegal fishing. Bushfires started by poachers or honey-gatherers burn about 50% of the park each year and are a serious problem for regeneration, particularly of riverine forest. The high density of elephants results in serious damage of baobab and *Acacia albida*.

Visitor Facilities A hutted camp has been established at Msembe near the ferry on the Ruaha river. There is also a luxurious lodge 'Foxcamp', which has been built on a kopje 50km upstream from Msembe, some authorised camp sites and two airstrips.

Scientific Research Research mainly concerns vegetational changes, elephant and baboon. Aerial counts have been made of the large mammals.

Special Scientific Facilities A small herbarium was set up by P.J. Greenway.

Principal Reference Material

- ° Barnes, R.F.W. (1983). The elephant problem in Ruaha National Park, Tanzania. *Biol. Conserv.* 26: 127-148. Includes a discussion of elephant management options.
- ° Bjornstad, A. (1976). The vegetation of Ruaha National Park, Tanzania Annotated check-list of the plant species. SRI Publication No. 215.
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- ° Norton-Griffiths, M. (1975). The number and distribution of large mammals in Ruaha National Park, Tanzania. *East Afr. Wild. J.* 13(2): 121-140.

Staff Senior park warden, two park wardens and staff of 54 (1977)

Budget 1977, Tanzanian Shs.687,200 (approximately US\$83,440)

Local Park or Reserve Administration Tanzania National Parks Authority, PO Box 3134, Arusha.

Date 1984

RUBONDO NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.27.14 (Lake Ukerewe)

Legal Protection Total

Date Established Established as a Forest Reserve under German rule; Game Reserve status in 1966; National Park status in 1977

Geographical Location An island in south-west Lake Victoria (Lake Ukerewe), 67km from Geita. 2°25'S, 31°50'E.

Altitude Approximately 1,130m

Area 45,700ha

Land Tenure Government

Physical Features The island comprises two main areas of hills, rising from the lake, joined by a flat narrow isthmus.

Vegetation Some 90% of the island comprises moist evergreen forest. The remaining area is woodland and wooded grassland on steeper, exposed slopes. Patches of open grassland on flat shores have fringes of papyrus.

Fauna The park has a varied fauna, mainly introduced. Indigenous species include: bushbuck *Tragelaphus scriptus*, sitatunga *Tragelaphus spekei*, hippopotamus *Hippopotamus amphibius*, vervet monkey *Cercopithecus aethiops*, marsh mongoose *Atilax paludinosus*, and species of crocodile and python. Introduced species include: chimpanzee *Pan troglodytes* (T), elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T), giraffe *Giraffa camelopardalis*, roan antelope *Hippotragus equinus*, suni *Neotragus moschatus*, and black and white colobus *Colobus polykomos*.

Conservation Management Intention to provide a safe refuge for threatened forest species. There are no large predators.

Zoning None

Disturbances or Deficiencies Some poaching and wood cutting occurs with access by canoes. There are no settlements on the island.

Visitor Facilities The recreational potential is high. Unlike many other areas, there is the possibility of walking safaris, boat trips and bird-watching from hides. It was originally intended as a tourist attraction, but as yet, there have been few visitors due to the remote location. Tourist accommodation is available in bandas.

Scientific Research Introduction of threatened species to the island was financed by the Frankfurt Zoological Society. There is a general ecological monitoring programme carried out by Dr Markus Borner.

Special Scientific Facilities None

Principal Reference Material

° Rodgers, W.A., Ludanga, R. and De Suzo, H.P. (1976). Biharamulo, Birigi and Rubondo Island Game Reserves. *Tanzania Notes and Records* 81 and 82: 99-123.

Staff Warden and 12 rangers

Budget No information

Local Park or Reserve Administration Tanzania National Parks Authority, PO Box 3134, Arusha.

Date 1984

SERENGETI NATIONAL PARK

Management Category II and IX (National Park and Biosphere Reserve)

World Heritage Site (Criteria: ii, iii, iv)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established Protected area since 1940. In 1929, 228,600ha of central Serengeti was declared a Game Reserve. National Park status in 1951 with extensive boundary modifications in 1959. Included with the adjoining Maswa Game Reserve as part of the Serengeti-Ngorongoro Biosphere Reserve in 1981. Accepted as part of a World Heritage Site in 1981.

Geographical Location West of Great Rift Valley, 130km west-north-west of Arusha. A corridor extends westwards to within 8km of Lake Victoria and a northern sector extending to the Kenya border. In the Mara, Arusha, and Shinyanga Regions. 1°30'-3°20'S, 34°00'-35°15'E.

Altitude 920-1,850m

Area The Biosphere Reserve covers 2,305,100ha and includes the Serengeti National Park (1,476,300ha); contiguous to the Ngorongoro Conservation Area (828,800ha) in the east, Maswa Game Reserve (220,000ha; recently reduced) in the south, Maasai-Mara National Reserve (167,200ha) in Kenya to the north, and Ikorongo Game Controlled Area on the west.

Land Tenure Government

Physical Features The plains of Serengeti are mainly crystalline rocks overlain by volcanic ash with numerous granitic rock outcrops (kopjes). In the north and along the western corridor are mountain ranges of mainly volcanic origin. Two rivers flowing west usually contain water and there are a number of lakes, marshes, and waterholes. Rainfall is mainly restricted to November-May with peaks in December and March/April. Mean annual temperature 20.8°C and mean annual precipitation 1210mm recorded at 1,150m.

Vegetation The undulating open grassland plains are the major type of vegetation, but become almost desert during periods of severe drought. Dominant species are couch grass *Digitaria macroblephara* and *Sporobolus marginatus* (an indicator of saline soils). In wetter areas, sedges such as *Kyllinga* spp. take over. There is an extensive block of acacia woodland savanna in the centre, a more hilly and densely wooded zone covering most of the northern arm of the park, and some gallery forest. Lowland woodlands comprise *Commiphora*, *Acacia drepanolobium*, and *Acacia gerrardii*. Upland woodlands comprise *Acacia lahai* and *Acacia seyal*.

Fauna The park is best known for the now unrivalled herd sizes of 'plains game', which migrate between seasonal water supplies. These include wildebeest *Connochaetes taurinus*

(about 1.3 million), zebra *Equus burchelli*, Thomson's gazelle *Gazella thomsoni*, numerous prides of lion *Panthera leo*, and spotted hyena *Crocuta crocuta*. In May and June many game animals take part in a mass migration away from the central plains into the western corridor. Other characteristic mammals are hunting dog *Lycaon pictus* (T), leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T), hippopotamus *Hippopotamus amphibius*, giraffe *Giraffa camelopardalis*, buffalo *Syncerus caffer*, topi *Damaliscus lunatus*, waterbuck *Kobus ellipsiprymnus*, eland *Taurotragus oryx*, sitatunga *Tragelaphus spekei*, bushbuck *Tragelaphus scriptus*, oryx *Oryx gazella*, reedbuck *Redunca redunca*, mountain reedbuck *Redunca fulvorufula*, numerous species of rodents and bats, golden jackal *Canis aureus*, side striped jackal *Canis adustus*, Grant's gazelle *Gazella granti*, seven species of mongoose, two species of otter, warthog *Phacochoerus aethiopicus*, and seven species of primate. Smaller predators include bat-eared fox *Otocyon megalotis* and ratel *Mellivora capensis*. Over 350 recorded bird species include 34 species of raptors, six vultures, kori bustard *Choriotis kori*, ostrich *Struthio camelus* and lesser flamingo *Phoeniconaias minor*, and several with a comparatively restricted distribution such as rufous-tailed weaver *Hirundo ruficauda*.

Conservation Management The management plan is under review, since the area was accepted as a World Heritage Site. The park administration works with the village authorities to resettle encroachers and re-mark the boundary. Grumeti Game Controlled Area has been incorporated in the park as greater control of the area was thought to be necessary. IUCN is coordinating an ambitious conservation and development programme in the Serengeti region in collaboration with NORAD. The overall aim of the programme and the most appropriate management for the whole area is to ensure that while the Serengeti remains as a wild ecosystem, local communities can benefit from appropriate development activities.

Zoning Three zones are proposed: strict nature reserve, tourist (or recreational) and defence. There are four administrative sub-divisions (anti-poaching zone): western, northern, Lobo, and Seronera lodges. Two tourist areas have been designated around Lobo and Seronera. Vehicles are not allowed off the tracks in a 16km radius from Seronera. Maswa Game Reserve forms an important buffer zone between the park and the populated region of Sukumaland.

Disturbances or Deficiencies Poaching in the southern, northern and western corridors seems to be increasing, while anti-poaching activities (and morale) are hampered by lack of fuel and equipment. At one time the Serengeti was not within the elephants' range, but cultivation and settlement outside the park resulted in change in distribution. This resulted at one time in a number of problems. The combination of elephant, uncontrolled fires, and subsequent browsing and stunting of regrowth by giraffe has caused a decline in woodlands. There has also been some tree cutting in small areas on the west and north-west boundaries. Boundary markers (piles of stones) have been removed and cultivation begun.

Visitor Facilities Tourist facilities include lodges at Seronera and Lobo and four campsites near Seronera. Six access routes exist, but usually access is by road from the Ngorongoro Conservation Area. There are several airstrips and an aerodrome at Seronera. In 1983, after several years of isolation due to the closed border with Kenya, Serengeti recorded its lowest number of visitors (18,602) since the 1950s. The reopening of the Tanzania-Kenya border in December 1983 has already resulted in increased visitor numbers. If tourism increases further, a lodge may be built in the western Kirawira area.

Scientific Research The park has been the centre for major research for the past 20 years, including studies in human and animal ecology, soils, vegetation, herbivores, predators, parasites, elephant damage, effects of burning and management problems and natural resource assessment. Present studies include continuation of long term studies of the behavioural ecology of lion, cheetah, dwarf mongoose and hyrax. An integrated research and management study of the effect of fire is in progress, as are studies of grazing ungulate behavioural ecology and banded mongoose behaviour.

Special Scientific Facilities The Seronera Research Centre (formerly known as the Serengeti Research Institute) has well-equipped laboratories, a library, herbarium and accommodation for visiting scientists. Although not fully utilised while the Kenya-Tanzania was closed, the Centre is now fully utilised.

Principal Reference Material

Over 300 papers have been published by Centre/SRI research workers and others in scientific journals, and several popular books are also available.

- ° Caro, T.M. (1970). Map of the Serengeti National Park and surrounding area. ARUSHA: SRI and Hunting Technical Services.
- ° Grzimek, B. (1960). *Serengeti shall not die*. Hamish Hamilton, London.
- ° Herlocker, D.J. (1976). Woody vegetation of the Serengeti National Park. College Station, Texas A & M University.
- ° IUCN/WWF Project 1931. Tanzania, Anti-poaching equipment for National Parks.
- ° Jager, T. (1979). Soil of the Serengeti Woodlands, *Tanzania Agricultural Research Report* 912: 1-239. PUDDOC, Wageningen.
- ° Kruuk, H. (1969). Interaction between populations of spotted hyena *Crocuta crocuta* and their prey species. In: Watson, A. (Ed.) *Animal populations in relation to their food resources*. Oxford.
- ° Kruuk, H. (1972). *The spotted hyaena*. University of Chicago Press, Chicago.
- ° Makacha, S., Msingwa, M.J. and Frame, G.W. (1982). Threats to the Serengeti herds. *Oryx* 16(5): 437-444.
- ° Pearsall, W. (1957). Report on an ecological survey of the Serengeti National Park, Tanganyika. Fauna Preservation Society, London.
- ° Schaller, G.B. (1972). *The Serengeti Lion*. University of Chicago Press, Chicago and London.
- ° Schmidt, D. (1982). *The Birds of the Serengeti National Park, Tanzania*. BOU Check-list No. 5, SRI Publication No. 225. British Ornithologists' Union, London.
- ° Sinclair, A.R.E. (1977). *The African buffalo: a study of resource limitation of populations*. University of Chicago Press, Chicago.
- ° Sinclair, A.R.E. and Norton-Griffiths, M. (1980). *Serengeti: Dynamics of an Ecosystem*. University of Chicago Press, Chicago. 389 pp.
- ° Wit, H.A. de (1977). Soil map of the Serengeti Plain. Appendix "Soils and grassland types of the Serengeti Plain (Tanzania)". Thesis, Landbouwhogeschool, Wageningen 1978.

Staff A staff of over 180 includes 35 in administration (many of whom trained at the College of African Wildlife Management at Mweka and/or the University of Dar es Salaam), 80 anti-poaching staff, one chief park warden and five park wardens.

Budget 1977: Tanzanian Shs.2,752,100 (approximately equivalent to US\$334,000) including grants from external sources. No recent information.

Local Park or Reserve Administration Tanzania National Parks Authority, PO Box 3134, Arusha.

Date 1985

TARANGIRE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established 1970 as a national park. Prior to that the area was a game reserve, gazetted in 1957.

Geographical Location East of the Arusha-Dodoma road, 114km from Arusha and about 20km south-east of Lake Manyara. 3°50'S, 36°00'E.

Altitude 1,100-1,500m

Area 260,000ha; surrounded by Lolkisale, Simanjaro and Mkungunero Game Controlled Areas

Land Tenure Government

Physical Features The arid undulating country has some rocky outcrops and high ground in the south-east. It is deeply incised by the Tarangire river which bisects the park from south to north, but shrinks to a series of deep pools at the height of the dry season (from July to October). There is a watercourse along the western boundary. Swamps form during the rains, which fall sporadically from November to May with a peak in March. Mean annual precipitation is 750mm. Mean maximum temperature is 27°C and minimum temperature 16°C. The extreme minimum is 4°C in July and highest maximum 40°C in January. Humidity in October falls to 35%, indicating very dry conditions.

Vegetation Nine distinct plant associations have been identified, of which the *Acacia tortilis* parkland appears the most attractive to both fauna and visitors. Other zones are riverine grassland, *Acacia-Commiphora* woodland, *Combretum-Dalbergia* woodland, sparse gallery forest and woodland along drainage lines, whistling-thorn *Acacia drepanolobium*, black cotton soil pans with a thin grass cover. *Euphorbia* spp. and succulents are found in the deeper gullies and on rocky ridges. Baobab trees *Adansonia digitata* commonly occur in association with several of these communities.

Fauna Mammals include most of the East African 'plains' species such as: lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), elephant *Loxodonta africana* (T), zebra *Equus burchelli*, lesser kudu *Tragelaphus imberbis*, eland *Taurotragus oryx*, and buffalo *Syncerus caffer*. Impala *Aepyceros melampus* are particularly common. The avifauna (like the more arid vegetation) constitutes an extension of north-east African conditions, so that species such as rosy-patched shrike *Tchagra cruenta* and golden-breasted starling *Cosmopsarus regius* occur here near the south-west extremity of their range.

Conservation Management A proposal has been put forward by the Frankfurt Zoological Society (FZS) that a multiple land use authority should be created in the Lolkisale-Simanjiro ecological unit, modelled on the Ngorongoro Conservation Area Authority. They also support proposals by Tanzania National Parks for corridors between Tarangire and the south, and northeast to Lake Manyara.

Zoning None

Disturbances or Deficiencies Due to an increase in the human population in the Mto wa Mbu area, and large farm/ranch schemes in the north and east, animal migration routes are being cut off and Tarangire is in danger of becoming an isolated island park. It is in fact a major dry season concentration area in north-east Masailand for many large mammal species. During the rains, large numbers of wildebeest, zebra, eland and elephant move out of the park to the shortgrass plains and adjacent thorn bush areas to the north and east. These areas comprise the Lolkisale and Simanjaro Game Controlled Areas and are essential to the well-being of Tarangire, but have little conservation status. The area has long been shared with Maasai pastoralists, but large and small scale cultivation (including much commercial seed bean farming long established northeast of the park) is rapidly encroaching. An illustration of this problem occurred in 1982 with the granting of a lease of 350,000 acres for farmland along the park's eastern boundary. The lease specified that animals could be shot. It was revoked after public outcry and amidst much controversy in 1983. Bushfires are another problem, often started by honey-hunters or poachers. Poaching is mainly for horn and ivory. Black

rhinoceros have been decimated and survival of the remaining few is doubtful. Availability of water for tourist use is another problem, with water only available from boreholes.

Visitor Facilities Tourism development is limited. Visitors are mainly from Arusha. There is a lodge (which is currently being renovated), campsites and two airstrips (1km from the lodge and near park headquarters). Rock paintings around 50km south of the park entrance are a tourist attraction.

Scientific Research The park was the site for one of the earliest studies entailing the development of accurate animal censuses. Recent research has been carried out on giraffe.

Special Scientific Facilities None

Principal Reference Material

- ° Borner, M. (1982). Recommendations for a multiple land use authority adjacent to Tarangire National Park, Arusha Region, Tanzania. FZS Report.
- ° Borner, M. (1985). The increasing isolation of Tarangire National Park. *Oryx* 19: 91-96.
- ° Lamprey, H.F. (1963). Ecological separation of the large mammal species in the Tarangire Reserve, Tanganyika. *East African Wildlife Journal* 1: 63-92.
- ° Lamprey, H. (1963). The survey and assessment of wild animals and their habitat in Tanganyika. Conservation of Nature and Natural Resources in modern African states. IUCN Publication New Series 1. Morges.
- ° Lamprey, H.F. (1964). Estimation of the large mammal densities, biomass and energy exchange in the Tarangire Game Reserve and the Masai Steppe in Tanganyika. *East African Wildlife Journal* 2: 1-46.
- ° Peterson, D. (1976). Survey of livestock and wildlife. Seasonal distribution in areas of Masailand adjacent to Tarangire Park. Final report to the regional livestock development department and the Masai range development project. Mimeo.
- ° Peterson, D. (1976). Seasonal distribution and interaction of cattle and wild ungulates in Masailand, Tanzania. Unpublished M.Sc. Thesis, Virginia Polytechnic Institute.
- ° Vesey-FitzGerald, D.F. (1973). Browse production and utilisation in Tarangire National Park. *East African Wildlife Journal* 11: 291-305.

Staff Senior park warden, two support wardens and a building foreman. Total staff of 60 in 1984.

Budget No information

Local Park or Reserve Administration Tanzania National Parks Authority, PO Box 3134, Arusha.

Date 1985

BIHARAMULO GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Hunting permitted with licence

Date Established 1959; designated National Project in 1984

Geographical Location South-west of Lake Victoria, 5km north of Biharamulo. Approximately centred 2°30'S, 31°30'E.

Altitude 1,250-2,000m

Area 130,000ha; contiguous to Burigi Game Reserve (220,000ha) to the west

Land Tenure Government

Physical Features The reserve is on the shore of Lake Victoria, composed of north-south ridges and valleys. The single wet season (typical of the region west of Lake Victoria) is from September to May, but even the driest months (June to August) have some rain. There are a few permanent watercourses in the east and extensive swamp areas and numerous waterholes and springs also provide water throughout the year. Mean annual rainfall is 925mm. Temperature range is 13°C to 31°C.

Vegetation *Acacia* scrub occurs near the lake. This is the northern limit of *Brachystegia* woodland. Riverine and evergreen thicket and *Pericopsis* and *Combretum* wooded savanna is also found.

Fauna Mammals include: hippopotamus *Hippopotamus amphibius*, elephant *Loxodonta africana* (T), zebra *Equus burchelli*, sable antelope *Hippotragus niger*, roan *Hippotragus equinus*, sitatunga *Tragelaphus spekei*, topi *Damaliscus lunatus*, and rhinoceros *Diceros bicornis* (T). Isolated small population of red colobus *Colobus badius*.

Zoning No information

Disturbances or Deficiencies Most populations of large mammals have been severely reduced by poaching.

Visitor Facilities The reserve has a guesthouse and was formerly used by hunting parties from Kenya, but tourism is now negligible.

Scientific Research No information

Special Scientific Facilities None

Principal Reference Material

- ° Rodgers, W.A., Ludanga, R. and De Suza, H.P. (1976). Biharamulo, Birigi and Rubondo Island Game Reserves. *Tanzania Notes and Records* 81 and 82: 99-123.
- ° Struhsaker, T.T. (1981). Forest and primate conservation in East Africa. *Afr J. Ecol.* 19 pp.

Staff Junior Officer in charge

Budget No information

Local Park or Reserve Administration Regional Wildlife Office, Bukoba.

Date 1984

BURIGI GAME RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Hunting permitted under licence

Date Established Established as a Forest Reserve. Gazetted as a Game Reserve in 1972. Proposal in 1980 to establish the reserve as a National Park.

Geographical Location The reserve boundary is defined by the shore of Lake Burigi in the north-west and the Rulenge-Karagwe road in the west and lies north of Biharamulo town in the east. Approximately 2°05'S, 31°20'E.

Altitude About 1,000-1,500m

Area 220,000ha; contiguous to Biharamulo Game Reserve (130,000ha)

Land Tenure Government

Physical Features The reserve is dominated by valleys running roughly north-south. Beyond a cliff range near the reserve is the wide valley of the Kayazi river with rolling hills, rocky outcrops, and cliffs. To west is Lake Burigi with two long wide valleys draining into the southern end of the lake. The flat wide Ruiza river valley with no distinct watercourse joins the lake near the northern boundary and merges in the south with the Kasongeny valley to form a large plain with flat hills. Between the Ruiza valley and the escarpment on the western boundary, is the narrow Nyakchabo valley broken by steep hills. The single wet season (typical of the region west of Lake Victoria) is from September to May, but even the driest months (June to August) have some rain. There are a few permanent watercourses in the east and extensive swamp areas, numerous waterholes and springs also provide water throughout the year. Mean annual rainfall is 925mm. Temperature range is 13°C to 31°C.

Vegetation The dominant vegetation cover is wooded grassland of the *Acacia-Combretum* type occurring throughout the Ruiza valley and in the upper reaches of the Kasongeny valley. Swampy vegetation occurs extensively in the centre and there are large papyrus swamps in the adjoining lake to the south. Grass-swamp areas in the upper Kasongeny valley and lower Ruiza valley. Riverine forests and relict forest patches are abundant in Kayazi valley in the east and north-west of Biharamulo, and in the upper Kasongeny valley.

Fauna Some 28 species of mammal were recorded in a 1981/1982 survey including giraffe *Giraffa camelopardalis*, impala *Aepyceros melampus*, eland *Taurotragus oryx*, elephant *Loxodonta africana* (T) (uncommon), hippopotamus *Hippopotamus amphibius*, and sable antelope *Hippotragus niger*. Waterbuck *Kobus ellipsiprymnus* are restricted to the lakeshore and Kasongeny river. The central area seems to have the highest diversity and concentration of species. Density elsewhere in the park is low. A comparison between wet and dry season censuses indicates that most of the animals may remain in the central area throughout the year. Movements out of the reserve area are possible at present to the east into Biharamulo Game Reserve and to the west to the Kagera River.

Conservation Management The area is considered to have little value for subsistence agriculture or cattle ranching and the highest land use potential is for wildlife and water catchment. Boundary adjustments to facilitate administration and safeguard the wildlife population have been proposed. The reserve administration may have to be centralised if the area is to survive as a valuable asset of the West Lake Region. This can be achieved by raising the status of the area to a National Project under direct administration of the Wildlife Division or by national park status. The Regional Development Committee accepted a proposal on 14

May 1980 that Burigi Game Reserve and the surrounding area be accorded national park status. This proposal must still pass parliament and the boundary has to be worked out at local level.

Zoning None

Disturbances or Deficiencies Most of the reserve (excluding the swamps) is burnt every year, mainly by poachers. There is considerable poaching with well organised parties of up to 40 people, who reach the area mainly from the west, across the lake or by foot from the north and south. There is almost no remaining infrastructure within the reserve, no ranger posts are manned and no roads maintained. Almost no patrolling is carried out at present due to decentralisation of the administration, lack of access, roads vehicles, equipment, personnel, and ammunition.

Visitor Facilities Potential for tourism is thought to be high as the reserve is between Serengeti National Park and Akagera National Park (Rwanda).

Scientific Research The reserve and its surroundings were surveyed using the Systematic Reconnaissance Flight Method (SRF) in June 1981 (dry season) and April 1982 (wet season) and a short ground survey was also carried out.

Special Scientific Facilities None

Principal Reference Material

- * Borner, M. (1981/1982). Wildlife Survey. Burigi Game Reserve. Frankfurt Zoological Society Report.
- * Rodgers, W.A., Ludanga, R. and De Suza, H.P. (1976). Biharamulo, Birigi and Rubondo Island Game Reserves. *Tanzania Notes and Records* 81 and 82: 99-123.

Staff Staff are at three posts outside the reserve: Kingombe (owned by Biharamulo Game Reserve), Nyakahura in the south, and Kimisi in the west.

Budget No information

Local Park or Reserve Administration Administered by four local district authorities.

Date 1984

MASWA GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Residence, agronomic activities and resident hunting are prohibited.

Date Established 1962, by Government Notice No. 270. Prior to 1962 the area was a game controlled area. Designated as a National Project in 1984. Maswa is a part of Serengeti Biosphere Reserve, and there is a proposal to include it in the World Heritage Site with Serengeti National Park.

Geographical Location Approximately 34°00'-35°00'E, 2°50'-3°50'S

Altitude No information

Area 220,000ha; it has recently been reduced due to settlement. Contiguous to the Serengeti National Park and its associated reserves to the north, covering an area of well over 2,000,000ha.

Land Tenure Government

Physical Features Similar to Serengeti National Park. Landscapes vary from flat plains to the west and south to the marked undulations of the central area and the rugged terrain of the east. These hills, a part of which are in the reserve provide water for the surrounding Sukumaland. Soils vary from black cotton soils in the flood plains to sandy loams on the hill slopes. Rains are generally November–May, peaking in mid-March.

Vegetation This is East African woodland savanna with *Acacia* spp. and *Commiphora africana*. Grassland plains are more extensive in the north, the south being more forested.

Fauna Maswa is important for various migratory species. Wildebeest *Connochaetes taurinus* enter Maswa from Serengeti and Ngorongoro towards the end of May while zebra *Equus burchelli*, topi *Damaliscus lunatus*, Grant's and Thompson's gazelles *Gazella grantii* and *Gazella thomsoni* appear July–August. Wildebeest are passage migrants, while topi and zebra are only partial migrants. Mid-November the wildebeest return through Maswa. Resident mammals are fairly typical of woodland savanna and grassland regions and include: giraffe *Giraffa camelopardalis*, impala *Aepyceros melampus*, kongoni *Alcelaphus buselaphus*, roan *Hippotragus equinus*, waterbuck *Kobus ellipsiprymnus*, eland *Taurotragus oryx*, warthog *Phacochoerus aethiopicus*, buffalo *Synceros caffer* and reedbuck *Redunca arundinum*. Carnivores include hyena *Crocuta crocuta*, jackal *Canis mesomelas*, lion *Panthera leo* and leopard *Panthera pardus* (T). Numbers of cheetah *Acinonyx jubatus* (T) are relatively low, and hunting dogs *Lycaon pictus* (T) are seldom seen. Elephant are rare, and possibly even absent, though a few herds visit the reserve from Ngorongoro and Serengeti. The current status of black rhinoceros *Diceros bicornis* (T) would appear to be poor within the reserve.

Conservation Management A new boundary has been demarcated, which excludes settlements and the reserve has been designated as a National Project which increases its status. An officer from the Game Division has been appointed to the area. No resident hunting is allowed, and the total ban on hunting or roan antelope, hartebeest and lion has led to increasing numbers.

Zoning This whole area forms an important buffer zone between the Serengeti National Park and the populated region of Sukumaland.

Disturbances or Deficiencies Human population growth at around 8% annually in and around the reserve threatens the whole area, leading to problems associated with agriculture and animal husbandry, tree felling for firewood and construction, and poaching. Encroachment has forced three boundary changes so far, in 1974, 1976 and 1980/81. Despite the presence of tsetse fly in Maswa, local pastoralists reportedly regard the reserve as potential pastureland and are prepared to eliminate tsetse by clearing woodland. In 1979, over 500,000 domestic animals were within the reserve. Poaching is reported to be both commercial and subsistence in nature, and fairly high. Staff also appear to lack field equipment and support, making effective management of the area difficult.

Visitor Facilities Tourist hunting

Scientific Research Associated with research in Serengeti National Park. Pasiamsi Ranger training school has research facilities.

Special Scientific Facilities None

Principal Reference Material None listed

Staff A Project Manager has been appointed with 10 staff and 20 additional staff proposed.

Budget The budget is insufficient to cover many of the necessary tasks. Frankfurt Zoological Society are assisting with boundary demarcation, uniforms, and other groups are providing assistance.

Local Park or Reserve Administration National Project of Wildlife Division, Ministry of Natural Resources and Tourism, PO Box 1994, Dar-es-Salaam.

Date 1984

MKOMAZI GAME RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Hunting is permitted with licence. Grazing of livestock was permitted in certain areas on a temporary basis, but this cannot now be stopped.

Date Established 1951

Geographical Location Situated on the Kenya/Tanzania border. Approximately centred at 38°00'E, 4°00'S.

Altitude 630-1,630m

Area 100,000ha; contiguous to Uмба Game Reserve (150,000ha) and to Tsavo National Park (2,086,814ha) in Kenya

Land Tenure Government

Physical Features This area is mainly arid plains with isolated rocky peaks.

Vegetation Thorn bush is scattered over the open plains and much of the vegetation is semi-arid.

Fauna Mammals include elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, lion *Panthera leo* (T), leopard *Panthera pardus* (T), giraffe *Giraffa camelopardalis*, Grant's gazelle *Gazella granti*, and lesser kudu *Tragelaphus imberbis*. The area is also of ornithological interest.

Zoning None

Disturbances or Deficiencies Serious encroachment by people and cattle has effectively transformed the area into a cattle ranch over the past 10 years. Waterholes, originally intended for wildlife during the dry season, are now the focus for Maasai pastoralists who have brought thousands of cattle and goats into the area. Along with settlements, overgrazing and lack of management, poaching has been effective in extirpating at least six species in the reserve including the black rhinoceros *Diceros bicornis*. Cutting of gallery forest along the Umbwa River has also removed important habitat. Game hunting is still allowed, but is not very popular as very few trophy species remain. The area was an important buffer and extension for the Tsavo National Park, but it is now not viable as a game reserve and will probably be released for other land use purposes. Mining in the adjoining Uмба Game Reserve was totally abandoned in 1984 as natural resources within the reserve had suffered almost irretrievably.

Visitor Facilities A small attractive rest house is situated 14 miles from the town of Same on the main tarmac road.

Scientific Research There have been game counts particularly of elephants, ecosystem analysis, and studies by Mweka students. This area has been included in studies of Tsavo.

Special Scientific Facilities No information

Principal Reference Material

- ° CNPPA Summary Status Report (1984). Threatened Protected Areas of the World. (draft).
- ° Harris, L.D. and Fowler, N.K. (1975). Ecosystem Analysis and Simulation of the Mkomazi Reserve, Tanzania. *East Afr. Wildlife J.* (13): 325-346.
- ° Miller, R.I. (1978). Island biogeographic theory on an East African Reserve. *Environmental Conservation* (5)3: 191-195.

Staff None

Budget None

Local Park or Reserve Administration Wildlife Division, Ministry of Natural Resources and Tourism, PO Box 1994, Dar-es-Salaam.

Date 1984

MOYOWOSI GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Controlled hunting permitted

Date Established First established as Mwaliye Forest Reserve in 1956, then as Moyowosi Game Controlled Area in 1969; Game Reserve in 1981. Designated as a National Project in 1982.

Geographical Location In Kibondo District, Kigoma Region, north-west Tanzania. The Game Reserve is bounded on the east by the Moyowosi River, on the west and south by the Malagarasi River and Lake Kitali, on the north-west by the Kibondo-Kigoma road and a line cut through the woodland, and on the north-east by Mpembei River. 30°30'-31°30'E, 3°45'-4°30'S.

Altitude Averages about 1,200m, but ranging from 800m to 1,600m

Area 600,000ha

Land Tenure Government

Physical Features Topography is generally flat, sloping gradually from the more hilly northwest to the flat open grasslands of the east and south. The Malagarasi and Moyowosi rivers form the western and eastern boundaries of the reserve, while the swamps at their confluence form the southern boundary. Other rivers and streams, particularly in the north, drain into this system. There are several swamps and permanent waterholes and a groundwater stream and springs at Murungu. Mean annual rainfall is 800-1,000mm, with the main rainy

season from November to April. Temperatures average 20–26°C during the dry season and 12–20°C during the rains.

Vegetation The flora of Moyowosi can be divided into five major associations. 70% of the area is covered by Miombo woodland, comprised mainly of *Julbernardia globiflora*, *Brachystegia spiciformis*, *B. wagnermeeana* and *Isoblerlinia tormentosa*. Bushland, thicket and scrub with *Acacia*, *Combretum* and *Commiphora* covers a further 12% of the reserve. The rest comprises wooded grassland (8%) with *Acacia*, *Albizia*, *Barossus* and *A. polyacantha*, valley grassland on the floodplains of the Moyowosi and Malagarasi rivers and along other flats and watercourses (5%), and riverine/groundwater forest around Murungu Springs.

Fauna Sitatunga *Tragelaphus spekei*, hippopotamus *Hippopotamus amphibius*, and crocodile *Crocodylus* sp. in the swamp. Topi *Damaliscus lunatus*, zebra *Equus burchelli*, lion *Panthera leo*, waterbuck *Kobus ellipsiprymnus*, and buffalo *Syncerus caffer* are found on the floodplain, though most of these species move to the bushland during the wet season. Sable antelope *Hippotragus niger*, roan antelope *Hippotragus equinus*, hartebeest *Alcelaphus buselaphus*, and elephant *Loxodonta africana* (T) inhabit the woodland.

Zoning None

Disturbances or Deficiencies Poaching, harvesting of forest products (firewood, timber and honey), and fishing from the time of Game Controlled Area status are difficult to control. The status of the very remote and inaccessible community of Burundi exile pastoralists on the S. Bohoro flats is unsure. The division staff is reported to be inadequate and there would appear to be a general lack of facilities.

Visitor Facilities No facilities, but there is tourist hunting

Scientific Research Surveys of mammal populations from 1973 to 1976

Special Scientific Facilities None

Principal Reference Material

- ° Mutch, G.R.P. (1977). The flora of the Moyowosi Game Controlled Area. *Tanzania Notes and Records* No. 81 and 82: 155–162, map.
- ° Mutch, G.R.P. (1980). The Larger Mammals of Moyowosi. *Tanzania Notes and Records* No. 84 and 85: 95–106.
- ° Swai, Issai (undated). A field guide to Moyowosi Game Reserve Project.

Staff Project Manager and 50 Game assistants

Budget No information

Local Park or Reserve Administration Wildlife Division, Dar-es-Salaam.

Date 1984

RUNGWA GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Hunting permitted with licence

Date Established 1951. Designated as a National Project

Geographical Location Central Tanzania. Approximately centred at 34°0'E, 6°55'S.

Altitude 1,350-2,350m

Area 900,000ha; contiguous to Ruaha National Park (1,295,000ha) and Kizigo Game Reserve (400,000ha).

Land Tenure Government

Physical Features Undulating plains with marshy valleys and rocky ridges

Vegetation Miombo woodland savanna occurs in the wetter north and west with *Acacia-Commiphora* woodland in the south and east.

Fauna There are large numbers of greater kudu *Tragelaphus strepsiceros*, elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T), sable *Hippotragus niger*, and roan antelope *Hippotragus equinus*. Other mammals include: lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), and a wide variety of ungulates, such as zebra *Equus burchelli*, lesser kudu *Tragelaphus imberbis*, bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, Grant's gazelle *Gazella granti* (at the southern point of its distribution), and Bohar reedbuck *Redunca redunca*.

Conservation Management The area is providing revenue through tourist hunting. Roadworks, anti-poaching patrols, and fire control are carried out. IUCN/WWF Project 1930 was initiated in 1980 to help combat poaching, particularly of elephant and rhinoceros, and supplied an aircraft, vehicles and graded roads.

Zoning None

Disturbances or Deficiencies There is extensive poaching and illegal woodcutting for construction of cattle enclosures (domas). Many areas are inaccessible.

Visitor Facilities There is a guest house and tourist hunting. Access is difficult and in the rainy season the area is inaccessible. There is an airstrip at Rungwa village on the Mbeya-Arusha road.

Scientific Research Aerial census in 1977

Special Scientific Facilities None

Principal Reference Material

° IUCN/WWF Project 1930. Tanzania, Anti-poaching Equipment for Game Reserves.

Staff Project manager and game scouts. The main base with airstrip is at Rungwa village on the Mbeya-Arusha Road.

Budget No information

Local Park or Reserve Administration National Project of Wildlife Division, Ministry of Natural Resources and Tourism, PO Box 1994, Dar-es-Salaam.

Date 1984

SADANI GAME RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Hunting permitted by licence

Date Established 1968

Geographical Location Adjacent to and north of Sadani town on the coast; 38°40'E, 6°00'S

Altitude Sea level to 50m

Area 30,000ha

Land Tenure Government

Physical Features 20km of unspoilt coastline

Vegetation There is coastal savanna, grassland, thickets and abandoned sisal plantations.

Fauna This is the southernmost distribution of Coke's hartebeest (kongoni) *Alcelaphus buselaphus*.

Zoning None

Disturbances or Deficiencies Poaching occurs, although there is no human population in the reserve.

Visitor Facilities Negligible

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° None listed

Staff No information

Budget No information

Local Park or Reserve Administration District Wildlife Officer, Maliasili, PO Bagamayo.

Date 1984

SELOUS GAME RESERVE

Management Category IV (Nature Reserve)

World Heritage Site (Criteria: ii, iv)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Hunting is permitted in all but three of the 45 management blocks - two in the northeast and one in the southwest.

Date Established Part of the area was gazetted in 1905 and four reserves were established in the region by 1912 (total 250,000ha). These were combined to form Selous Game Reserve in 1922. Accepted as a World Heritage Site in December 1982. Designated as a National Project.

Geographical Location In the Coast, Morogoro, Lindi, Mtwara and Ruvuma Regions of southeast Tanzania. 7°17'-10°15'S, 36°04'-38°46'E.

Altitude From 100m in the northeast to 1,200m in the southwest

Area 5,000,000ha; contiguous to Mikumi National Park (323,000ha)

Land Tenure Government

Physical Features The reserve is the second largest in Africa and is part of the Selous ecosystem (7,400,000ha) which includes Mikumi National Park and Kilombero Game Controlled Area. A large area of the reserve is drained by the Rufiji River and tributaries which include the Luwegu, Kilombero, Great Ruaha, Luhombero and Mbarangardu (the only permanently flowing streams). The Rufiji is formed by the Luwegu and Kilombero which join at Shughuli Falls. Soils are relatively poor and infertile. Annual rainfall is 750mm in the east to 1250mm in the west. Temperature ranges from 13°C to 41°C.

Vegetation There are two main vegetation types in the reserve: the eastern sector (17%) is predominantly wooded grassland dominated by *Terminalia spinosa* and the western sector (about 75%) deciduous miombo woodland with *Brachystegia*, *Julbernardia globiflora*, *Pterocarpus angolensis*, and *Combretum*, a vegetation type thought to be maintained by fire. There are also areas of dense thicket, riverine and ground water forest.

Fauna Cheetah *Acinonyx jubatus* (T) and giraffe *Giraffa camelopardalis* occur in the wooded grassland north of Rufiji River. Elephant *Loxodonta africana* (T) (maximum 100,000), Lichtenstein's hartebeest *Alcelaphus lichtensteini* and sable antelope *Hippotragus niger* are more typical of the miombo woodland. Some animal populations are large due to the size of the reserve including 200,000 buffalo *Syncerus caffer*, 98,000 impala *Aepyceros melampus*, 80,000 wildebeest *Connochaetes taurinus* and 7,000 sable antelope *Hippotragus niger*. Selous claims to have the largest concentration in the world of elephant *Loxodonta africana* (T), crocodile *Crocodylus* sp., hippopotamus *Hippopotamus amphibius* and black rhinoceros *Diceros bicornis* (T). Other mammals include leopard *Panthera pardus* (T) and wild dog *Lycaon pictus* (T). The rich birdlife includes knob-billed duck *Sarkidiornis melanotos*, southern ground hornbill *Bucorvus leadbeateri* and bateleur eagle *Terathopius ecaudatus*.

Conservation Management Existing local management plans include construction of staff quarters and amenities, improvement of the existing ferrys road system and airstrips, construction of new roads in tourist camps and establishment of two additional sectors with head offices at Mpelembe and Ilonga. Regular anti-poaching patrols are made in addition to those made by the Anti-poaching Unit but there is a lack of vehicles, camping gear and radios. IUCN/WWF Project 1930 was set up in 1980 to help this by supplying an aircraft and vehicles and grading roads.

Zoning The area is divided into four management zones and 45 management blocks.

Disturbances or Deficiencies The resident population in the area was evacuated when the reserve was established and Selous has therefore remained relatively intact. No forest exploitation has taken place and mineral exploration has as yet failed to find any valuable deposits. A serious threat is the proposed Stiegler's Gorge Dam Project to harness the flood waters of the Rufiji River. Both dam and reservoir would be entirely within the reserve and cover some 44,000ha. Seismic roads are being built into 75% of the reserve for oil exploration. The main threat is increased accessibility to the area and the presence of a population within the reserve to maintain these developments. Because of the difficulties of transportation, the interior of Selous is seldom patrolled, so poaching could well have severely reduced populations of some species. A proper management plan is needed for the area.

Visitor Facilities The reserve is remote and not easily accessible except by air. Access by the Tazara railway is now a possibility. There are three tented camps (one luxury) and a bungalow-style hotel along the Rufiji River in a Tourist Area where hunting is prohibited except for meat supply for the camps.

Scientific Research Studies mainly concern ecological and wildlife management problems in the miombo woodlands but research is hampered by a shortage of equipment. Aerial censuses were carried out in 1976, 1980 and 1981 to estimate the number and distribution of mammal species.

Special Scientific Facilities There is a research centre at Kingupira in the east located near all four major habitat types and within easy reach of Dar es Salaam. It has an office block, laboratory, staff accommodation and airstrip, but is cut off in the wet season. There is a substation at Msolwa in the west. They have inadequate scientific equipment and vehicles.

Principal Reference Material

- ° Börner, M. (1981). Selous Census. WWF/IUCN/FZS Report.
- ° Bureau of Reclamation, U.S. Dept. of Interior. (1967). Rufiji Basin: Land and water resource development plans and potentials.
- ° Bureau of Reclamation, U.S. Dept. of Interior and FAO (1961). The Rufiji Basin, Tanganyika. FAO, Rome.
- ° Hafslund - Norplan (1979). Stiegler's Gorge power and flood control development: Preliminary Project Report 1. Oslo.
- ° IUCN/WWF Project 1930. Tanzania, Anti-poaching Equipment for Game Reserves.
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Staff Project manager, four sector managers and support staff

Budget Included in allocation made by the government to the Wildlife Division for recurrent and development expenditure

Local Park or Reserve Administration The Wildlife Division, Ministry of Natural Resources and Tourism, PO Box 1994, Dar-es-Salaam.

Date 1984

UGALLA GAME RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Controlled hunting permitted

Date Established 1964; Game Controlled Area status in 1951

Geographical Location Urambo District in Tabora Region (north), and Mpanda District in Rukwa Region (south); 5°35'-6°10'S, 31°25'-32°15'E.

Altitude 1,400m

Area 500,000ha; contiguous to Msima, Ugunda and Inyonga Game Controlled Areas

Land Tenure Government

Physical Features This flat area lies to the north and south of Ugalla River and its tributaries (such as the Wala and Isimbiri).

Vegetation There are several communities, including floodplain grasslands, *Borassus* palm woodland, termite-mound woodland, *Combretum* woodland and miombo *Brachystegia*.

Fauna Many animals are easily visible, including sable antelope *Hippotragus niger*, roan antelope *Hippotragus equinus*, greater kudu *Tragelaphus strepsiceros*, buffalo *Syncerus caffer*, elephant *Loxodonta africana* (T), topi *Damaliscus lunatus*, hartebeest *Alcelaphus buselaphus*, warthog *Phacochoerus aethiopicus* and zebra *Equus burchelli*.

Zoning No information

Disturbances or Deficiencies Fishing in the dry season is licenced but controlled. Wood cutting, logging and poaching occur and there is little management now as the field staff have been recalled to Tabora due to access difficulties.

Visitor Facilities Safari hunting

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

° Rodgers, W.A. (no date). An ecological survey of Ugalla Game Reserve in *Tanzanian Notes and Records*.

Staff None

Budget No information

Local Park or Reserve Administration Now at Tabora, outside the reserve

Date 1984

UMBA GAME RESERVE

Management Category No category assigned

Biogeographical Province 3.14.07 (Somalian)

Legal Protection Hunting permitted with licence

Date Established Uмба Game Reserve was part of Mkomazi Game Reserve until 1974.

Geographical Location On the Kenya/Tanzania border, about 90km northwest of Tanga; approximately centred 38°50'E, 4°20'S.

Altitude No information

Area 150,000ha. Contiguous to Mkomazi Game Reserve (100,000ha) which is contiguous to Tsavo National Park (2,086,814ha) in Kenya.

Land Tenure Government

Physical Features The flat coastal plain has some small hills and is drained by the Uмба River system.

Vegetation Several types occur, including thornbush scrub of *Acacia/Commiphora*, coastal savanna and thickets in moister places.

Fauna This includes the southern extension of the once large populations of elephant *Loxodonta africana* (T) and black rhinoceros *Diceros bicornis* (T) of adjacent Tsavo National Park in Kenya. Other mammals include oryx *Oryx gazella*, gerenuk *Litocranius walleri* and lesser kudu *Tragelaphus imberbis*.

Zoning None

Disturbances or Deficiencies There is poor administration and funding. Encroachment from pastoralists is increasing with settlements permitted during dry season famines becoming permanent. These settlements are of the Wakwavi or Baryuyu people who are allied to the Maasai. Mining in this reserve was totally abandoned in 1984 but natural resources within the reserve had suffered almost irretrievably.

Visitor Facilities None

Scientific Research No research since the work of L. Harris in 1965-1969.

Special Scientific Facilities None

Principal Reference Material

° Harris, L.D. and Fowler, N.K. (1975). Ecosystem Analysis and Simulation of the Mkomazi Reserve, Tanzania. *East Afr. Wildlife J.* (13): 325-346.

Staff Junior staff only

Budget No information

Local Park or Reserve Administration Regional Wildlife Office, Tanga.

Date 1984

UWANDA GAME RESERVE

Management Category No Category Assigned

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established 1971

Geographical Location Situated in Sumbarranga District of Rukwa Region. 8°45'-8°20'S, 31°30'-32°45'E.

Altitude 1,200m

Area 500,000ha (50% under floodwater); contiguous to North Rukwa Game Controlled Area (120,000ha)

Land Tenure Government

Physical Features The reserve includes floodplains along the south-west and north shores of Lake Rukwa in the rift valley. The lake is subject to cyclic floods and is presently at a very high level.

Vegetation Floodplain habitats of great complexity include grassland and some woodland.

Fauna This is one of two Tanzanian areas for puku *Kobus vardonii*. Other mammals include: zebra *Equus burchelli*, topi *Damaliscus lunatus*, buffalo *Syncerus caffer*, and elephant *Loxodonta africana* (T). Numbers are much reduced within the reserve by floods.

Zoning No information

Disturbances or Deficiencies Hunting, fishing, and grazing encroachment, occur as there is virtually no management.

Visitor Facilities There was tourist hunting in this area

Scientific Research In the past, there was major research effort as the area was a principal breeding zone of the red locust.

Special Scientific Facilities None

Principal Reference Material

* Rodgers, W.A. (1983). Lake Rukwa Floods and Declining Wildlife Populations. *Afr. J. Ecol.*

Staff No information

Local Park or Reserve Administration Wildlife Division, Dar-es-Salaam.

Date 1984

NGORONGORO CONSERVATION AREA

Management Category VIII and IX (Multiple Use Management Area and Biosphere Reserve)

World Heritage Site (Criteria: ii, iii, iv)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Some 25-30% with total protection; grazing in the remaining area, but hunting prohibited

Date Established 1959 by Ordinance No. 413 as amended by the Game Parks Law (Miscellaneous Amendments) Act No. 14 of 1975. Accepted as World Heritage Site 1979. Approved as part of Serengeti-Ngorongoro Biosphere Reserve in 1982.

Geographical Location In the Arusha Region of northern Tanzania, south-east of Serengeti National Park. 2°30'-3°30'S, 34°50'-35°55'E.

Altitude Under 1,500m to 3,648m

Area 828,800ha; contiguous to Serengeti National Park (1,476,300ha) and close to Lake Manyara National Park (32,500ha). Serengeti is contiguous to Maswa Game Reserve, and Maasai Mara National Park in Kenya. Biosphere Reserve 2,305,100ha. World Heritage Site 809,440ha.

Land Tenure Government

Physical Features The open plains of the eastern Serengeti rise to the crater highlands of the volcanic massifs of Loolmalasin (3,587m) and Oldeani (3,168m) dating from the late Mesozoic-early Tertiary period. Ngorongoro Crater is one of the largest inactive unbroken calderas in the world which is unflooded. It has a mean diameter of 16-19km, a crater floor of 26,400ha, and a rim soaring to 400-610m above the crater floor. The formation of the Crater and other highlands are associated with the massive rifting which occurred to the west of the Gregory Rift Valley. The conservation area also includes Empakaai crater and Olduvai Gorge, famous for geology and associated palaeontological studies. Because of the great amplitude in relief and the dynamics of air masses, there is a great variation in the climate of the area. In the highlands, it is generally moist and misty, and temperatures in the semi-arid plains can be as low as 2°C, but can often go up to 35°C. Rainfall is seasonal and follows the altitudinal gradient. Annual precipitation varies from under 500mm on the arid plains in the west, to 1,400mm along the forested slopes in the east.

Vegetation A variable climate and diverse landforms and altitudes have resulted in several distinct habitats. Scrub heath and the remains of dense montane forests cover the steep slopes. The crater floor is mainly open grassy plains with alternating fresh and brackish water lakes, swamps and two patches of *Acacia* woodland; Leraï Forest, comprising dominant tree

species *Acacia xanthophloea* and *Rauvolfia caffra*; and Laiyanai Forest with *Cassipourea malosana*, *Albizia gummifera*, and *Acacia lahai*. The area includes undulating plains covered in grass, which become almost desert during periods of severe drought. These grass and shrublands are rich and support very large animal populations. The upland woodlands contain *Acacia lahai* and *A. seyal*.

Fauna There is a large population of wild ungulates in the crater including: wildebeest *Connochaetes taurinus*, zebra *Equus burchelli*, eland *Taurotragus oryx*, gazelles *Gazella granti* and *Gazella thomsoni*, black rhinoceros *Diceros bicornis* (T) (at least 20; the Ngorongoro Crater representing perhaps the only viable breeding population left in northern Tanzania), and hippopotamus *Hippopotamus amphibius* (very uncommon in the area). The crater also has the densest known population of lion *Panthera leo*. On the crater rim are buffalo *Syncerus caffer*, elephant *Loxodonta africana* (T), mountain reedbuck *Redunca fulvorufula* and leopard *Panthera pardus* (T). Serengeti migrants, including over one million wildebeest are numerous on the plains. Waterbuck *Kobus ellipsiprymnus* mainly occur near Lerei Forest, while serval *Felis serval* occur widely in the crater as a whole and on the plains to the west. Particularly common in the reserve are lion *Panthera leo* (T), hartebeest *Alcelaphus buselaphus*, and spotted hyena *Crocuta crocuta*. Cheetah *Acinonyx jubatus* (T), though common in the reserve as a whole, are scarce in the crater itself. Wild dog *Lycaon pictus* have recently disappeared from the crater and may have declined elsewhere in the Conservation Areas as well. Golden cat have recently been in the Ngorongoro forest. Birds include ostrich *Struthio camelus*, kori bustard *Choriotis kori*, possibly lammergeier *Gypaetus barbatus*, Verreaux's eagle *Aquila verreauxii*, Egyptian vulture *Neophron percnopterus*, rosy-breasted longclaw *Macronyx ameliae* and lesser flamingo *Phoeniconaias minor* (on the lake in Ngorongoro crater and Lake Ndutu). Sunbirds in the highland forest include golden winged sunbird *Nectarinia reichenowi* and eastern double collared sunbird *N. mediocris*. *Papilio sjoestedti* (R), sometimes known as the Kilimanjaro swallowtail, flies in the montane forests of Mt Meru, Mt Kilimanjaro and Ngorongoro in north-eastern Tanzania. It has a very restricted range but is well protected in national parks.

Cultural Heritage The NCA has palaeontological and archaeological sites over a wide range of dates. The four major sites are: Olduvai gorge, Laetoli site, Lake Ndutu site, and the Nasera Rock Shelter. The variety and richness of the fossil remains, including those of early hominids, has made Ngorongoro one of the major areas in the world for research on the evolution of the human species. Olduvai Gorge has produced valuable remains of early hominids including *Australopithecus boisei* (Zinanthropus) and *Homo habilis* as well as fossil bones of many extinct animals. Nearby, at Laetoli, are fossil hominid footprints of Pliocene age.

Population There is considerable controversy about the exact number of people in the NCA partly because pastoral people, being mobile, are difficult to enumerate, but about 18,000 Maasai (20 percent of the total number in Tanzania) live there with some 126,326 cattle and 140,337 goats and sheep which graze approximately 70-75% of the conservation area. There are no inhabitants in Ngorongoro and Empaakai Craters or the Forest.

Conservation Management The Ngorongoro was first established as a conservation area to benefit the Maasai. The Ngorongoro Conservation Area Ordinance of 1959 created the Ngorongoro Conservation Area Authority (NCAA) which was charged with ensuring multiple land use there to assist in conserving and developing its natural resources, but it failed to function because of lack of rapport between the government officials and the Maasai. By 1960, a draft management plan was prepared, which was revised in 1962 and further reviewed. In 1961 the Prime Minister, Julius Nyerere issued the Arusha Manifesto. The Tanzanian government is now conducting a pioneer experiment in multiple land use (one of few such areas in Africa) which attempts to reconcile the interests of wildlife, Maasai pastoralists, and conservation. Cultivation was banned in 1976 due to incompatibility with wildlife conservation (though it still remains a problem). Forest areas protect the local water catchment, soils and vegetation. Ngorongoro Conservation Area Management Plan proposals have been submitted but have been rejected by the Chief Conservator because the proposed plan is regarded as going beyond its terms of reference. Some animals, such as buffalo, wildebeest and zebra migrate out of the crater during periods of drought and considerable

effort is being made to prevent the migration routes from being encroached upon by settlements and agricultural developments. Efforts have been made to control poaching with the aid of FZS, AWF, TWPF, WWF, and the police. In an effort to increase international support for conservation, the Tanzanian government requested that Ngorongoro be put on the list of World Heritage Sites in Danger (Thorsell, 1985). It has since been included in the list of eleven most endangered areas (IUCN, 1985). IUCN/WWF Project 1934 was set up in 1981 to combat poaching of rhinoceros in the Lake Eyasi area. Two vehicles and radios have been provided. With the financial support of NORAD, a major technical workshop was being held in December 1985 to study improving the management.

Zoning Ngorongoro Crater is a specific use zone, where only game viewing is allowed. However, cattle are permitted controlled access to drink in the dry season.

Disturbances or Deficiencies About 5% of the area has been degraded by trampling and overgrazing. There is poaching, mainly of black rhinoceros and leopards, but lack of equipment and fuel, and low morale, as well as the rough terrain, make this difficult to suppress effectively. There is no conclusive evidence to indicate that the pastoralists alone are responsible for this poaching threat. Wildebeest have increased to 1.3 million due to control of rinderpest in cattle, but this has brought problems as wildebeest carry the cattle disease malignant catarrh fever, which kills cattle (although it has little effect on wildebeest). There are uncontrolled fires in grassland areas and in particular Empaakai crater. Management has been severely hampered by lack of finance, equipment, and administration.

Visitor Facilities There are three lodges on the crater rim and one at Ndutu, and vehicles and guides can be hired from the Authority to go into the crater.

Scientific Research Various studies based at Seronera Wildlife Research Centre (formerly known as the Serengeti Research Institute) include monitoring of climate, vegetation and animal populations. The level of research into human and range ecology is low. Recent studies in the crater have been on lion behaviour, serval behaviour, and on rhinoceros and elephant behavioural ecology.

Special Scientific Facilities The Seronera Research Centre in the contiguous National Park provides a research station and accommodation for scientists. There is a small research cabin within the crater.

Principal Reference Material

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- ° Saibull, S.A. ole and Carr, R. (1981). *Herd and Spear. The life of pastoralists in transition*. Collins, London.
- ° Saibull, S.A. ole (1968). Ngorongoro Conservation Area. *East African Agric. For. Research Journal*. Vol. 33 Special Issue.
- ° Saibull, S.A. ole (1978). The Policy Process in the Ngorongoro Conservation Area. Status of the Area Looked at Critically. *Tanzanian Notes and Records* No. 83.
- ° Thorsell, J. (1985). World Heritage Report - 1984. *Parks* 10(1): 8-9.

Staff Some 408 staff (1984)

Budget No information

Local Park or Reserve Administration Ngorongoro Conservation Area Authority, PO Box 1, Ngorongoro Crater.

Date 1984

USAMBARA MOUNTAINS (EAST AND WEST)

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Partial. Mountains include 19 gazetted forest reserves and the University of Dar-es-Salaam Forest Reserve (Mazumbai, for research)

Date Established No information

Geographical Location Situated on either side of the north-south running Lwengera Valley in north-eastern Tanzania and north of the main Moshi-Tangi road in Tanga region; 100km from Tanga on the coast. 4°30'-5°15'S, 38°20'-39°00'E.

Altitude 1,000-2,286m (2,287m maximum in West, 1,506m maximum in East).

Area 621,300ha. Comprising 216,300ha in West and 405,000ha in East (16,500ha already within Forest Reserves)

Land Tenure No specific information, but would appear to vary widely.

Physical Features Both the East and West Usambaras have a varied topography, ranging from steep slopes at their edges to undulating high ground at their cores. The base rocks are Precambrian in origin and comprise a thick series of metamorphosed sediments (granulites, gneisses and schists) with minor igneous intrusions. The mountains have been formed by block faulting since the Precambrian. Soils range from red-brown, acid, leached, highly laterized soils on ridges and slopes, to grey-black sandy clay in valleys. The mean annual precipitation varies from over 2,000mm around Amani in the eastern ranges and Ambangulu in the west to less than 700mm in the rainshadow area around Shume on the western slopes of the West

Usambaras. There are two wet seasons; the long rains between April and May and the less distinct short rains between October and December.

Vegetation The mountains also support what is probably one of the richest biological communities in Africa, in terms of plant and animal species and endemic taxa. More than 276 forest tree species have been recorded, of which some 50 are endemic (or nearly so), such as the monotypic genera *Cephalosphaera usambarensis*, *Englerodendron usambarense*, and *Platypterocarpus tanganyikensis*. Endemic herb taxa include the *Dolichometra* genus. Rodgers and Homewood (1978) include a detailed tree species list. The most widespread vegetation is forest with species distribution and vegetation structure being influenced by altitude and rainfall. The major vegetation types are: wet lowland evergreen forest characterized by *Anthocleista grandiflora*, *Cephalosphaera usambarensis* and *Anisophyllea obtusifolia*; dry lowland evergreen forest with *Chlorophora excelsa*, *Scorodophloeus fischeri* and *Azelia quanzensis*; intermediate evergreen forest with *Newtonia buchananii*, *Parinari excelsa* and *Sorindeia madagascariensis*; montane rain forest with *Ocotea usambarensis*, *Chrysophyllum gorungosanum*, *Ficalhoa laurifolia*, *Mammea usambarensis* and *Dasylepis integra*; and drier juniper forest characterised by *Juniperus procera*, *Warburgia ugandensis*, and *Euclea divinorum*. On the more exposed ridges (above 1,800m) forest gives way to ericaceous bushland and thicket dominated by *Erica arborea* or *Philippia* sp., with *Anthospermum usambarense*, and *Adenocarpus manii*. Lovett et al. (1983) contains a preliminary vegetation classification with detailed descriptions for several named locations studied in greater depth. Economically valuable plants include the hardwood timber species *Ocotea usambarensis*, *Cephalosphaera usambarensis*, *Erica excelsa* and *Juniperus procera*; the tree *Allanblackia stuhlmannii* (soap and candles), and *Cinchona* sp. introduced from South America (quinine).

Fauna There have been 55 mammal species recorded including: lion *Panthera leo*, leopard *Panthera pardus* (V), marsh mongoose *Atilax paludinosus*, and civet *Civettictis civetta schwarzi*, seven species of insectivores, 11 species of bat including three slit-faced *Nycteris* spp., 18 species of rodent, bushpig *Potamochoerus porcus*, buffalo *Syncerus caffer*, bushbuck *Tragelaphus scriptus*, red forest duiker *Cephalophus natalensis harveyi*, blue duiker *Cephalophus monticola*, Abbot's duiker *Cephalophus spadix*, suni *Neotragus moschatus*, samango monkey *Cercopithecus albogularis*, eastern black-and-white colobus *Colobus guereza* and lesser bushbaby *Galago senegalensis*. Unlike other parts of the fauna, there is not much endemism among mammals, although there is an endemic subspecies of tree hyrax *Dendrohyrax validus terricola*. The avifauna includes: two threatened species endemic to the Usambaras, the Usambara ground robin *Dryocichloides montanus* (R) and Usambara eagle owl *Bubo vosseleri* (R) and several threatened species only found in a few montane forests in Tanzania: dappled mountain robin *Modularix orostruthus* (R), banded green sunbird *Anthreptes rubritorques* (R), and Tanzanian mountain weaver *Ploceus nicolli* (R). Other threatened birds found here have limited distributions in East Africa: Longbilled apalis *Apalis moreaui* (R) and Amani sunbird *A. pallidigaster* (R). Other uncommon birds in the Eastern Usambaras are the red-headed bluebill *Spermophaga ruficapilla*, green ibis *Bostrychia olivacea*, pale-breasted illadopsis *Trichastoma rufipennis* and red-tailed ant-thrush *Neocossyphus rufus*. The Eastern Usambara forests contain one of the highest avifaunal diversities of all East African montane and lowland forests (with the exception of the West African-influenced forests of Uganda and Kenya) with 90 forest species in addition to those listed already. These include 16 birds of restricted distribution and dependent on natural forest habitat, e.g. southern banded snake eagle *Circaetus fasciolatus*, Kenya crested guinea-fowl *Guttera pucherani*, Fischer's turaco *Tauraco fischeri*, green tinkerbird *Pogoniulus simplex*, green barbet *Cryptolybia olivacea*, Sharpe's akalāt *Erithacus sharpei*, and violet-backed sunbird *Anthreptes neglectus* (a full species list is found in Rodgers and Homewood, 1981). There is also a high level of endemism within the invertebrate fauna, for example, of 131 species of Sphecidae (solitary predatory wasps) 27 are endemic and there are several endemic species of butterfly including four Nymphalidae and three Lycaenidae. Of the 122 molluscan taxa, 56 are endemic. The amphibian fauna is unique within Africa with 15 forest species, of which eight are endemic (e.g. *Parhoplophryne usambaricus* and *Hoplophryne rogersi*) and seven known only from other mountain forests in Tanzania (Uluguru, Uzungwa and Rungwa). The lizard fauna includes 15

savanna and 22 forest species, of which 14 are endemic, e.g. *Scelotes eggeli* and *Lygodactylus conradti*; and seven of the 11 chameleon taxa are also endemic to the Usambaras e.g. *Chamaeleo spinosus*, *C. tenuis* and three subspecies of *C. fischeri*.

Population The Usambaras are inhabited by the agricultural Wasambaa (Bantu) tribe.

Conservation Management An area within the forest reserves is fully protected as a watershed reserve. The University Forest Reserve is managed for education and research. An EEC/IUCN project has been proposed which will probably concentrate upon the establishment of buffer zone plantations around indigenous forest areas, the creation of fuelwood lots, the establishment of trial and demonstration agro-forestry plots, education, and training. Funding has been approved under the Fight Against Hunger in the World (FAHW) and an initial planning mission has been proposed for 1984-1985. The Usambaras comprise a valuable watershed which, if cleared, would lead to reduced water supplies to the dry lowland areas, soil erosion and silt deposition in coastal fish breeding areas.

Zoning The mountains contain 19 gazetted forest reserves, and a Forest Reserve maintained by the University of Dar-es-Salaam for research purposes.

Disturbances or Deficiencies The proportion of forest cover has declined by about 78% since the end of the last century predominately due to encroachment by local populations into the wet, fertile lands for cash crops (tea and cardamom); subsistence cultivation; firewood collection; and commercial timber extraction and plantations. As a result the remaining forests are small and fragmented. In addition, the clearance of forest from steep slopes has already resulted in serious soil erosion. Uncontrolled hunting is also a problem.

Visitor Facilities The forests do not have the general appeal of the savanna national parks. However, their diverse avifauna, including many rare birds, will attract the growing number of touring ornithologists. Good facilities exist at the Amani Rest House, but the West Usambaras are less well served.

Scientific Research Research has mainly been conducted within the University Forest Reserve. The avifauna has been studied (Stuart and Hutton 1978, Stuart 1981, 1982). In 1983/1984 the forest types were extensively surveyed by J. Lovett under IUCN/WWF Project 3204.

Special Scientific Facilities Amani Research Station

Principal Reference Material

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Staff Three Reserve guards protect the University Forest Reserve

Budget No information

Local Park or Reserve Administration Forest Division

Date 1984

MAHALE (MAKARI) MOUNTAIN NATIONAL PARK

Management Category Proposed

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection No protection at present. The park is to be dedicated to the protection of chimpanzees.

Date Established Yet to be gazetted. A resolution was passed by the Kigoma regional parliament for the establishment of Mahale National Park.

Geographical Location Near Gombe, about 120km south of Kigoma; 6°10'S, 29°50'E

Altitude 780m (lake surface) to 2,462m (Mt Nkungwe)

Area 161,300ha including 9,600ha of Lake Tanganyika

Land Tenure Government

Physical Features The Mahale Mountains run in a chain from north-north-west to south-south-east for some 50km with Mt Nkungwe, the highest peak. The western slopes of the main ridge drop precipitously with many ravines running into the lake. Hilly country (below 1,700m) extends to the east of the main ridge. A series of almost parallel dendritic valleys contain rapid streams that flow even in the dry season. There are two seasons with the dry from May to October. Annual precipitation is 800-1000mm. There is significant variation in temperature and humidity within the area.

Vegetation There are three major vegetation types: Kasoge Forest (780m at lake level to 1,300m) which is a lowland forest well developed on the western slope of the Mahale Mountains and along the lakeshore; wet and more verdant forest from 1,500-2,400m which comprises a mosaic of montane forest, grassland and alpine bamboo bush with *Arundinaria alpina* dominant in a ravine near the mountain ridge; and miombo forest on the eastern slopes and north and south of the Kasoge Forest, covering some 75% of the park area. The miombo forest consists of tall trees mainly of *Brachystegia*, *Isobertia*, and *Julbernardia* with a floor of grass. The northern portion of the miombo forest is bamboo bush dominated by *Oxytenanthera abyssinica* which is presumed to be a secondary vegetation after miombo forest has been destroyed by recurrent fire for cultivation purposes.

Fauna The park contains 55 recorded mammal species, including nine primates. Tropical rain forest mammals include: a large population of chimpanzee *Pan troglodytes* (T) (500-700 in 1981 and 1,600 in 1983), red colobus *Colobus badius*, brush-tailed porcupine *Atherurus* sp., and blue duiker *Cephalophus monticola*. Savanna mammals include lion *Panthera leo* (T), giraffe *Giraffa camelopardalis*, and warthog *Phacochoerus aethiopicus*. Mammals in the miombo forest include sable *Hippotragus niger* and Lichtenstein's hartebeest *Alcelaphus lichtensteini*. The 120 recorded bird species include: crested malimbe *Malimbus rubricollis* and white-spotted pygmy crane *Coturnicops pulchra*, while 90% of 193 species of fish in the lake are endemic. A species list has been published (Anon, 1980).

Conservation Management There is a policy of minimum interference. A management plan has been prepared for the area and no settlements are planned within the park area.

Zoning None

Disturbances or Deficiencies The Parks Authority does not have sufficient funds to manage this area (1983).

Visitor Facilities The area is remote and accessible only by boat from Kigoma. Motor vehicles will probably be prohibited, but hiking excursions are being considered.

Scientific Research Research has been carried out on the chimpanzees and other primates by Kyoto University of Japan since 1965. Basic ecological studies have been undertaken since 1975.

Special Scientific Facilities Kasoge Chimpanzee (Mahale Mountains) Research Station (KCRS) established in 1975 has a laboratory, hostel, boat and habituated primate troops.

Principal Reference Material

- ° Anon. (1980). Study and Management Plan for the proposed Mahale Mountains National Park. Japan International Cooperation Agency. Final Report May 1980.
- ° Struhsaker, T.T. (1981). Forest and primate conservation in East Africa. *Afr. J. Ecol.* 19: 99-114.
- ° Several papers in *Primates*, 1965 to present.

Staff Acting warden, Director Research Centre, and field staff were proposed.

Budget None

Local Park or Reserve Administration Regional Wildlife Officer, PO Ujiji, Kigoma.

Date 1984

UZUNGWA FOREST NATIONAL PARK

Management Category Proposed II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Classified as catchment forests with no human settlements, agriculture, or other existing rights within these areas

Date Established Mwanihana Forest Reserve was gazetted in 1959.

Geographical Location In Iringa District, Iringa Region and Kilombero District, Morogoro Region; approximately centred 7°50'S, 35°55'E

Altitude 300-2,800m

Area Approximately 100,000ha to include sections of Mwanihana (Kilombero District) and West Kilombero Scarp (Iringa District) Forest Reserves. Adjacent to Mikumi National Park.

Land Tenure Government

Physical Features The Uzungwas form the central section of a chain of isolated block mountains which run from southern Malawi to north-east Tanzania. They rise from 300m at the valley of the Great Ruaha River in the north as a series of rolling hills and dissected plateaux to a greatly undulating upland (1,200m) with peaks reaching 2,800m, ending as a steep south-east facing scarp face. Mwanihana Forest Reserve covers this scarp face and is adjacent to West Kilombero, which has forest at 2,000-2,600m, but is largely plateaux grassland extending 120km westward. Soils vary, with lateritic, slightly acid red earths of medium fertility at higher levels to soils with a high percentage of clay at lower levels. Permanent fast-flowing streams run off into alluvial fans at the scarp foot. Rainfall is over 2000mm a year.

Vegetation This area shows a considerable altitudinal range, and is botanically rich in terms of numbers of communities as well as species. There are five broad vegetation categories: miombo woodland (300-500m) with *Pericopsis*, *Diplorhynchus*, *Annona*, *Crossopteryx*, and *Sclerocarya*; lower rainforest (400-750m) which is characterised by a high diversity of tree species with a closed canopy at 15m-25m, and a large proportion of trees whose fruits are preferred primate foods; intermediate rain forest (750-1,250m) with a canopy reaching 50m, largely dominated by *Parinari* and *Newtonia* with occasional stands of *Cephalosphaera*, *Strombosia* and *Uapaca palludosa* and an understorey comprising complex layers of underwood and shrubs (largely Rubiaceae) and a sparse herbaceous ground layer; montane rain forest (1,250m) of trees 15m-40m high with *Allanblackia*, *Syzygium*, *Parinari* and *Newtonia* are dominant at lower levels and increasing amounts of *Olea*, *Rapanea* and *Ocotea* at higher levels; upland grassland and bushy grassland on the western plateau forest edge (1,000-1,600m) which is dominated by *Andropogon* and *Hyparrhenia* with frequent *Pteridium* and *Dissotis* with scattered trees (such as *Agauria*, *Syzygium* and *Vitex*) near the forest edge; *Erica* and *Podocarpus latifolius* are common on exposed ridges. The common houseplant the African violet *Saintpaulia ionantha* was only known in the wild from a few plants in the Usambaras but some specimens were recently found in the Uzungwas.

Fauna Six species of primate, four of which require climax forest conditions (particularly below 1,350m), are found in the mountains: black and white colobus *Colobus angolensis palliatus*, blue monkey *Cercopithecus mitis*, vervet monkey *Cercopithecus aethiops*, baboon *Papio* sp. (the latter two being forest edge or savanna species), and two forms endemic to the mountains, Iringa red colobus *Colobus badius gordonorum* (T), and crested mangabey *Cercocebus galeritus*. There are also a number of large mammals including bushpig *Potamochoerus porcus*, buffalo *Syncerus caffer*, elephant *Loxodonta africana* (T), leopard *Panthera pardus* (T), lion *Panthera leo* and sable antelope *Hippotragus niger*; smaller species, such as tree hyrax *Dendrohyrax validus*, squirrels *Anomalurus* sp. and otter *Aonyx* sp. The avifauna includes eight threatened species; three are endemic to a few forests in eastern Tanzania: Mrs Moreau's warbler *Bathmocercus winifredae* (R), banded green sunbird *Anthreptes rubitorques* (R) and Tanzanian mountain weaver *Ploceus nicolli* (R); four have very limited distributions: dappled mountain robin *Modulatrix orostruthus* (R), Iringa ground robin *Dryocichloides lowei* (R), Amani sunbird *Anthreptes pallidigaster* (R) and Swynnerton's forest robin *Pogonocichla swynnertoni* (R), the subspecies *rodgersi* of the latter being endemic to the Uzungwas; one species the rufous-winged sunbird *Nectarinia rufipennis* (R) is endemic to the Uzungwas, being only recently discovered in the Mwanihana Forest. Further details about the avifauna are given in Stuart and Jensen (1981). There are also many endemic species of invertebrate.

Conservation Management The forest is important as a watershed for surrounding agricultural land and protection against soil erosion on the steep mountain slopes as well as a source of local medicines. A large portion of the Kilombero Scarp Forest Reserve has been excluded from the proposed park in order to provide a source of timber, firewood and other forest products. A project to establish plantations along the Ifikara road has been proposed. Present government policy restricts all development to the lowland alluvium.

Zoning The proposed park currently comprises parts of two forest reserves classified as catchment forests and surrounding areas.

Disturbances or Deficiencies The pressure on the forests can be divided into three main categories, large scale commercial exploitation of timber by mechanised logging operations, small scale commercial use by pitsawyers, and illegal non-commercial use by the local population for firewood and building poles. The forest is most disturbed at lower attitudes. There is no replanting and there are indications of reduction in forest cover due to fire and perhaps agriculture over the last 80 years.

Visitor Facilities Due to its proximity to Mikumi National Park, there is potential for tourism on a small scale.

Scientific Research The National Geographic Society of the United States is planning a scientific expedition to this site. A survey of forest communities was carried under IUCN/WWF Project 3204 in 1983-1984. Rodgers and others have undertaken primate surveys in the area.

Special Scientific Facilities No information

Principal Reference Material

- ° WWF/IUCN Project 3204. Tanzania, Habitat Evaluation in Uzungwa and Usambara mountains, 1983.
- ° Rodgers, W.A. (1981). An aerial survey of Natural Forest Conservation status in the Uzungwa Mountains, southern Tanzania. Mimeograph. University of Dar-es-Salaam.
- ° Rodgers, W.A. and Homewood, K.M. (1982). Biological values and Conservation Prospects for the Forests and Primate Populations of the Uzungwa Mountains, Tanzania. *Biol. Conserv.* 24(4): 285-304.
- ° Stuart, S.N. and Jensen, F.P. (1981). Further range extensions and other notable records of forest birds from Tanzania. *Scopus* 5: 106-115.

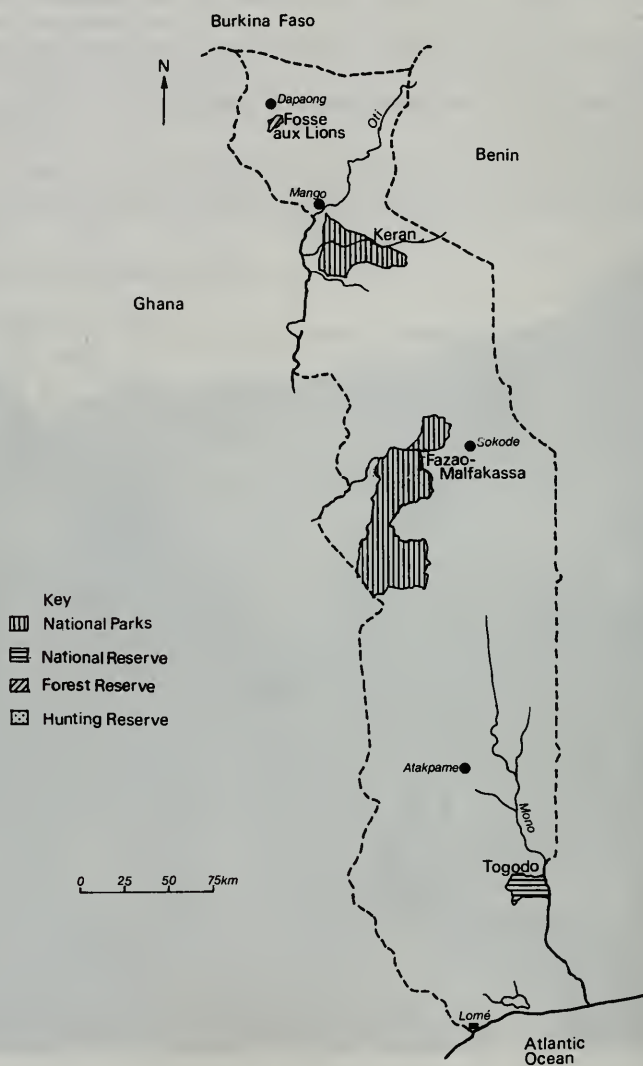
Staff No information

Budget No information

Local Park or Reserve Administration Forest Division

Date 1984





Togo

TOGO

Area 56,500 sq.km

Population 2,890,000 (1984)

Parks and Reserves Legislation Forestry and hunting legislation. Several areas have been declared Faunal Reserves and in addition all Classified Forests (forêt classé) within Togo are similarly designated. All exploitation is strictly prohibited within these areas, but for the collection of water and dead wood. The other legally defined category of reserve is the Integral Hunting Reserve (Réservé integral de chasse) which is totally protected, with access by permit only (though scientific and economic research is allowed). There appears to be no legal basis for national parks or reserves, which are classified as Faunal Reserves or RICs, although stricter protection is afforded to those areas designated as such. Seven areas have recently been proposed for increased status; Fosse aux Lions and Togodo as faunal reserves; Abdoulaye and Galangachi as forest reserves; and areas in the regions of Otit-Mandouri in the north, and Kpessi and Akaba in the centre of the country.

Parks and Reserves Administration This comes under the Department of Forests, Hunting and the Environment (Direction des forêts, des chasses et de l'environnement) within the Ministry of Rural Improvement (Ministère de l'aménagement rural). There are various divisions (environment, fauna, planning, operation and legal) which all play a role in the administration of protected areas. The Ministry of Rural Development is also involved in the development and exploitation of both natural and planted (teak) forests, and casual cutting outside reserves. There are apparently no formal management plans for the reserves, though there are regional planning offices.

Address

° Direction des forêts, des chasses et de l'environnement, Ministère de l'aménagement rural, BP 355, Lomé.

Additional Information Government policy is clearly stated to be protection and rational utilisation of animal and plant resources, and the environment in general. Protected areas in Togo cover some 10% of the country, with the two major areas, Kéran and Fazao being representative of the two principle terrestrial ecosystems, Subsudanien Savanna and semi-montane tropical humid. Reserves benefit from controls in the form of anti-poaching raids, with severe punishment for infractions such as, unauthorized fires and clearing of land. Fines (up to £5,000) and long prison sentences (up to 5 years) are imposed for burning, or for the killing of wildlife in protected areas, and levels of hunting in Togo would appear to be lower than in many West African countries, perhaps as a result of this. There are special yearly patrols which reinforce these measures.

The EEC in conjunction with the government of Togo has recently supported a study to assess the potential and means for further development of tourism, while IUCN (1985) have prepared a report as an initial step in the development of a national conservation strategy for Togo.

References

- ° IUCN (1985). République du Togo: la conservation des ressources naturelles au service du développement. IUCN Conservation for Development Centre, Gland.
- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° Roudie, P. (1978). Aspects du développement récent de l'économie togolaise. *Cahiers d'Outre-mer* 31(124): 359-374.

Protected Areas

	(hectares)
<i>National Parks</i>	
Fazao-Malfakassa	192,000
Keran	170,000
Subtotal	362,000
<i>Nature Reserves</i>	
Kamassi	17,000
Koue	40,000
Subtotal	57,000
<i>National Reserves</i>	
Togodo	35,000
<i>Forest Reserves</i>	
Fosse Aux Lions	9,000
<i>Proposed areas</i>	
Mandouri Animal Preserve	180,000

PARC NATIONAL DE LA FAZAO-MALFAKASSA

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established The national park was established in 1975, though comprising two classified forests established September 1950 by Presidential Decree. There has been a proposal to exclude the south-east section of the reserve due to its high agricultural potential and low biological value.

Geographical Location In the central region with the south-west boundary on the border with Ghana; the south-east boundary is almost to the Sokode - Atakpame road. Approximately centred 8°50'N, 0°40'E.

Altitude 200-844m

Area 192,000ha; close to the reserves of Koue (40,000ha) and Kamassi (17,000ha).

Land Tenure Government

Physical Features The park is a mountainous region with two major north-south ridges. The Fazao Mountains in the west have cliffs up to 200m and there is a waterfall at Boulo, which only flows during the wet season. In the east, is a ridge which has sheer cliffs and rises to a knife-edge. It continues to Kpeya and reaches a maximum of 844m before falling to the flat north-eastern section between the Kamassi and Keouo rivers. The rainy season is between April and October with an annual rainfall of approximately 1400mm. During the dry season, the 'harmattan', a dry wind from the Sahara, brings dust into the area.

Vegetation There are areas of savanna woodland, extensive gallery forest, and sub-montane forests of a similar type to those found in Ghana and Cameroon.

Fauna Mammals include: chimpanzee *Pan troglodytes* (T), elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, yellow-backed duiker *Cephalophus sylvicultor*, warhog *Phacochoerus aethiopicus*, black-and-white colobus *Colobus polykomos*, less bushbaby *Galago senegalensis*, mona monkey *Cercopithecus mona*, aardvark *Orycteropus afer*, and kob *Kobus kob*. The avifauna includes western ground hornbill *Bucorvus abyssinicus*, white-necked picarhates *Picathartes gymnocephalus* (R), and secretary bird *Sagittarius serpentarius*. Bird lists and more references are given in Cheke and Walsh, Cheke (1982), and Cheke and Walsh (1980; 1984).

Conservation Management Active management within this park is at a much lower level than within Kéran, as a result of the lower staffing levels and budget. IUCN (1985) recommended that anti-poaching measures be considered an absolute priority, with other management activities suggested including reintroduction of predators and, an education programme.

Zoning Management area includes the reserves of Malfakassa, Koué and Kamassi, although these are not managed separately.

Disturbances or Deficiencies Severe poaching is a problem, particularly near the border with Ghana, and agricultural encroachment and honey-gathering also occur. Staff levels are much lower than at Kéran, and control of these activities is difficult.

Visitor Facilities There is an hotel at Fazao. There are rough tracks for four-wheel drive vehicles or walking is accompanied by park staff, but there is a lack of infrastructure. IUCN (1985) regarded the park as being of high tourist potential, and regretted the lack of organization in this regard.

Scientific Research Bird species have been listed, but otherwise no information.

Special Scientific Facilities None

Principal Reference Material

- ° Cheke, R.A. and Walsh, J.F. (1980). Bird records from the Republic of Togo. *Malimbus* 2: 112-120.
- ° Cheke, R.A. (1982). More bird records from the Republic of Togo. *Malimbus* 4: 55-62.
- ° Cheke, R.A. and Walsh, J.F. (1984). Further bird records from the Republic of Togo. *Malimbus* 6: 15-22.
- ° IUCN (1985). Republique du Togo: la conservation des ressources naturelles au service du developpement. IUCN Conservation for Development Centre, Gland.
- ° Robinson, N. (1973). The Republic of Togo. *Nigerian field* 38(4).

Staff Wardens, assistant game wardens, and auxiliary staff (1980)

Budget Administered by the regional office of the D.F.C.E.; no specific budget for this park.

Local Park or Reserve Administration Direction des forêts, chasses et l'environnement, BP 355, Lomé.

Date April 1985

PARC NATIONAL DE LA KERAN

Management Category II (National Park)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established Established as a Classified Forest (6,700ha) in 1950. Enlarged for the first time and declared a national park in 1971, then enlarged to 179,550ha with different parts designated National Park and Hunting Reserve in 1975. Redesignated a National Park of 170,000ha in 1982.

Geographical Location In the Kara region, 92km from Lama-Kara on the international highway between Lomé and Upper Volta. Approximately centred 10°15'N, 0°40'E.

Altitude Average of 140m with range of less than 100m

Area 170,000ha

Land Tenure Government

Physical Features This is a very flat area, that includes the flood-plain of the Koumongou River which flows westwards through the northern section of the reserve. The river level varies from isolated pools in the dry season to a depth of 6m or more in the wet season. It floods quickly in response to rain upstream. Soils are predominantly lateritic. There is a short wet season from May to October with an average annual rainfall of 1000mm.

Vegetation There is wooded savanna with gallery forest along streams.

Fauna Mammals include: elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, hippopotamus *Hippopotamus amphibius*, hartebeest *Alcelaphus buselaphus*, kob *Kobus kob*, warthog *Phacochoerus aethiopicus*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca redunca*, roan antelope *Hippotragus equinus*, red-flanked duiker *Cephalophus rufilatus*, common duiker *Sylvicapra grimmia*, oribi *Ourebia ourebi*, olive baboon *Papio anubis*, brush-tailed porcupine *Atherurus africanus*, potto *Perodicticus potto*, aardvark *Orycteropus afer*, and leopard *Panthera pardus* (T). It would seem, however, that the balance of species differs considerably from other similar areas. For example numbers of kob and warthog would appear to be very high, while populations of roan, waterbuck buffalo and leopard would appear to be very low, and lion, hyena and hunting dog have disappeared. Avifauna include saddle-billed stork *Ephippiorhynchus senegalensis*, crowned crane *Balearica pavonina*, and marabou *Leptoptilos crumeniferus*. Bird species lists are given in Cheke (1982), and Cheke and Walsh (1980; 1984).

Conservation Management This park is reported to be extremely well protected, and would appear to be fairly well provided for. Surveillance is fairly continuous, with regular anti-poaching activities. Active management of the area includes provision of artificial watering places, and fires are used every year to ensure adequate regrowth to encourage certain species to remain in the area. The appropriate date for this burn is set by a committee every year. Large fines are associated with killing animals or starting fires without permission. There are plans to extend the park northwards to form a corridor with Pendjari National Park in Benin. As a beginning an extension north of the road has already been demarcated with a bulldozer line and settlements have been relocated. There is a 50kph speed restriction on the road through the park to reduce road casualties.

Zoning Previously divided into a national Park and Hunting Reserve

Disturbances or Deficiencies Poaching and grazing by cattle occurs on a small scale, but as has been noted anti-poaching measures are strict. Kob have increased over the last five years and may be causing overgrazing and a nuisance on surrounding farms. Low predators, and the strict control of hunting are thought to be behind this increase, (and a similar one in warthog), but the increases in ungulate number are not found in other species, and this imbalance is causing concern. The international road from Lomé to Burkina runs through the park North-South for approximately 70km and causes some problems for park management.

Visitor Facilities The combined length of trails throughout the reserve is 300km. There is a rest house with more than 20 beds and excellent hotel accomodation in the towns in the surrounding area (though a little far from the park). Trans-saharan travellers, tourists from Benin and Nigeria and people going to Burkina Faso visit the reserve. All visitors must be accompanied by a ranger when on safari.

Scientific Research Birds species, and distribution and abundance of some of the larger mammals have been recorded, otherwise no information.

Special Scientific Facilities None

Principal Reference Material

- ° Cheke, R.A. and Walsh, J.F. (1980). Bird records from the republic of Togo. *Malimbus* 2: 112-120.
- ° Cheke, R.A. (1981). More bird records from the Republic of Togo. *Malimbus* 4: 55-62.
- ° Cheke, R.A. and Walsh, J.F. (1984). Further bird records from the Republic of Togo. *Malimbus* 6: 15-22.
- ° IUCN (1985). Republique du Togo: la conservation des ressources naturelles au service du developpement. IUCN Conservation for Development Centre, Gland.
- ° 1979 Pamphlet by Ministry of Tourism.

Staff Three 'chefs de conscription', nine 'chefs de poste', and 45 agents, with support from the army and gendarmerie, including helicopter and anti-poaching sorties

Budget CFA 10 million for the National Park and CFA 2,000,000 for the National Reserve in 1980.

Local Park or Reserve Administration Direction des forêts, chasses et environnement BP 355, Lomé. Forestry station at Naboulgou.

Date April 1985

RESERVE NATIONALE DU TOGODO

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.04.04 (West African Woodland/savanna)

Legal Protection Total

Date Established July 1952 by Presidential Decree

Geographical Location On the border with Benin in the south-east. Approximately centred 7°00'N, 1°30'E.

Altitude 0-200m

Area 35,000ha

Land Tenure Government

Physical Features This area is a penepplain, crossed by several rivers with the River Mono as the eastern boundary.

Vegetation There is wooded savanna with gallery forest along rivers.

Fauna This includes buffalo *Syncerus caffer*, hippopotamus *Hippopotamus amphibius*, Buffon's kob *Kobus ellipsiprymnus*, bushbuck *Tragelaphus scriptus*, rose-ringed parakeet *Psittacula krameri*, grey heron *Ardea cinerea*, glossy ibis *Plegadis falcinellus*, and fish eagle *Haliaeetus vocifer*.

Zoning None

Disturbances or Deficiencies Poaching and agriculture occur. A dam is being constructed upstream on the Mono river, and may affect hippopotamus in the reserve.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Wardens, rangers, and support staff

Budget No information

Local Park or Reserve Administration Direction des forêts, chasses et l'environnement, BP 355, Lomé.

Date 1984

FORET DE LA FOSSE AUX LIONS

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.4.4 (West African Woodland/savanna)

Legal Protection Total

Date Established 1950 by Presidential Decree; there was a proposal in 1983 to upgrade the status of this area to National Park

Geographical Location The reserve is either side of the road, midway between Dapaong and Tandjoaré. Approximately centred 10°55'N, 0°15'E.

Altitude 200-500m

Area 9,000ha

Land Tenure Government

Physical Features Plains

Vegetation Mainly grass savanna with gallery forest along rivers.

Fauna Mammals include: elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, red-flanked duiker *Cephalophus rufilatus*, kob *Kobus kob* and buffalo *Syncerus caffer*.

Zoning None

Disturbances or Deficiencies Poaching and grazing by cattle have almost been eradicated by strict anti-poaching measures.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Wardens, rangers, support staff

Budget No information

Local Park or Reserve Administration Direction des forêts, chasses et l'environnement, BP 355, Lomé.

Date 1984





- Key
- National Parks
 - Game Reserves
 - Nature Reserve
 - Sanctuaries
 - Forest Reserve
 - * Biosphere Reserve
 - ▲ shape unknown

Uganda

UGANDA

Area 236,036 sq.km

Population 13,990,000 (1982)

Parks and Reserves Legislation The National Parks Act of 3 April 1952 is a Parliamentary Act providing for the establishment of National Parks for the purpose of preserving wild animal life and the natural vegetation. The Game Preservation and Control Act governs the Controlled Hunting Areas and Game Reserves and Sanctuaries. National parks can only be created or abolished by an act of parliament, but all other conservation areas can be gazetted or degazetted by a minister of government responsible for wildlife. Settlement and other forms of land use are prohibited within national parks and game reserves, though human settlement, cultivation, and the grazing of domestic stock are all allowed in game sanctuaries and controlled hunting areas. Hunting, previously authorised in game sanctuaries (by special permit) and controlled hunting areas under certain circumstances, was banned for five years in 1979 due to diminishing animal populations. Travelling for any purpose inside a game reserve is permitted only if authorised by the Chief Game Warden. Areas can be gazetted as Forest Reserves or as Nature Reserves under the Forest Act (1962).

Parks and Reserves Administration A Board of Trustees (of nine to twelve officers) has full legal and administrative control over the national parks system. This board runs a parastatal organization, Uganda National Parks, to which it appoints a Director and wardens as full-time officers to run the parks. Responsibility for control and conservation of wildlife in the rest of the country is vested in the Game Department, under the Chief Game Warden. Both administrations come under the Ministry of Wildlife and Tourism. Forest reserves and nature reserves are the responsibility of the Forest Department, Ministry of Agriculture and Forestry, which is charged with the task of conservation and reafforestation of the country's indigenous forests.

Address

- ° Uganda National Parks, PO Box 3530, Kampala.
- ° Forest Department, PO Box 1752, Kampala; and PO Box 31, Entebbe.
- ° Game Department, PO Box 4, Entebbe.

Additional Information Tourism collapsed following the military coup in 1972, and poaching by well armed military personnel and government officials led to a decline in elephant numbers between 1973 and 1975 (though other species were not seriously affected). The 1979 war, which resulted in the reintroduction of civilian government, caused further serious problems, and other species have since been affected. However despite these difficulties, most rangers remained at their posts throughout the troubles, and the national parks organization remained intact.

The Government of Uganda has made considerable commitments to conservation and is firmly encouraging projects to reinforce the national parks and establish further areas as such. The major difficulty experienced by the administrators of parks, reserves and sanctuaries is lack of funds, as their budgets in general cover only wages and any extra expenses must be earned (few external tourists visit these areas). Assuming Uganda becomes more stable, the national parks should once again become a major tourist attraction. Meanwhile numerous sources outside the country are providing assistance.

Approximately 8% of Uganda's land and swamp surface is within Government forest reserves, with little natural forest remaining outside the reserves (Struhsaker, 1981). Even that within the reserves has partly been destroyed. Some of the forests are particularly interesting, for example the Bwamba Forest which has some of the most easterly habitat for up to 40 typically West African species of bird. Since the Forest Department started systematic exploitation and management of forest it has been a policy to set aside certain representative parts of the forest as nature reserves. However, although nature reserves are provided for in legislation and at

least eight stipulated for protection, only two have been demarcated - Budongo and Kibale. In addition, prevention of illegal cultivation within the forests is hampered by lack of transport for forestry staff, and forest destruction may therefore be continuing. Aerial surveys in 1982 and 1983 (by Eltringham and Malpas) showed that forest boundaries were intact, though there were extensive clearances in southern Kibale and Semliki.

A current WWF project aims to review the present status of a number of forest reserves in the west of the country in terms of the wildlife they support, and the human pressures on them. Results of the project will include management recommendations for each forest (aimed at maximising their long-term value), and the establishment of a continuing capability for a national forest wildlife monitoring programme.

References

- ° Howard, P. (1986). Conserving tropical forest wildlife in Uganda. WWF Monthly Report for July. WWF Project 3235.
- ° IUCN (1976). Proceedings of a regional meeting on the creation of a coordinated system of national parks and reserves in Eastern Africa. IUCN Publications New Series, Supplementary Paper No. 45. IUCN, Morges, Switzerland.
- ° IUCN/WWF Project 1178. Uganda, Wildlife Clubs.
- ° IUCN/WWF Project 1765. Uganda, Protection of Forest Reserves.
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Protected Areas

	(hectares)
<i>National Parks</i>	
Kidepo Valley	134,400
Lake Mburo	53,600
Murchison Falls (Kabalega)	384,000
Queen Elizabeth (Rwenzori)	197,800
Subtotal	769,800
<i>Nature Reserves</i>	
Budongo	1,041
<i>Game Reserves</i>	
Ajai	15,800
Bokora Corridor	205,600
Bugungu	52,000
Gorilla	2,900
Karuma	82,000
Katonga	20,800
Kibale Forest Corridor	56,000

Kigezi	33,000
Kyambura	15,700
Matheniko	160,000
Pian-Upe	231,400
Toro	55,488
Subtotal	930,688

Sanctuaries

Dufile, Otze & Mount Kei	48,900
Entebbe	5,200
Jinja	800
Kazinga	20,700
Malaba	3,100
Nkosi Island Sitatunga	
Zoka Forest Elephant	20,700
Subtotal	99,400

Forest Reserves

Bugoma	36,497
Bwindi (Impenetrable)	31,000
Itwara	9,000
Kalinzu	14,000
Kasyoha-Kitomi	40,000
Lake Shore	22,050
Mabira	30,721
Maramagambo	44,000
Ruwenzori	100,000
Semliki	22,000
Subtotal	349,268

Controlled Hunting Areas

Buhuka	1,773
East Madi	174,940
East Testo	
Kaiso Tonya	22,656
Karuma	24,061
Katonga	227,297
Lipan	89,856
Napak	22,451
North Karamoja	1,667,604
North Teso	
Sebei	253,084
Semliki	50,319
South Karamoja	897,164
West Madi	83,123
Subtotal	3,514,328

Biosphere Reserves

Queen Elizabeth (Ruwenzori) National Park	220,000
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KIDEPO VALLEY NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established Established as a Game Reserve in 1958; National Park status in March 1962

Geographical Location North-east corner of Uganda, along the Sudan border and near the Kenya border. The town of Taan is on the southern boundary. 3°45'-4°10'N, 33°30'-34°05'E.

Altitude 900-2,750m (mainly under 1,350m)

Area 134,400ha; surrounded in Uganda by an extensive Controlled Hunting Area complex

Land Tenure Held in trusteeship from the government

Physical Features The park is bordered to the southeast by Mount Morungole (2,750m) and on the north-east by the Lotuke ridge, a south-east extension of the Didinga Hills in Sudan. It straddles the Kidepo and Larus Rivers, which flow north into Sudan during the rains. In the dry seasons, there are some permanent pools in the upper Larus. The Kidepo basin is a gently undulating plain of black alluvial soils with stony ridges between the river tributaries and occasional rocky outcrops. The typical Sudanian climate has a rainy season from April to September and a long dry season. Mean annual rainfall is 700mm.

Vegetation The area has predominantly tree and shrub steppe (or arid savanna), mixture of bush or thicket and trees, such as: *Acacia tortilis*, *Combretum*, *Lannea stuhlmannii*, *Lonchocarpus*, *Terminalia*, and *Ziziphus*. Dominant grasses are *Setaria incrassata*, *Hyparrhenia dissoluta*, *H. rufa*, and *Cymbopogon afronardus*. The mountain areas of Morungole (south-east) and Nangeya (south-west) support high level forest savanna mosaics dominated by trees such as: *Protea gaguedi*, *Faurea saligna*, *Juniperus procera* and *Podocarpus gracilior*, with grassy swards of *Andropogon distachyos*, *Cymbopogon validus*, and *Hyparrhenia cymbaria*.

Fauna The park is the only protected area in Uganda in which certain species occur. Mammals include: lesser kudu *Tragelaphus imberbis*, a local race of Grant's gazelle *Gazella granti brighti*, Burchell's zebra *Equus burchelli*, eland *Taurotragus oryx livingstonii*, roan antelope *Hippotragus equinus*, Uganda kob *Kobus kob thomasi* (three in 1981), klipspringer *Oreotragus oreotragus*, bushbaby *Galago senegalensis*, bat-eared fox *Otocyon megalotis*, striped hyena *Hyacina hyaena*, aardwolf *Proteles cristatus*, caracal *Felis caracal*, cheetah *Acinonyx jubatus* (T), greater kudu *Tragelaphus strepsiceros*, Chanler's or mountain reedbuck *Redunca fulvorufula chanleri*, black rhinoceros *Diceros bicornis* (T), and long-snouted dik-dik *Madoqua guentheri*. Abundant birdlife includes: ostrich *Struthio camelus*, swallow-tailed kite *Chelictinia riocourii*, stone partridge *Ptilopachus petrosus*, Abyssinian ground hornbill *Bucorvus abyssinicus*, standard-wing nightjar *Macrodipteryx longipennis*, Karamoja apalis *Apalis karamojae* (K), fan-tailed raven *Corvus rhipidurus*, piapiac *Ptilostomus afer* and five bustards including kori *Choriotis kori*. Over 50 species of birds of prey include Verreaux's eagle *Aquila verreauxii* and pygmy falcon *Polihierax semitorquatus*.

Conservation Management Some 21 days per month are spent on patrol with 50% of the park covered each month.

Zoning No information

Disturbances or Deficiencies Incursions of poaching parties from the east, west, and particularly over the border from the north-west, have been reported. Elephant damage to *Acacia* trees is a continuing problem.

Visitor Facilities The fully-equipped Apoka Restcamp near the southern entrance of the park has excellent facilities.

Scientific Research Experimental plots to study the effect of game and bushfire on habitat, were established some years ago by Makerere University. A survey of the avifauna was carried out for the park authorities by Oxford University in 1966.

Special Scientific Facilities None

Principal Reference Material

- ° Elliott, C.C.H. (1972). An ornithological survey of Kidepo Valley National Park. *J. East Afr. Nat. Hist. Soc.* 28(129): 1-31.
- ° Ross, I.C., Ziefler, A.P. and Field, P.A.C. (1968). A visitors guide to Kidepo National Park. AWLF Washington.
- ° Thiollay, J.M. (1978). Falconiformes in Uganda National Parks. *East Afr. Wildl. J.* 16: 145-151. (Includes checklist of raptors recorded for the park.)

Staff Some 109 rangers based at the park headquarters.

Budget No recent information

Local Park or Reserve Administration Park headquarters at Opoka

Date April 1985

LAKE MBURO NATIONAL PARK

Management Category Under Review

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Settlement prohibited

Date Established Originally established as a Controlled Hunting Area under General Notice 1558 of 1959. Game Reserve status in 1964 by Statutory Instrument No. 226. Boundaries amended by S.I. No. 133 of 1965. Gazetted as a National Park in 1983 by an Act of Parliament.

Geographical Location Southern Uganda near the border with Tanzania in the Ankole District, about 35km due east of Mbarara; bounded on the north by the Mbarara-Kampala road. 0°30'-40'S, 30°35'-31°10'E.

Altitude 1,200-1,800m

Area 53,600ha

Land Tenure Government

Physical Features There are undulating open plains and marshes with hills in the west of the park. It is bounded on the east by Lake Kachira, on the west by the Ruizi River and on the south by swampland and a chain of 11 lakes, including Lake Mburo.

Vegetation Dry *Acacia* and grassland savanna surrounds the lakes. The shores are lined with extensive belts of papyrus, reed, and waterlily. In the western hills small acacia forests occur in the valleys, and there is some gallery forest.

Fauna The fauna represents a remnant of an abundant fauna which once covered the entire Ankole grasslands and the park is the last area in western Uganda where zebra *Equus burchelli*, roan antelope *Hippotragus equinus*, impala *Aepyceros melampus* (plains area) which are not found in any of the other Ugandan national parks, and eland *Taurotragus oryx* (Acacia belt) occur. Mammals in the park are characteristic of the broad belt of high, but fairly dry and stony grasslands extending from north Tanzania through eastern Ankole to south-east Toro and also include topi *Damaliscus lunatus*, oribi *Ourebia ourebi*, klipspringer *Oreotragus oreotragus*, warthog *Phacochoerus aethiopicus*, reedbuck *Redunca redunca*, leopard *Panthera pardus* (T), spotted hyena *Crocuta crocuta*, and baboons *Papio* sp.. Buffalo *Syncerus caffer*, sitatunga *Tragelaphus spekei* and hippopotamus *Hippopotamus amphibius* occur in the marshy forested area. Many birds are attracted to the lakes, and the Narina trogon *Apaloderma narina* is found in forested valleys.

Conservation Management The Game Department of Uganda made concerted efforts in 1982 to move cattle and people out of the park in preparation for national park status. Resettlement of people was finalised in 1984, although cattle were still present in the park. Construction of park headquarters had begun at Mburo in 1983/1984. However, there is currently little management possible within the area.

Zoning None

Disturbances or Deficiencies Massive encroachment of over 10,000 Ankole cattle, numerous temporary camps and some permanent settlements surrounded by banana plantations were reported in 1982, but in 1985 settlements had been removed, although some encroachment continued. During the recent troubles, however, local residents again resettled the park, and attacked park staff. As staff weapons and vehicles had been requisitioned they were unable to control the situation and left the park.

Visitor Facilities There is a small guest house and three good campsites. Access is easy, via the Kampala-Mbarara tarmac road.

Scientific Research Periodic animal population surveys; at present habitat utilisation by large herbivores is being studied.

Special Scientific Facilities None

Principal Reference Material

- ° IUCN/WWF Project 1915. Uganda, Anti-poaching and law enforcement in Uganda's National Parks.
- ° Kingdon, J. (1985). Lake Mburo - a new national park in Africa. *Oryx* 19(1): 7-10.

Staff There is now a full-time resident warden

Budget No information

Local Park or Reserve Administration Uganda National Park, PO Box 3530, Kampala.

Date 1986

MURCHISON FALLS (KABALEGA) NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total, but fishing is permitted in the river

Date Established 3 April 1952

Geographical Location Upstream of the point where the Victoria Nile flows into Lake Mobutu Sese Seko. 2°00'-2°30'N, 31°30'-32°15'E.

Altitude 500-1,292m (mainly 600-800m)

Area 384,000ha; contiguous in the south to Bugungu Game Reserve (74,800ha) and Karuma Game Reserve (71,270ha) and in the north to Aswa-Lolim Game Reserve (recently degazetted). Aswa-Lolim Game Reserve was contiguous to Ajay Game Reserve (15,600ha) by a narrow corridor and East Madi Controlled Hunting Area (174,940ha).

Land Tenure Government

Physical Features This is an area of rolling grassland and savanna decreasing in height from Rabongo Hill in the east to the western Rift wall and Lake Albert. The Victoria Nile, running east to west, bisects the park. The river is forced through a rock cleft some 7m wide in spectacular 43m high Murchison Falls (also now secondary falls on north bank), which constitute an important ecological barrier for aquatic fauna. Karuma Falls upstream are outside the eastern park boundary. Mean annual precipitation is 1200mm, falling mainly during the two rainy seasons in the periods March to May and August to November.

Vegetation The east and south of the park were formerly covered by *Terminalia* woodland and the west by *Hyparrhenia* grassland, but damage by elephant has destroyed much of the woodland and the area has tended to become a uniform grassland with scattered remnants of riparian forests. Investigations in 1980 suggested that regeneration is occurring, particularly of *Acacia sieberana* along the river, *Borassus aethiopum* in the Tangi River catchment, and *Lonchocarpus laxiflorus* in the south. Areas of *Cyperus papyrus* swamp occur along the river.

Fauna Over 1,000 elephant *Loxodonta africana* (T) were recorded in the northern sector in 1980, greatly reduced from approximately 14,500 in the early 1970s, and now due to a reduction in poaching the number is probably higher. Numbers of buffalo *Syncerus caffer* and kob *Kobus kob* are relatively high and there are good populations of several other game species. Other mammals include: chimpanzee *Pan troglodytes* (T) in Rabongo Forest, lion *Panthera leo*, leopard *Panthera pardus* (T), hippopotamus *Hippopotamus amphibius*, and giraffe *Giraffa camelopardalis rothschildi*. The northern white rhinoceros *Ceratotherium simum cottoni* (T), a subspecies introduced into the park in the 1970s from the West Nile district, has not been seen recently. The black rhinoceros *Diceros bicornis* (T) is decreasing in numbers. Over 350 recorded bird species include: shoebill *Balaeniceps rex* (of special concern), goliath heron *Ardea goliath*, open-bill stork *Anastomus lamelligerus*, saddle-bill stork *Ephippiorhynchus senegalensis*, fish eagle *Haliaeetus vocifer* (most conspicuous of 49 recorded raptors), tawny eagle *Aquila rapax*, lappet-faced vulture *Torgos tracheliotus*, skimmer *Rhynchops flavirostris*, pratincole *Glareola nuchalis*, and seven species of kingfisher including malachite *Alcedo cristata*. Also many palearctic and African migrants include buzzards and harriers. The population of crocodile *Crocodylus niloticus* (V) has suffered from poaching but numbers are still high in the lower river.

Conservation Management Successful anti-poaching operations had resulted in increased herbivore populations and a natural cycle of change to the *Acacia* dominated scrub seems to be

occurring. Park headquarters were on the north bank of the river. There are currently several serious management problems.

Zoning Not yet established

Disturbances or Deficiencies During the political unrest in the late 1970s, over 75% of the animal population in the park was destroyed by hunters and ivory poachers. In remoter areas poaching, particularly of hippopotamus, continues, sometimes with automatic weapons. A proposed hydroelectric scheme at Murchison Falls would seriously affect the ecological balance of the area. During recent disturbances there has again been increased poaching, and damage to park buildings and equipment, as well as staff losses.

Visitor Facilities Hotels are at Paraa (badly damaged in 1979) and at Chobe below Karuma Falls. Campsites are designated and good access roads (including to Murchison and Karuma Falls). Launch trips go to the foot of Murchison Falls. Sport fishing is permitted in the river. The slack water below the two falls is renowned for large Nile perch.

Scientific Research Studies for management purposes have been made by the Uganda Institute of Ecology (previously the Nuffield Unit of Tropical Animal Ecology). Of particular interest is the barrier to aquatic fauna created by Murchison Falls and the barrier of the river to animal movements. An ecological impact study is being carried out (1984) concerning the proposed hydroelectric scheme.

Special Scientific Facilities The Wildlife Education Centre at Paraa, built in 1967, which offered accommodation and a wide range of facilities, was closed in 1979, but had been reopened by 1985. WWF is assisting in the reopening of the centre.

Principal Reference Material

- ° Cott, H.B. (1961). Status and biology of the Nile crocodile below Murchison Falls. *J. Zool. Soc. Lond.* 29(4): 211-356.
- ° Cott, H.B. (1969). Tourists and crocodiles in Uganda. *Oryx* 10: 153-160.
- ° Hatton, J., Hobsley, C. and Smart, N. (1982). Kabalega Falls National Park, Uganda. Interim Project Report. University College, London, Ecological and Conservation Unit.
- ° IUCN/WWF Project 3079. Uganda, Rehabilitation of Paraa Wildlife Education Centre in Kabalega Falls National Park.
- ° Malpas, R.C. (1978). The Ecology of the African Elephant in Ruwenzori and Kabalega Falls National Parks. Ph.D. Thesis (Unpublished), University of Cambridge.
- ° Malpas, R. (1980). Wildlife in Uganda 1980 - A Survey. A Report to the Minister of Tourism and Wildlife, Uganda.
- ° Smart, N.O.E., Hatton, J.C. and Spence, D.H.N. (1985). The effect of long-term exclusion of large herbivores on vegetation in Murchison Falls National Park, Uganda. *Biological Conservation* 33: 229-245.
- ° Thiollay, J.M. (1978). Population structure and seasonal fluctuation of falconiformes in Ugandan National Parks. *East African Journal of Wildlife* 16: 145-151. (Includes a checklist of raptors recorded from the park.)

Staff Some 120 rangers were employed within the park with 60 at park headquarters and 60 at 15 outposts. They spent over two-thirds of each month on patrol with about 75% of the park covered in each month. However, during recent disturbances many of the staff are reported to have left.

Budget No recent information

Local Park or Reserve Administration Park headquarters are on the north bank of the river.

Date April 1985

QUEEN ELIZABETH (RWENZORI) NATIONAL PARK

Management Category II and IX (National Park and Biosphere Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna) and 3.20.12 (Central African Highlands)

Legal Protection Total

Date Established April 1952 as Queen Elizabeth National Park (197,800ha); the area was known as Rwenzori National Park between 1972 and 1980. Accepted as a Biosphere Reserve in November 1979.

Geographical Location Situated on both sides of the Equator in western Uganda on the Zaire border, between Lakes Edward and George. 0°15'S-0°10'N, 29°45'-30°05'E.

Altitude 910-1390m

Area National Park 197,800ha and Biosphere Reserve 220,000ha. Contiguous to Kigezi Game Reserve (32,830ha), Kyambura Game Reserve (15,700ha), and Kibale Forest Corridor Game Reserve (33,910ha) in Uganda and Virunga National Park (809,000ha) in Zaire. Kazinga Channel Sanctuary (20,700ha) abuts the east central boundary and part of the southern shore of Lake George.

Land Tenure Government

Physical Features The park is situated in the western Rift Valley between Lake George and Lake Edward. The lakes are joined by the 34km-long Kazinga Channel, which bisects the park. Mean annual rainfall is 700mm with marked differences occurring over short distances, falling mainly during two rainy seasons in March to May and August to November. This area was one of volcanic activity 8,000 to 10,000 years ago and to the north of Lake Edward there is an area of explosion craters, some containing salt lakes. The eastern boundary of part of the park follows the escarpment of the rift valley edge. There are areas of swamp, the largest being in the north, to the north of Lake George, and much of the park is fairly flat. Climate is cool for the latitude; temperatures are similar all year round. Mean minima are about 18°C and maxima 28°C most months, but rain falls mainly in two seasons, March to May and September to November. It varies considerably within the park, increasing from about 750mm annually on Lake Edward, towards the escarpment, which has about 1230mm per year.

Vegetation The area has a remarkable range of ecosystems: semi-deciduous tropical high forest, undulating grasslands, *Acacia* savannas, swamps and tundra. Maramagambo Forest (about 50,000ha) is between the escarpment and Lake Edward and comprises a wide belt of medium altitude semi-deciduous forest. It is the only forest of any extent protected within an Ugandan National Park. South of this forest are the rolling plains of the Kigezi section, and north are grasslands dotted with *Euphorbia* spp.. The bush cover appears to have increased over the past few years with the decline in elephant numbers.

Fauna A west African influence is apparent in the fauna, particularly among birds and invertebrates. The park is well-known for its rich and diverse tropical fauna with large herds of buffalo *Syncerus caffer* (4200 in 1980), elephant *Loxodonta africana* (T) (153 in 1980), and hippopotamus *Hippopotamus amphibius*. A 1980 survey recorded five elephant herds totalling about 150 animals (though this is regarded as an under-estimate) though numbers have been greatly reduced by poaching compared with previous years. Other large mammals include: kob *Kobus kob* (most numerous species: about 20,000), waterbuck *K. ellipsiprymnus*, bushbuck *Tragelaphus scriptus*, warthog *Phacochoerus aethiopicus*, topi *Damaliscus lunatus*, and leopard *Panthera pardus* (T) also interesting species are chimpanzee and giant forest hog *Hydrochoerus meinertzhageni*. There are some surprising gaps in the fauna, such as the absence of zebra and impala. The Kigezi section is well-known for tree climbing lion *Panthera leo*. There are 543 recorded bird species including: shoebill *Balaeniceps rex* (of special

concern), black bee-eater *Merops gularis*, 11 species of kingfisher including malachite *Alcedo cristata* and pied *Ceryle rudis*, and numerous resident and migrant (Palearctic and African) raptors such as Peregrine falcon *Falco peregrinus*, bateleur *Terathopius ccaudatus*, migrant black kite *Milvus migrans parasitus*, and Wahlberg's eagle *Aquila wahlbergi*. Nile monitor *Varanus niloticus* is common along the Kazinga channel.

Conservation Management Improvements in anti-poaching methods had been implemented, but more recently staff have been disarmed and their vehicles requisitioned, and this has led to increases in poaching. There is a management plan.

Zoning No information

Disturbances or Deficiencies The higher areas are in a natural state, but there are about 20 settlements in the lower area on the lakeshore. The population has increased recently (due in particular to a salt factory built with German aid, but which is no longer functioning and has been abandoned), and is putting great pressure on natural resources. There has been an increase in fire, grazing (sheep, goats and cattle), and overfishing of the lakes. All game species, except kob, were still declining in numbers in 1980. Staff are currently without weapons or vehicles, though they remain within the park.

Visitor Facilities Mweya Lodge, run by Uganda Hotels, is fully operational. There are two hostels and self-catering bandas at Ishasha in the south of the park. A campsite is available on the Mweya Peninsula and elsewhere within the park. Launch trips are organised along the Kazinga channel. Uganda Airways run a regular service from Entebbe to Kasese, 40km from Park Headquarters.

Scientific Research Research at the Uganda Institute of Ecology continues, including studies on overgrazing by goats and habitat exploitation by bushbuck. At present, there is a study on the effects of fishing villages on the park's animals.

Special Scientific Facilities The park contains the oldest ecological research station in East Africa (Uganda Institute of Ecology) with five permanent research workers. Research facilities were partly destroyed during the recent political unrest. There are no educational facilities.

Principal Reference Material

- ° Eltringham, S.K. (1973). The Large Mammal Community of the Queen Elizabeth National Park (Uganda). *Annales de l'université d'Abidjan*. Série E. Tome VI - fascicule 2.
- ° Lock, J.M. (1967). Ph.D. Thesis (Unpublished), University of Cambridge.
- ° Lock, J.M. (1977). Botanical Survey of Rwenzori National Park. *Engl. Bot. Jahrb.*
- ° Malpas, R.C. (1978). The Ecology of the African Elephant in Rwenzori and Kabalega Falls National Parks. Ph.D. Thesis (Unpublished), University of Cambridge.
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- ° Thiollay, J.M. (1978). Falconiformes in Uganda National Parks. *East Afr. Wildl. J.* 16: 145-151. Includes checklist of raptors recorded in the park.
- ° Williams, J.G. (1981). *A Field Guide to the National Parks of East Africa*, Collins, London. Bird and mammal list. Brief description of the park.

Staff Some 107 rangers with 55 at park headquarters, and 52 in 13 outposts. They did spend about two-thirds of their time on patrol with about 60% of the park covered each month, but during the recent troubles travel has been curtailed following the requisition of park vehicles.

Budget No information

Local Park or Reserve Administration Park headquarters is situated at Mweya.

Date 1986

AJAI GAME RESERVE (WEST NILE)

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Established primarily to protect the white rhinoceros, but other resident species are accorded same protection. Hunting is strictly prohibited.

Date Established Established in 1962 as the White Rhino Sanctuary under General Notice 353. Established as Ajai Game Reserve in 1965 by Statutory Instrument No. 147.

Geographical Location West bank of the Nile between Pakwach and Nimule, about 10km north of Inde and 32km east-south-east of Arua. 2°55'N, 31°25'E.

Altitude 700-1,000m

Area 15,800ha

Land Tenure Public

Physical Features This area of rivers and riverine swamp borders the River Nile and two tributaries, the Ala and Acha. The reserve includes a number of swamp islands including Ajai island formed by gradual deposition of soil from the hills by the Ala River. The swamp is surrounded by savanna woodland. Most of the swamp is flooded during the rainy months (June to January), but dries out from February to May.

Vegetation Wooded savanna and grassland communities of *Loudetia-Eragrostis* and *Hyparrhenia*. There is a variety of vegetation on the island due to its gradual formation. The older eastern sector has a mosaic of savanna forest and sandy plains, areas of thick forest, rain forest and open grass plains with *Imperata* (a grass occurring elsewhere only in the highlands which are the source of the Ala River). The western sector is covered in dense elephant grass *Pennisetum* with clumps of wild date plum *Phoenix*.

Fauna Migration of animals onto the island during the dry season is necessitated by lack of forage in the surrounding dry scrubland. Mammals include hippopotamus *Hippopotamus amphibius* along the Nile, Uganda kob *Kobus kob thomasi*, hartebeest *Alcelaphus buselaphus*, bushbuck *Tragelaphus scriptus*, and waterbuck *Kobus ellipsiprymnus*. Black and white colobus *Colobus guereza* and baboon *Papio* sp. have been recorded.

Conservation Management There are guard posts at Ogoko, Iriemve and Inde. Iriemve and Inde were not in use in 1980.

Zoning None

Disturbances or Deficiencies The small size of the reserve results in many animals continually moving in and out into open areas in the vicinity where they are subject to poaching. The threatened northern white rhinoceros *Ceratotherium simum cottoni* (T) has not been seen here since the war in 1979 and is assumed to have been wiped out.

Visitor Facilities It has high tourism potential despite the distance from Kampala and excellent potential for short walking safaris.

Scientific Research Mammal species have been periodically monitored.

Special Scientific Facilities None

Principal Reference Material

° WWF/IUCN Project 1760. Uganda, Conservation of Rhino in Ajai Sanctuary.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date 1983

BOKORA CORRIDOR GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established Gazetted in 1964 by Statutory Instrument No. 223 to ensure freedom of movement for game during migration between the Matheniko plains and Pian-Upe Game Reserve. The reserve was originally part of Central and South Karamoja Controlled Hunting Areas.

Geographical Location In eastern Uganda between Moroto and Mount Elgon, between Matheniko Game Reserve and Pian-Upe Game Reserve, along the south-western boundary of the Karamoja region. 2°07'-2°45'N, 33°50'-34°50'E.

Altitude 1,000-2,100m

Area 205,600ha; contiguous to Pian-Upe Game Reserve (228,710ha) and Matheniko Game Reserve (158,650ha). Flanked on remaining sides by four Controlled Hunting Areas totalling over 2,000,000 ha, which are contiguous to four other Controlled Hunting Areas and Kidepo Valley National Park (134,400ha).

Land Tenure Public

Physical Features The reserve is a plateau with a few inselbergs, typical of the southern Karamoja region. The climate is relatively dry.

Vegetation The wooded grassland savanna on marginal land is of little or no use for agriculture or settlement.

Fauna A wide variety of antelopes (but not in high numbers) includes: eland *Taurotragus oryx*, Uganda kob *Kobus kob thomasi*, reedbuck *Redunca redunca*, oryx *Oryx gazella*, mountain reedbuck *Redunca fulvorufula*, roan antelope *Hippotragus equinus*, topi *Damaliscus lunatus*, hartebeest *Alcelaphus buselaphus jacksoni*, and oribi *Ourebia ourebi aequatoria*. Other mammals include: spotted hyena *Crocuta crocuta*, lion *Panthera leo*, leopard *Panthera pardus* (T), and giraffe *Giraffa camelopardalis*.

Zoning None

Disturbances or Deficiencies Settlement and grazing by domestic livestock occurs, competing with the wildlife population which is now very sparse.

Scientific Research Periodic animal population aerial surveys, last done 1983.

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date April 1985

BUGUNGU (BUKUMI-BUGUNGU) GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection No settlement allowed in the reserve

Date Established 1968 by Statutory Instrument 20; originally established as a Controlled Hunting Area in 1963 under Legal Notice 361

Geographical Location Between Murchison Falls (Kabalega) National Park and the north shore of Lake Mobutu Sese Seko (Lake Albert). 2°15'N, 31°30'E.

Altitude 600-1,300m

Area 52,000ha; contiguous to Murchison Falls National Park (384,000ha) and Karuma Game Reserves (82,000ha)

Land Tenure Public

Physical Features The features are similar to the southern sector of Murchison Falls National Park. Bugungu Game Reserves and Karuma Game Reserve constitute a buffer zone for the southern boundary of Murchison Falls National Park.

Vegetation Dry thicket with some open savanna woodland

Fauna The area is well-known for chimpanzees *Pan troglodytes* (T), but the number in the reserve is unclear. Mammals include: lion *Panthera leo*, elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, Uganda kob *Kobus kob*, hartebeest *Alcelaphus buselaphus*, and many small ungulates. The reserve includes part of Budongo Forest which has a relatively rich birdlife.

Zoning None

Disturbances or Deficiencies Permanent fishing villages on the shore of Lake Mobutu are not considered to threaten the purposes of the reserve. Previous poaching problems are now under some degree of control. There is some tree felling for making charcoal.

Scientific Research Periodic animal population surveys

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date April 1985

GORILLA GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Established strictly for protection of the mountain gorilla and chimpanzee. No settlement is allowed in the reserve.

Date Established 1964 by Statutory Instrument No. 215. Originally established in 1930 as a Game Sanctuary under Legal Notice 21. Also known as Kigezi Gorilla Game Reserve or Mgahinga Forest Reserve, but it is further south than Kigezi Game Reserve.

Geographical Location Extreme south-west corner of Uganda on the borders with Zaire and Rwanda. 1°25'S, 29°35'E.

Altitude 2,700-4,127m

Area 2,900ha; contiguous to Volcanoes National Park (23,000ha) in Rwanda, which is contiguous to Virunga National Park (809,000ha) in Zaire. Size reduced from 3,400ha in 1950.

Land Tenure Government

Physical Features It includes parts of three volcanic mountains (Muhavura, Mgahinga, and Sabinio). The summit of Muhavura has a small crater lake and forms the highest point in the reserve.

Vegetation The alpine summit areas are dominated by St John's wort *Hypericum* spp. and dwarf heaths which merge into broad leaved montane forest and bamboo. On the lower slopes is a high altitude type of savanna woodland. The forest is rich in lichens and mosses.

Fauna The reserve was established to protect chimpanzee *Pan troglodytes* (T) and the mountain gorilla *Gorilla gorilla berengei* (T). Other mammals include: the distinctive golden monkey *Cercopithecus mitis kandti* (rare subspecies of the diademed monkey), leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), giant forest hog *Hylochoerus meinertzhageni*, bushbuck *Tragelaphus scriptus*, and buffalo *Syncerus caffer*. The abundant birdlife includes the Ruwenzori turaco *Tauraco johnstoni*, yellow-billed barbet *Trachyphonus purpuratus*, five species of *Apalis*, Lühder's bush shrike *Laniarius lühderi*, six species of sunbird, and four species of crimson-wing *Cryptospiza*. The threatened butterfly species *Papilio leucotaenia* (V) may also inhabit the reserve.

Conservation Management No harvesting of bamboo has been allowed since 1982. Local people buy bamboo from the Forest Department who collect it from other areas. There is a general working plan for the area, but this is in need of revision.

Zoning None

Disturbances or Deficiencies There is severe disturbance from agricultural and pastoral activities and poaching. The decrease in area by raising the boundary from 2,425m to 2,730m removed an important gorilla habitat from the reserve. Increasing deforestation by residents of the lower slopes is tending to destroy more gorilla habitat, reducing its chance of survival in the area. Restricted bamboo cutting was allowed annually in the reserve before 1982. The area seems to be less well protected than neighbouring protected areas in Zaire and Rwanda. There are about 400 gorillas in this whole region, but only one group is found in the Ugandan sector and may have disappeared recently. The access road was destroyed by heavy rain in 1983.

Scientific Research Monitoring of the gorilla population and other species has been carried out.

Special Scientific Facilities None

Principal Reference Material

° Malpas, R. (1980). Wildlife in Uganda 1980 - A Survey. A report to the Minister of Tourism and Wildlife, Uganda.

Staff No recent information

Budget No recent information

Local Park or Reserve Administration Game Department, Fort Portal.

Date April 1985

KARUMA GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Total

Date Established 1964 by Statutory Instrument 248. Previously a Controlled Hunting Area under General Notice No. 352 of 1962.

Geographical Location Western Uganda, adjoining Murchison Falls National Park to the north. Approximately 1°50'N, 31°45'E.

Altitude 900-1,300m

Area 82,000ha; contiguous to Murchison Falls National Park (384,000ha) and Bugungu Game Reserve (52,000ha)

Land Tenure Public

Physical Features This is an area of gentle relief crossed by several watercourses, south of the Victoria Nile.

Vegetation The savanna grasslands are dominated by elephant grass *Pennisetum purpureum* and *Hyparrhenia rufa* with isolated forest and savanna trees representing remnants of former forest cover. It is bordered to the south-west by a forested zone.

Fauna Species similar to those in Murchison Falls National Park include: elephant *Loxodonta africana* (T), giraffe *Giraffa camelopardalis*, buffalo *Syncerus caffer*, and many antelope species. Large numbers of animals move in herds to and from Murchison Falls National Park.

Conservation Management Control of poaching has improved.

Zoning None

Disturbances or Deficiencies Increased settlement in areas adjoining the reserve with increased cultivation have resulted in problems of law enforcement and control of game.

Scientific Research Periodic animal population surveys

Special Scientific Facilities None

Principal Reference Material None listed

Staff No recent information

Budget No recent information

Local Park or Reserve Administration No information

Date 1983

KATONGA GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection No settlement allowed

Date Established 1964 by Statutory Instrument No. 222. Originally part of a larger Controlled Hunting Area under Legal Notice 525 of 1961.

Geographical Location 190km west of Kampala on the Kampala-Kasese railway. 0°15'N, 30°45'E.

Altitude 1,200-1,500m

Area 20,800ha; surrounded on three sides by Katonga Controlled Hunting Area (227,297ha)

Land Tenure Public

Physical Features The reserve is bounded to the south by the Katonga River, part of a river system from Lake George to Lake Victoria draining extensive areas to the north and south.

The Katonga enters Lake Victoria about 35km north-east of Masaka. The reserve is drained by numerous tributaries of the Katonga.

Vegetation There is dry savanna with deciduous thickets of *Acacia*, *Combretum* and *Albizia* and perennial grasses such as *Cymbopogon*, *Hyparrhenia* and *Themeda*.

Fauna Mammals include: elephant *Loxodonta africana* (T), lion *Panthera leo*, leopard *Panthera pardus* (T), buffalo *Syncerus caffer*, zebra *Equus burchelli*, eland *Taurotragus oryx*, roan antelope *Hippotragus niger*, waterbuck *Kobus ellipsiprymnus*, topi *Damaliscus lunatus* and the highland race of the bohar reedbuck *Redunca redunca wardi*. The reserve includes part of the migratory route from Murchison Falls National Park to south-east Toro.

Zoning None

Disturbances or Deficiencies Very extensive illegal cattle grazing has resulted in a decline in the numbers of eland, roan antelope, zebra, elephant, and topi.

Scientific Research Periodic aerial surveys to assess animal populations, last done in 1982.

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date 1983

KIBALE FOREST CORRIDOR GAME RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection No settlement is allowed

Date Established 1964 by Statutory Instrument No. 221. A sector of the reserve was previously part of the former Lake George Game Reserve. (Lake George Game Reserve now forms the northern sector of Queen Elizabeth National Park).

Geographical Location Located in the Toro District of western Uganda, it extends northwards from Queen Elizabeth National Park and Lake George towards Fort Portal. 0°30'N, 30°20'E.

Altitude 1,110-1,590m

Area 56,000ha; contiguous to Queen Elizabeth (Rwenzori) National Park (197,800ha), which is contiguous to several other protected areas

Land Tenure Government

Physical Features The reserve is in the plateau area of the volcanic crater region east of the Ruwenzori range. The basement complex of precambrian undifferentiated acid gneisses is overlain in some areas by quartzite intruded by amphibolites, gneisses, and granites. The soils are well-drained ferallitic sandy to sandy clay loams. Two rainy seasons occur in the periods March to May and September to November. Mean annual precipitation is 1500mm. Mean maximum temperature is 25°C and minimum temperature is 13°C.

Vegetation The reserve includes part of Mpanga Forest, a vast tract of tropical high forest extending from Fort Portal almost to Lake George (some 12-15 miles away) and links up with the main block of Kibale Forest. The main vegetation type is moist semi-deciduous forest (part way between lowland and montane forest) with *Chrysophyllum* spp., *Celtis* spp., and *Cynometra alexandri* grading to moist *Acacia-Hyparrhenia* woodland/savanna with grasses *Cymbopogon afronardus*, *Imperata cylindrica*, *Themeda triandra*, and *Hyparrhenia* spp.. Other species include *Pennisetum purpureum*, *Beckeropsis unisetata*, and *Acanthus pubescens*. The combination of species varies with location. There is also swampland of *Cyperus papyrus*, *Phragmites* sp., *Mitragyna rubrostipulata*, and *Neoboutonia macrocalyx* with canopy of *Pseudospondias microcarpa*, *Treculia africana*, and *Symphonia globulifera*. The montane forest trees support many epiphytes including beard lichens, elephant-ear fern, horse-tongue fern, mosses, and orchids.

Fauna Mammals include: elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, giant forest hog *Hylochoerus meinertzhageni*, hippopotamus *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, blue duiker *Cephalophus monticola*, red duiker *Cephalophus natalensis*, common duiker *Sylvicapra grimmia*, Uganda kob *Kobus kob thomasi*, bush pig *Potamochoerus porcus*, pangolin *Manis* sp., serval *Felis serval*, otter *Lutra* sp., and five species of mongoose. The forests are among the richest in East Africa for primates, with 11 species present, including: diademed monkey *Cercopithecus mitis*, red-tailed monkey *Cercopithecus ascanius*, l'Hoest's monkey *Cercopithecus lhoesti*, white-cheeked mangabey *Cercocebus albigena*, and olive baboon *Papio anubis*. Chimpanzee *Pan troglodytes* (T) and black and white colobus *Colobus guereza* occur in the northern sector which also constitutes the last refuge for the only remaining viable population in Uganda of red colobus *Colobus badius tephrosceles*. Kibale is exceptional for forest birds and about 290 species have been recorded, including one endemic to this forest, the Kibale ground-thrush *Turdus kibalensis* (I); giant blue turaco *Corythaëla cristata*, grey parrot *Psittacus erithacus*, and black-and-white casqued hornbill *Bycanistes subcylindricus* also occur. The reserve also constitutes an important reservoir of reptiles and insects including several species of mamba, cobra, viper and python, and the butterflies African giant swallowtail *Papilio antimachus* (R) and *Salamis temora*.

Conservation Management Settlement is confined to the southern sector. Kibale has been identified as one of the five most important forests for wildlife in Uganda (Kingston 1967). A Toyota Landcruiser was provided under IUCN/WWF Project 1765 to combat encroachment and illegal timber removal.

Zoning Part of Kibale Forest was established in 1976 as a nature reserve (about 6,000ha) protected against all forms of human exploitation and buffered by forest (60% tall mature forest) used for selective timber felling. It is also contiguous to Queen Elizabeth National Park, which includes a 1,630ha area of undisturbed natural forest also protected from human exploitation.

Disturbances or Deficiencies The reserve was originally established as a migratory route for animals moving to the protected areas north of Queen Elizabeth National Park, but it is now less useful in that role due to the reduction in animal numbers over the past years. Agricultural encroachment occurs in the south (18,700ha) and some illegal timber extraction in the forests of the north, reducing the undisturbed area of forest to 18500ha (Kingdon 1973). One of the main reasons for establishment of the reserve was maximisation of sustained timber production. Timber is being extracted and there are plantations of exotic conifers. Some hunting is permitted.

Scientific Research Periodic animal population surveys. Integrated ecological research projects have been carried out in Kibale Forest for about 10 years including a study aided by WWF, the New York Zoological Society and Ugandan National Research Council (IUCN/WWF Project 1969) on the effects of selective tree felling on primate populations.

Special Scientific Facilities Kanyawarra Forest Station has a library.

Principal Reference Material

- IUCN/WWF Project 1969. Effects of selective tree felling on populations of rain forest primates.
- IUCN/WWF Project 1765. Uganda, Forest Reserves.
- Kingdon, J. (1973). Endemic birds and mammals of western Uganda: measuring Uganda's wealth and a plea for supra-economic values. *Uganda J.* 37: 1-7.
- Kingston, B. (1967). Working plan for Kibale and Itwara Central Forest Reserves, Toro District, Uganda. Entebbe: Uganda Forest Department.
- Malpas, R. (1980). Wildlife in Uganda 1980 - A Survey. A Report to the Minister of Tourism and Wildlife, Uganda.
- Struhsaker, T. and Leland, L. (1979). In: Kibale an inheritance still preserved. *SWARA* 2(1).
- Wing, L.D. and Buss, I.O. (February 1970). Elephants and forests. *Wildlife monographs* 19. (Includes list of woody plant species in the reserve).

Staff There are forest and game staff based at two plant stations, including three foresters, four forest rangers, and four forest guards. The game department employs one senior game guard and two game guards.

Budget No recent information

Local Park or Reserve Administration Forest and Game Department

Date 1984

KIGEZI GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection No settlement allowed

Date Established 1952 by General Notice No. 158. Boundaries changed by Legal Notices 154 of 1955 and 292 of 1962.

Geographical Location The reserve is a southward annexe to Queen Elizabeth (Rwenzori) National Park, separated from Lake Edward by a 7km wide sector of the park. 0°30'S, 29°50'E.

Altitude About 1,050m

Area 33,000ha; contiguous to Queen Elizabeth National Park (197,800ha) and its associated reserves

Land Tenure Government

Physical Features Situated on the western arm of the Central African rift valley.

Vegetation The moist deciduous forest and grass savanna is similar to the sector of Queen Elizabeth National Park south of Maramagambo Forest with dominant trees of *Acacia* and *Albizia* spp., and grasses such as *Imperata*, *Cymbopogon*, *Hyparrhenia*, and *Beckeropsis*.

Fauna Mammals usually occur in small numbers and includes: eastern black-and-white Colobus *Colobus guereza* and some red colobus *Colobus badius*, the eastern subspecies of chimpanzee *Pan troglodytes schweinfurthii* (T), lion *Panthera leo*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, giant forest hog *Hylochoerus meinertzhageni*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, Uganda kob *Kobus kob thomasi*, waterbuck *Kobus ellipsiprymnus*, bushbuck *Tragelaphus scriptus*, topi *Damaliscus lunatus* and Oribi *Ourebia ourebi*. The abundant birdlife is similar to Queen Elizabeth National Park.

Zoning The reserve acts as a buffer zone between Queen Elizabeth National Park and the well-populated areas to the south and east. There is no zonation within the reserve.

Disturbances or Deficiencies Settlement and cultivation in adjoining areas are encroaching on the reserve and local people poach for meat. A road from the national park to Kabale, which provides access to Kayonza Forest, crosses the reserve.

Scientific Research Periodic animal population surveys

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Game Department, Fort Portal.

Date 1983

KYAMBURA GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Settlement prohibited, but licenced fishing permitted

Date Established 1965 by Statutory Instrument No. 147. The boundaries were amended by Statutory Instrument No. 199 of 1965. The reserve was previously part of a larger area established as a Controlled Hunting Area by General Notice 363 of 1962.

Geographical Location South-west Uganda bordering the south-east of the Kazinga Channel and the south shore of Lake George. 0°05'S, 30°05'E.

Altitude 700-1,100m

Area 15,700ha; contiguous to Queen Elizabeth National Park (197,800ha) and its associated reserves

Land Tenure Government

Physical Features The terrain is characterised by small hills and about 10 crater lakes above the east wall of the western Rift Valley (here interrupted by the vast upheaval of the Ruwenzori range). The area also contains a number of swamps. The boundary with Queen Elizabeth National Park is defined by the Kyambura River which flows into the Kazinga Channel.

Vegetation Savanna grassland and deciduous thickets

Fauna The fauna is similiar to Queen Elizabeth National Park with mammals including: hippopotamus *Hippopotamus amphibius*, lion *Panthera leo*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, and a variety of antelope and other small ungulates. Waterbirds feature prominently in the avifauna including occasional visits by lesser flamingo *Phoeniconaias minor*.

Zoning The reserve forms a buffer zone for animals moving out of Queen Elizabeth National Park. No zoning exists within the reserve.

Disturbances or Deficiencies Small fishing villages existing at the time of the declaration of the reserve remain, but further settlement is prohibited. There is poaching of hippopotamus and other game for meat and illegal fishing.

Visitor Facilities Access is by unsurfaced tracks only passable in dry weather.

Scientific Research Periodic animal population surveys.

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date 1983

MATHENIKO GAME RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Grazing of domestic livestock and settlement reduce effectiveness of protection.

Date Established 1964 by Statutory Instrument No. 219. Previously part of Central Karamoja Controlled Hunting Area.

Geographical Location In Karamoja region, just north of Moroto, extending along the border with Kenya. 2°40'-3°07'N, 34°10'-34°50'E.

Altitude 1,200-1,600m

Area 160,000ha; contiguous to Bokora Corridor Game Reserve (205,600ha) and the eastern Uganda complex of Controlled Hunting Areas

Land Tenure Government

Physical Features The reserve is part of the Karamoja plateau. It is bounded on the east by the Great Rift escarpment which forms the Uganda/Kenya border in this area and is interrupted in the south by spurs and extensions of higher ground.

Vegetation Thorny deciduous thicket

Fauna Resident mammals include: lion *Panthera leo*, leopard *Panthera pardus* (V), cheetah *Acinonyx jubatus* (V), giraffe *Giraffa camelopardalis*, eland *Taurotragus oryx*, roan antelope *Hippotragus equinus*, oryx *Oryx gazella*, and Grant's gazelle *Gazella granti*. Roan and Grant's gazelle are the predominant species. The area has been the traditional pasture during the wet season for herds migrating from southern Karamoja, particularly from the Pian-Upe plains.

Zoning None

Disturbances or Deficiencies Grazing by domestic cattle, settlement, poaching and forest destruction continue. The area has recently been subject to political unrest, drought, and famine. It appears that control of the area is insufficient (perhaps due to difficulty of access) and wildlife is very sparse.

Scientific Research Periodic animal population aerial surveys, last done in 1983.

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Game Department, Mbale.

Date 1983

PIAN-UPE GAME RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Sporadic settlement and grazing of domestic livestock make protection ineffective

Date Established 1964 by Statutory Instrument No. 220; previously declared as Debasien Animal Sanctuary under Legal Notice 23 of 1960.

Geographical Location Eastern Uganda, north of Mount Elgon and 80km east of Soroti. 1°30'-2°15'N, 34°34'05'-34°50'E.

Altitude 1,000-3,068m

Area 231,400ha; connected to Matheniko Game Reserve (160,000ha) by the Bokora Corridor

Land Tenure Government

Physical Features This is a high plateau area of rolling plains with black cotton soil drained by intermittent watercourses flowing westwards into Lake Kyoga. Most of the area is subject to inundation during the rainy season. Mount Kadam (previously Mount Debasien) near the border with Kenya, is the highest point in the reserve at 3,068m.

Vegetation Most of the area is wooded savanna grasslands with some forest in the north on the margins of a higher ridge.

Fauna A large variety of mammals in the area include: lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), giraffe *Giraffa camelopardalis*, buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, Uganda kob *Kobus kob*, mountain reedbuck *Redunca fulvorufula*, roan antelope *Hippotragus equinus*, oryx *Oryx gazella*, Jackson's hartebeest *Alcelaphus buselaphus jacksoni*, oribi *Ourebia ourebi* and Grant's gazelle *Gazella granti*. Most of the eland *Taurotragus oryx*, topi *Damaliscus lunatus*, and zebra *Equus burchelli* migrate into the area to breed from North Bokora and Matheniko reserves and migrate northwards when the rains begin. Birds include ostrich *Struthio camelus*, secretary bird *Sagittarius serpentarius*, and yellow-billed shrike *Corvinella corvina* (uncommon).

Zoning None

Disturbances or Deficiencies Settlement and grazing of domestic livestock has occurred since the declaration of the reserve. Cattle and wildlife share the same habitat during dry seasons and wildlife are now very sparse. Poaching and forest encroachment in the south, although this has been reduced by local cattle rustling activities.

Scientific Research Periodic aerial surveys of animal populations, last done in 1983.

Special Scientific Facilities None

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration Eastern Range Office, Mbale.

Date 1984

TORO GAME RESERVE

Management Category IV (Managed Nature Reserve)

Biogeographical Province 3.05.04 (East African woodland/savanna)

Legal Protection Controlled hunting permitted, but livestock grazing prohibited

Date Established The reserve is one of the oldest gazetted game areas in Uganda. It was established in 1929 by General Notice No. 546 to protect the large herds of Uganda kob. Later boundary modifications by Legal Notices 245/62 and 246/63.

Geographical Location Adjoining the southern end of Lake Albert, about 60km by road from Fort Portal. 1°00'N, 30°20'E.

Altitude 690-750m

Area 55,488ha; contiguous to Semliki Controlled Hunting Area (50,319ha)

Land Tenure Government

Physical Features The reserve is on the floodplain of the Semliki River delta (where it flows into Lake Albert) and includes the river, valley floor and Rift Valley scarp. The escarpment is composed of Precambrian rocks which are crystalline or metamorphic. Gneisses and granites are most common, influencing the nutrient pool of the freshly weathered soils on the floodplains of the rivers. The valley floor is composed of Quaternary sediments. The reserve is dominated in the south-west by the Ruwenzori range where the Wasa and Mugidi Rivers and tributaries, which cross the reserve, rise. The Ruwenzori foothills and surrounding equatorial rain forest are only about 30km from the boundary. Mean annual temperature is 21°C to 27°C. Annual rainfall is 700-1300mm. Mean annual potential evapotranspiration is 900 to 1500mm.

Vegetation The open grasslands of *Hyparrhenia dissoluta* and *Themeda triandra* have patches of *Heteropogon contortus*. Overgrazed areas have *Sporobolus pyramidalis*. Streams and escarpments are thickly forested.

Fauna The population of Uganda kob *Kobus kob thomasi* is very low. Other mammals include: black-and-white colobus *Colobus guereza*, lion *Panthera leo*, leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), giant forest hog *Hylochoerus meinertzhageni*, warthog *Phacochoerus aethiopicus*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus* and reedbuck *Redunca redunca*. Jackson's hartebeest *Alcelaphus buselaphus jacksoni* is reported to have disappeared from the reserve. Birdlife is similar to that of Murchison Falls National Park and species include brown harrier eagle *Circaetus cinereus*, banded harrier eagle *Circaetus cinerascens*, painted snipe *Rostratula benghalensis*, white-naped pigeon *Columba albinucha*, black-wattled and pied hornbills *Ceratogymna atrata* and *Tockus fasciatus*, and yellow-spotted barbet *Pogoniulus duchailui*.

Zoning None

Disturbances or Deficiencies There is a fishing village on the shores of Lake Albert, but its population is controlled. Poaching occurs and many game species including Uganda kob have declined in number in recent years, from 18,000 in 1974 to 2,500 in 1978, and may now not exist in the reserve.

Visitor Facilities Hotel accommodation is being constructed to replace the former lodge and campsite. Access by all-weather gravel road from Fort Portal. Hunting arranged on a quota basis through the Uganda Wildlife Development Organization.

Scientific Research Periodical surveys of animal populations. The area was the site of the most detailed studies of the Uganda kob yet undertaken.

Special Scientific Facilities None

Principal Reference Material

- ° Buechner, H.K. (1974). Implications of social behaviour in the management of Uganda kob. In: *The behaviour of Ungulates and its relation to management*.
- ° IUCN publication New Series No. 24, Morges Vol 2: 853-870. (Includes list of references to other studies in this region.)
- ° Malpas, R. (1980). Wildlife in Uganda 1980 - A Survey. A Report to the Minister of Tourism and Wildlife, Uganda.
- ° Verner, P.H. (Ed.) (1978). Uganda kob and other wildlife problems in Toro Game Reserve, Uganda. Czechoslovak Landscape and Nature Conservation Association Report, Prague.

Staff No information

Budget No information

Local Park or Reserve Administration Game Department, Fort Portal.

Date 1983

BWINDI (IMPENETRABLE) FOREST RESERVE

Management Category VI (Resource Reserve)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Partial

Date Established First gazetted in 1932, although the boundaries were not firmly established until 1958. Since then some small areas have been added. The whole reserve was gazetted as an Animal Sanctuary in 1961. Provisionally proposed for upgrading to National Park status in 1982.

Geographical Location South-west Uganda near the border with Zaire. 1°10'S, 29°30'E.

Altitude 1,400-2,400m

Area 31,000ha

Land Tenure Government

Physical Features The reserve is very steep, hilly countryside which, together with some remnant lowland forest outside the boundary, constitutes an important water catchment area for many rivers supplying agricultural land of the surrounding region. Three major tributaries of the Ishasha River flow to the north, and the Ndego, Kanyamwabo and Shongi Rivers flow to the south. The soils are very susceptible to erosion in areas where trees are cleared due to the steepness of the slopes.

Vegetation This is the richest forest in Uganda in terms of number of plant species, as the area is one of the few large expanses of forest in East Africa, where lowland and montane communities meet. The valley bottoms contain a dense ground cover of herbs, vines and shrubs with only a few trees - hence its name. Vegetation is more fully described in Hamilton (1969).

Fauna One of the richest faunal communities in East Africa exists here including one-third (130 of about 500) of the world's population of the mountain gorilla *Gorilla gorilla berengei* (T), which is the rarest race of gorilla. It is one of only three areas outside Zaire that contains members of the eastern gorilla population. Several threatened birds with limited ranges are among the diverse avifauna: African green broadbill *Pseudocalyptomena graueri* (R), Grauer's swamp warbler *Bradypterus graueri* (V), and Chapin's flycatcher *Muscicapa lendu* (R). *Papilio leucotaenia* (V), the cream-banded swallowtail, is a large swallowtail found in this reserve and restricted to forests in areas with very high human populations in the highlands of south-western Uganda, around Lake Kivu in north-eastern Zaire and Rwanda, and in western Burundi.

Conservation Management In 1981, settlements were removed from the area between the road and the boundary under jurisdiction of a ministerial order. New York Zoological Society has proposed an intensive study of the area with consequent development of a scientific management plan. The general purpose working plan used at present is considered out of date. IUCN/WWF Project 1765 has supplied a Toyota Landcruiser to help anti-poaching measures and control wood-cutting.

Zoning The reserve contains two small nature reserves (960ha and about 200ha) in which human exploitation is prohibited. These reserves are not demarcated, but topographical indicators are considered to be adequate.

Disturbances or Deficiencies A survey has indicated a decline in the gorilla population in the reserve, especially in those areas most exploited by the local population. Relatively intensive logging occurs in certain areas (18.5% of the total reserve area) and logging has increased fifteen-fold since the construction of a new road across the western sector. The surrounding remnant forest should be included in the reserve to protect the water catchment of the Munyaga River the resident gorillas. Due to the susceptibility of the soil to erosion, the present rapid deforestation of the slopes could adversely affect agricultural land to the north. Gold prospecting, charcoal burning, and poaching are also gradually destroying the reserve (Harcourt 1979a).

Visitor Facilities Access is difficult, but tourism seems to be on the increase as the gorillas can now be seen from the road. Resthouse facilities are limited.

Scientific Research A survey of the conservation status of the reserve was carried out by Harcourt in 1979. Dr T. Butuynski of the New York Zoological Society is carrying out a fauna and flora monitoring programme.

Special Scientific Facilities A resthouse in one of the nature reserves has been renovated with WWF aid. It was established for forest officers, but tourists and researchers can use the facilities for a fee.

Principal Reference Material

- ° Bwindi Working Plan available from Forest Department Headquarters, Entebbe.
- ° Hamilton, A. (1969). The vegetation of south-west Kigezi. *Uganda J.* 33: 175-99.
- ° Harcourt, A.H. (1979). Conservation of the Bwindi Forest Reserve and its Gorillas, S.W. Uganda. WWF/IUCN Project 1577 Report.
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- ° IUCN/WWF Project 1765. Uganda-Establishment of Forest Reserves.
- ° Keith, S., Twomey, A., Friedmann, H. and Williams, J. (1969). The Avifauna of the Impenetrable Forest, Uganda. *Amer. Mus. Novit.* 2389.
- ° Malpas, R. (1980). Wildlife in Uganda 1980 - A Survey. A Report to the Minister of Tourism and Wildlife, Uganda.

Staff One forestry officer and three forest rangers in the centre of the reserve; one forestry officer and two forest rangers in the south; and three forest ranger in the north; plus several game guards

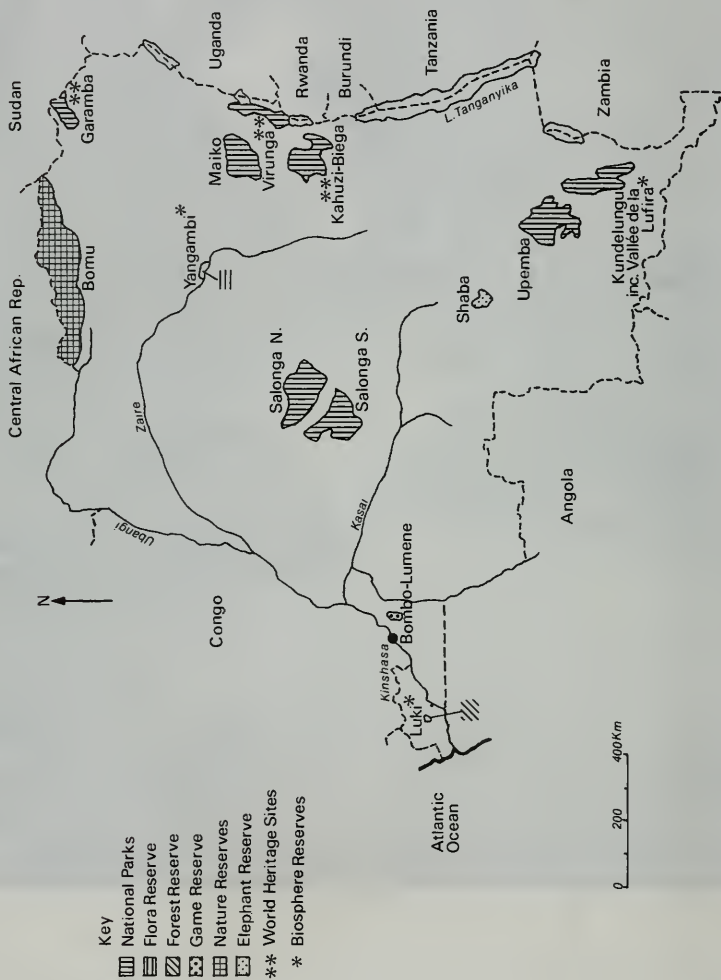
Budget No information

Local Park or Reserve Administration Ministry of Agriculture and Forestry, Forest Station/
or Game Department.

Date 1983



Zaire



ZAIRE

Area 2,345,236 sq.km

Population 31,940,000 (1983)

Parks and Reserves Legislation Prior to independence each protected area was established by a Royal Decree, under a general decree passed in 1937. Ordinance-Law 69-041 relating to the conservation of nature was passed 22 August 1969, which, as well as confirming the existing protected areas, also established the Institut National pour la conservation de la nature (INCN), now the Institut Zairois pour la conservation de la nature (IZCN). This piece of legislation was modified by Decree 244 of 21 February 1972, and by Decree 023 of 22 July 1975. National Parks are established under Presidential Order on the recommendation of IZCN, with their creation as 'réserves naturelles intégrales' confirmed by individual Ordinance-laws.

Parks and Reserves Administration The principal management and protection body is the Institut Zairois pour la conservation de la nature (IZCN) which comes under the Department of Agriculture, Rural Development and the Environment. The work of IZCN was previously carried out by the Institute of National Parks (attached to the Department of Agriculture) which had been established by Decree on 26 November 1934.

Address

- ° Institut Zairois pour la conservation de la nature (IZCN), BP 868, Kinshasa 1.
- ° Département de l'agriculture et du développement rural, Division de la conservation de la nature et gestion des ressources naturelles renouvelables, BP 73, Kinshasa 1.

Additional Information Tourism is based mainly on the national parks system, general and photographic safaris, and hunting. From 1960 to 1969, while the national parks were directly under the jurisdiction of the Department of Agriculture, poaching was rife, but during the late 1970's the National Institute for Nature Conservation managed to get this under control. There is still a need, however, for funds, equipment and transport (particularly water transport) for the game wardens as there is increased poaching, particularly in the lakes and floodplain areas. In addition, it would appear that a large quantity of ivory and leopard skin is finding its way out of the country.

IUCN/WWF Project 1613 is giving support to survey the primates of eastern Zaire, develop gorilla and chimpanzee reserves and conserve the pygmy chimpanzee. IUCN and WWF have also been involved for a number of years in the protection and management of the Garamba National Park. In 1983 a five-step programme to develop a national conservation strategy was formulated in conjunction with IUCN/WWF and is being considered by the government and also the German Technical Cooperation Agency.

References

- ° FAO (1977). Conservation de la nature. Zaire. Conclusions et recommandations du projet. FO: DP/ZA1/70/001, Rapport terminal. FAO, Rome.
- ° IUCN/UNEP (1983). La répartition des aires protégées en fonction des besoins de la conservation des communautés biotiques de l'Afrique Centrale et de l'Ouest. Working Document. IUCN, Gland, Switzerland.
- ° IUCN/WWF Project 1613. Primate Action Fund.
- ° IUCN/WWF Project 1941. Zaire, Conservation of gorillas.
- ° IUCN/WWF Project 1954. Zaire, Management of Garamba National Park.
- ° IUCN/WWF (1985). Rapport d'une mission au Zaire et Rwanda. IUCN/WWF, Gland, Switzerland.

Protected Areas

	(hectares)
<i>National Parks</i>	
Garamba	492,000
Kahuzi-Biega	600,000
Kundelungu	760,000
Maiko	1,083,000
Salonga National Park	3,656,000
Salonga	3,656,000
Upemba	1,173,000
Virunga	780,000
Subtotal	12,200,000

Nature Reserves

Bomu
Eaux Delcommune
Lac Fwa

Game Reserves

Bombo-Lumene 240,000

Flora Reserves

Yangambi 250,000

Reserves

Shaba Elephant

Forest Reserves

Luki 33,000

Biosphere Reserves

Forest Reserve of Luki 33,000
Reserve Floristique de Yangambi 250,000
Vallee de la Lufira 14,700

Subtotal 297,700

World Heritage Sites

Garamba National Park 492,000
Kahuzi-Biega National Park 600,000
Virunga National Park 780,000

Subtotal 1,872,000

PARC NATIONAL DE GARAMBA

Management Category II (National Park)

World Heritage Site (Criteria: iii, iv)

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection The World Heritage Nomination document notes that the park "has had the status of 'integral nature reserve' since its creation as a national park according to the terms of the 1933 London Convention" (sic). Limited settlement and hunting of small game for meat,

using spears and other traditional weapons, but not guns, is allowed in reserves surrounding the park. It was designated a World Heritage site in 1980.

Date Established Established by decree on 17 March 1938, primarily to protect the northern white rhino and northern savanna giraffe. Since 22 August 1969 the park has been governed by Decree No. 69/041 and designated as a World Heritage Site in 1980. In 1984, it was put on the list of the eleven most threatened areas by the IUCN General Assembly in Madrid.

Geographical Location In Uele District, north-east Zaire, on the Sudan border (Nile-Zaire watershed). 28°48'–30°00'E, 3°45'–4°41'N.

Altitude 710–1,061m

Area 492,000ha. It is contiguous in the north to Lantoto Game Reserve in Sudan and is surrounded in Zaire by three hunting areas totalling about 1,000,000ha: Reserve Azande (west), Reserve Mondo-Missa (east), and Reserve Gangala na Bodio (south).

Land Tenure Government

Physical Features A vast undulating plateau, part of an ancient peneplain, broken by inselbergs (generally of granitic formation) and sizeable marshland depressions. The largest rivers are the Dungu, Aka, and Garamba. The tropical climate has a semi-moist rainy season (March to November) and long dry period (November to March), during which, temperatures range from 15°C to 35°C and hot dry north-easterly winds are common. Mean annual rainfall is about 1,500mm.

Vegetation The park's position, between the Guinean and Sudanese biogeographic realms, makes it particularly interesting. The densely wooded savanna, gallery forests, and papyrus marshes of the north and west gradually give way in the south to a less wooded savanna which merges into grassy savanna. The main species of the treeless grasslands are *Loudetia arundinacea*, *Panicum* and *Hyparrhenia*, which in August are over 2m high with the tallest grass *Urelytrum thyrsoides* at over 5m. The savanna woodlands are often dominated by *Albizia* sp. with predominant species including *Bauhinia*, *Dombeya*, *Erythrina*, and coral trees. Gallery forests and forest patches contain *Irvingia smithii*, *Chlorophora excelsa*, *Klainedoxa* sp., date palms, *Khaya senegalensis*, fig *Ficus* sp. or rubber, waterberry and flambeau trees. The marshlands are dominated by *Cyperus papyrus* and *Mitragyna africana*. Forests are predominantly *Khaya senegalensis*, *Chlorophora excelsa* and *Klainedoxa* sp..

Fauna The park contains probably the last viable natural population of square-lipped or northern white rhinoceros *Ceratotherium simum cottoni* (T) which has been reduced to 10–15 by intensive poaching and they are now on the IUCN list of the world's 12 most threatened animals. The elephant *Loxodonta africana* (T) are a unique population representing an intermediary form on the cline between the forest and savanna sub-species, *L. africana cyclotis* and *L. africana africana*, but have been reduced by two-thirds in the last seven years, by poaching, to about 8,000. Other mammals include: northern savanna giraffe *Giraffa camelopardalis congoensis* (occurring nowhere else in Zaire), hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer* (about 53,000), hartebeest *Alcelaphus* sp., kob *Kobus kob*, waterbuck *Kobus ellipsiprymnus*, chimpanzee *Pan troglodytes* (T), olive baboon *Papio anubis*, colobus *Colobus* sp., vervet *Cercopithecus aethiops* and five other species of monkey, two species of otter, five species of mongoose, golden cat *Felis aurata*, leopard *Panthera pardus* (T), lion *Panthera leo*, warthog *Phacochoerus aethiopicus*, bushpig *Potamochoerus porcus*, roan antelope *Hippotragus equinus*, and six other antelope species.

Conservation Management There are 22 patrol points on the boundary. Weapons for anti-poaching were U.S. army .300 carbines, but there were few anti-poaching patrols and arrests were minimal. The proposed third sector of control in the north, administered by an additional station (Berudua), would, it is suggested, improve protection in the northern area bordering Sudan. Five surveillance posts have been set up in the surrounding hunting areas in an attempt to control the hunting. Garamba is famous for the African Elephant Training School at Gangala-na-Bodio, south-west of the park. However, there are reports of imminent

closure of the centre due to both lack of funds, and a lack of trained elephants (only four now remain). A WWF project is being carried out which will provide the technical advisors, equipment and anti-poaching supplies necessary to restore the infra-structure, management and anti-poaching capability of the park. This includes use of a light aircraft to locate rhinoceros and has proved the most effective method of locating them and counteracting poaching. Foot patrols and an increase in the number of vehicles are also having some effect. However, prospects for conserving the remaining rhinoceros are poor (WWF 1984). IUCN/WWF Project 1954 has been set up to counteract poaching and rehabilitate the park, including staff training and improvement of infrastructure. This and an FAO project seem to be having success in improving park infrastructure and management.

Zoning The park contains two zones of control: the eastern sector (Nagero Station) and the western sector (Gangala-na-Bodio Station), though, the current management plan recommends three zones of control: North, East, and West. The park is surrounded by three hunting areas which act as buffer zones on the east, west, and north (totalling about 1 million ha): Mondo-Missa in Faradje and Aba zones controlled by Nagero Station; Gangala-na-Bodio in Faradje and Dungu zones; and Azande in Dungu zone.

Disturbances or Deficiencies Elephant numbers fell from about 22,000 in 1976 to about 8,000 in 1983 and numbers of many other species declined considerably after the political unrest in the 1960s. The square-lipped rhinoceros numbered 259 in 1975, but have been threatened by recent fighting in Sudan and Uganda. A 1983, intensive aerial survey aided by ground counts involving 150 guards revealed only 15-20 individuals (WWF News 24). A massive increase in poaching in the park in recent years, which threatened the surviving rhinoceros population, but the situation has apparently improved recently, mainly due to FAO/IUCN activity. However, more recent estimates give the number of rhinoceros to be 10-15 and there is doubt whether they can be conserved (Thorsell, 1985). In 1983 it was reported that management planning was weak and needed support, weaknesses including lack of co-ordinated management of the two sectors of control and the relatively unprotected northern boundary on the Sudan border. Control also needed to be improved in the surrounding hunting areas. Park management practices, once recognised as among the finest in Africa, were reported to have deteriorated to a level that could have resulted in irreversible degradation of resources. The park lacked sufficient trained personnel, equipment, vehicles, supplies, and funds, and communications are extremely difficult. However the situation would appear to be improving. An IUCN/WWF mission to the area in 1985 reported that equipment and assistance provided under project 1954, and the work of FAO, had led to development of a solid park infrastructure. Protection of the park had been intensified to the point where poaching had virtually disappeared.

Visitor Facilities High potential exists for tourist development in the area of the Elephant Training School as part of a coordinated project to rehabilitate Garamba.

Scientific Research No recent information

Special Scientific Facilities It is planned to establish a research laboratory at Nagero.

Principal Reference Material

- ° De Saeger, H. (1954). Introduction Exploration du Parc National de la Garamba. Mission H. De Saeger. *Inst. Parcs. Nat. Congo. Belge* : 1-107.
- ° IUCN (1985). Threatened Natural Areas, Plants and Animals of the World. *Parks* 10: 15-17.
- ° IUCN/WWF Project 1954. Garamba National Park.
- ° IUCN/WWF (1985). Rapport d'une mission au Zaïre et Rwanda. IUCN/WWF, Gland, Switzerland.
- ° Kabala Matuka (1976). *La conservation de la nature au Zaïre*. Aspects. Edition Lokola, Kinshasa: 237-42.
- ° Maldague, M. (1979). Parc National de la Garamba. Recommandations d'aménagement. Mission Unesco/WCNH, Zaïre.
- ° Mackie, C. (1984). *A preliminary evaluation of Conservation Development in Garamba National Park and Recent Poaching Developments in Garamba National Park*. Reports submitted to IUCN/WWF/FZS.

- ° Pierret, P.V., Grimm, M., Petit, J.M. and Dimoleyele-ku-Gilima Buna (1976). Contribution à l'étude des grands mammifères du PNG et zones annexes. FAO Document de travail No. 4 ZAI/70/001. 49 pp.
- ° Project Proposal (1983) to IUCN for rehabilitation programme for Garamba National Park.
- ° Rogers, P.M., Hillman, A.K.K., Mankoto ma Mbaelele and Mankoto ma Oyisenzoo (1983). Développement et conservation du Parc national de la Garamba. FAO Kinshasa. Rapport de terrain 01/84.
- ° Savidge, J.M., Woodford, M.H. and Croze, H. (1976). Report on a mission to Zaire, 3-10 April 1976. FAO W/K1593 34 pp, 13 maps.
- ° Thorsell, J. (1985). World Heritage Report - 1984. *Parks* 10: 8-9.
- ° Van den Bergh, W. (1955). Nos rhinoceros blancs. *Zool. Garten* 21(3): 129-151.
- ° Verschuren, J. (1948). Ecologie et biologie des grand mammifères (primates, carnivores, ongules). *Exploration du parc national de la Garamba*. Mission H. de Saeger (1949-1952). Institut des Parcs Nationaux du Congo Belge, Bruxelles. 225 pp. 2 colour plates
- ° World Heritage Nomination submitted to Unesco for Garamba National Park. (Includes a more detailed bibliography).
- ° WWF Monthly Report November 1984. The Last Refuge of the Northern White Rhino.

Staff Core staff include: head conservator at Gangala-na-Bodio, conservator at Nagero and about 180 guards throughout the park. Four duty game rangers and their families at each of the 22 patrol points are responsible for surveillance on the boundary (1980). Under IUCN/WWF Project 1954, two expatriate advisers are implementing the programme and training their Zairois counterparts to take over in 1987.

Budget No recent information

Local Park or Reserve Administration Head Curator, Parc National de la Garamba, Gangala-na-Bodio, or Institut Zairois pour la Conservation de la Nature, 13 Avenue des Cliniques, Kinshasa Gombe, BP 868 Kinshasa 1.

Date 1984

PARC NATIONAL DE KAHUZI-BIEGA

Management Category II (National Park)

World Heritage Site (Criteria ii, iii, iv)

Biogeographical Province 3.20.12 (Central African Highlands)

Legal Protection Total

Date Established 30 November 1970 by Decree 70-316. It was enlarged from 75,000ha to 600,000ha in July 1975 by Decree 75-238. Part of the area had been a reserve since 1960. It was accepted as a World Heritage Site in 1980.

Geographical Location Eastern Zaire, 50km west of the town of Bukavu in Kivu Region, near the Rwanda and Burundi borders. 2°10'-2°52'S, 28°40'-28°50'E.

Altitude 1,800-3,400m (Kahuzi Volcano)

Area 600,000ha

Land Tenure Government

Physical Features In the eastern part are the Western mountains of the Great Rift Valley in the Zaire River basin, between Walungu and Massisi. A very undulating terrain in the west forms a belt between the lowland and high altitude forests. The park takes its name from two extinct volcanoes. Throughout the year maximum temperatures are about 18°C and minimum temperatures about 10.4°C. Mean annual rainfall is about 1800mm with wide variation. Humidity varies between 50% and 85%.

Vegetation Two-thirds of the mountain forest is dense primary forest intermixed with bamboo, especially at higher altitudes. Some patches of more open vegetation occur at lower altitudes. The remaining area is mainly mesophytic woodland including *Hagenia* trees and areas of *Cyperus* swamp and peatbog. Alpine and sub-alpine grassland occur at high altitudes. The park extension (1975) is a vast undulating area of equatorial rain forest.

Fauna The park was established to protect 200-300 mountain gorilla *Gorilla gorilla* (disputed whether the subspecies is *beringei* (T) or *graueri* (T)) occurring mainly in the forests at 2,100-2,400m, but also in the lower rain forest. The 'mosaic' of biotypes makes the park an excellent gorilla habitat. Other primates include: chimpanzee *Pan troglodytes* (T), owl-faced monkey *Cercopithecus hamlyni*, and numerous Cercopithecinae and Colobinae including black and white colobus monkey *Colobus guereza* and red colobus *Colobus badius*. Other mammals include: elephant *Loxodonta africana* (T), forest hog *Hylochoerus meinertzhageni* and many antelope and duiker. Avifauna include the endemic Rockefeller's sunbird *Nectarinia rockefelleri* (R), African green broadbill *Pseudocalyptomena graueri* (R), and Grauer's swamp warbler *Bradypterus graueri* (V).

Conservation Management There is a secondary station at Itebero on the northern boundary. Five new patrol points were planned in 1980. A regional Conservation Strategy focusing on the park is to be initiated by the Government of Zaire in 1985. This park is the focus for IUCN/WWF Project 1613's efforts to conserve the mountain gorilla.

Zoning None

Disturbances or Deficiencies Agricultural activities especially tea growing occur on the periphery and, in the past, slash and burn rotational agriculture was practised throughout the area. Poaching affects most species and the road system has deteriorated to the point where it is not possible for the guards to adequately patrol the park. Recent economic problems in Zaire have resulted in a marked decrease in the effectiveness of management, and thus, a decline in tourism, which had previously provided a cash flow for the region.

Visitor Facilities The mountain gorillas, including one or two groups accustomed to being watched, are the unique attraction. An asphalt road crosses the park from east to west and some paths are kept open to facilitate gorilla observation.

Scientific Research Studies of geology and botany are planned in collaboration with the Institut des Recherches Scientifiques en Afrique Centrale (IRSAC).

Special Scientific Facilities IZCN intends to establish a small research centre at Tchivanga.

Principal Reference Material

- ° Goodall, A.G. (1974). Studies on the ecology of the mountain gorilla of the Mt Kahuzi-Biega region (Zaire) and comparisons with the mountain gorillas of the Virunga Volcanoes. Unpublished Ph.D. Thesis, University of Liverpool.
- ° IUCN/WWF Project 1613. Primate Action Fund.
- ° Marius, C. (1972-3). Vegetation maps of Kahuzi-Biega.
- ° World Heritage Nomination to Unesco for Kahuzi-Biega National Park. (Includes a more detailed bibliography.)

Staff Chief Curator, Assistant Curator and a resident biologist at Tchivanga. Four patrol points with a total of 35 guards. There are plans to increase this staff by 40 (1980).

Budget Annual budget varies, but covers staff and maintenance.

Local Park or Reserve Administration Institut Zairois pour la Conservation de la Nature (IZCN), 13 Avenue des Cliniques, Kinshasa Gombe, BP 868 Kinshasa.

Date 1984

PARC NATIONAL DES KUNDELUNGU

Management Category II (National Park)

Biogeographical Province 3.06.04 (Congo Woodland/savanna)

Legal Protection Total as a 'réserve naturelle intégrale' under the 1933 London Convention

Date Established 30 November 1970 by Ordinance 70-317. Extended from 120,000ha to 760,000ha by Ordinance 75-097 of 1 March 1975. Much of the area had been protected as a hunting reserve since 11 November 1939 under Decree 80/Agri. and 16 July 1949 under Decree 52/100. Vallée de la Lufira Biosphere Reserve is within the park and was approved by MAB bureau June 1982.

Geographical Location In Shaba Region, southern Zaire, centred 10°35'S, extending 27°51'-30°00'E.

Altitude 1,200-1,700m

Area 760,000ha

Land Tenure Government

Physical Features The park comprises two main features. The Kundelungu section is a plateau and foothills characteristic of the Shaba Region. The western limit is formed by 400m cliffs which fall perpendicularly to the other main section, the Lufira River valley. The falls on the Lofoi River (tributary of the Lufira) are reputed to be the highest in Africa at 384m with a single fall of 347m. Mean annual temperature is 12°C on the plateau and 20°C in the valley.

Vegetation Principal vegetation types are open woodland dominated by *Brachystegia* covering about 90% of the plateau up to about 1,600m; grassy savanna with *Hyparrhenia* predominant; and wooded savanna with gallery forests along the drainage lines. Above about 1,500m, the gallery forest is characterised by afro-montane species. A preliminary phytogeographic analysis of the plateau has shown a typically Zambezi flora with species such as *Cyathea thomsoni*, *Pteris catoptera*, *Nymphaea sulphurea*, *Hypericum oligandrum*, *Indigofera peltata*, *Dolichos bianoensis*, *Drosera affinis*, *D. katangensis*, *Craterostigma kundelungense*, and *Psychotria mushiticola*.

Fauna The park is particularly rich in ungulates with at least 15 species including: zebra *Equus burchelli*, duikers, klipspringer *Oreotragus oreotragus*, reedbuck *Redunca redunca*, waterbuck *Kobus ellipsiprymnus*, roan antelope *Hippotragus equinus* and sable antelope *Hippotragus niger*, bushbuck *Tragelaphus scriptus*, greater kudu *Tragelaphus strepsiceros*, and eland *Taurotragus oryx*. Primates include: savanna monkey *Cercopithecus aethiops*, blue monkey *Cercopithecus mitis kandii*, yellow baboon *Papio cynocephalus*, olive baboon *Papio anubis* and bushbabies *Galagoides demidoffi*, and *Galago senegalensis*. Felidae

include leopard *Panthera pardus* (T) and cheetah *Acinonyx jubatus* (T). This park is within the only region of Zaire in which zebra and cheetah occur. Birds include wattled crane *Bugerus carunculatus* (of special concern) and ground hornbill *Bucorvus leadbeateri*.

Population There is a population of fishermen in the area, particularly on the Lufira River.

Conservation Management Fire is an important factor in the park and fire research and management are urgently needed to prevent a change in character of much of the area.

Zoning The park comprises a 220,000ha strict nature reserve and a 540,000ha annexed zone. Some areas are set aside for tourist facilities.

Disturbances or Deficiencies Severe poaching continues, the species particularly at risk including zebra, sable, cheetah and elephant. Some incursion of grazing animals, illegal settlement, fires, and mineral exploitation also occur.

Scientific Research No detailed scientific study as yet. However, research is developing in part of the region in collaboration with scientists at the University of Lubumbashi. There are a number of geological publications on Kundelungu and Shaba regions.

Special Scientific Facilities None

Principal Reference Material World Heritage Nomination to Unesco for Kundelungu National Park. (Includes a detailed bibliography).

Staff Park station at Katwe and six patrol posts with 51 guards (1981)

Budget 1981 - 124.142,85 Zaires

Local Park or Reserve Administration Parc National de Kunelungu, 972 Avenue du Kasai, BP 309, Lubumbashi.

Date 1984

PARC NATIONAL DE LA MAIKO

Management Category II (National Park)

Biogeographical Province 3.20.12 (Central African Highlands)

Legal Protection Protected as a total natural reserve under the terms of the 1933 London Convention.

Date Established 20 November 1970 by Ordinance 70-312

Geographical Location In Kivu and Haut-Zaire Regions, eastern Zaire. 0°00'-1°00'S, 27°00'-28°30'E.

Altitude 700-1,300m

Area 1,083,000ha

Land Tenure Government

Physical Features It is located in the semi-mountainous region between the central Zaire River basin and the mountain ranges of the west side of the Rift Valley, at Massisi and Béné. The north and south are undulating, but the central area is almost flat. Ferrallitic soils predominate with underlying pre-Cambrian baserock. The park is drained by the Maiko Lindi and Lubutu Rivers. Precipitation is the highest in Zaire at 1,200 to 1,800mm, with almost no dry season.

Vegetation The area is almost completely covered by dense humid equatorial forest of low to medium altitude which form a transitional zone between the lowland forests of the Zaire basin and the mountain forests. Much of the forest appears to be primary.

Fauna The typical forest fauna includes elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, leopard *Panthera pardus* (T), and various antelope including duikers. The most important and characteristic animals are mountain gorilla *Gorilla gorilla berengei* (E), okapi *Okapia johnstoni*, and the endemic Congo peacock *Afropavo congensis* (of special concern).

Population The whole area is extremely remote with no inhabitants, except some occasional groups concentrated along the roads.

Zoning None

Disturbances or Deficiencies Some tree felling and poaching of elephant, okapi and duikers and illicit gold mining have been difficult to control, particularly due to the size of the park and nature of the terrain, but also due to human pressure on the boundaries and the existence of rebel forces. Lack of sufficient management infrastructure, trained staff, and management plans is also a problem.

Scientific Research Studies based on developing inventories of flora and fauna, have been carried out by staff and students of Kisangani. Scientific research is fairly rudimentary. A project is planned on the Zaire 'peacock'.

Special Scientific Facilities Not yet developed

Principal Reference Material

° None reported, but apparently information on the area is available from the Agricultural Training School (Ecole Technique Agricole) at Butembo, the Administrative Service of the area and the Geological Service at Bukavu (Kivu).

Staff Some 29 patrol posts with a total of 43 guards (1981)

Budget 1981 - 164,691,86 Zaires

Local Park or Reserve Administration Institut Zairois pour la Conservation de la Nature (IZCN), BP 868, Kinshasa 1.

Date 1984

PARC NATIONAL DE LA SALONGA

Management Category II (National Park)

World Heritage Site (criteria: ii, iii)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Total. It is defined in law as 'une réserve naturelle intégrale' in the sense of the 1933 London Convention and declared a World Heritage Site in October 1984. Public access is controlled.

Date Established 30 November 1970 by Ordinance 70-318

Geographical Location Central Zaire basin. 1°00'-3°20'S, 20°-22°30'E.

Altitude 350-700m rising from west to east

Area 3,600,000ha in two sectors of approximately equal size, separated by about 45km.

Land Tenure Government

Physical Features The park comprises a large section of the central basin of the Zaire River, a very isolated region mainly accessible by water transport. 3 types of landscape can be recognised: low plateaux, river terraces, and high plateaux, each with different associated vegetation. Rivers in the west of the north sector are large and meandering with marshy banks. On the higher ground in the east, valleys are deeper, and rivers may run below cliffs of up to 80m. The south sector includes the watershed between the basin of the Luilaka to the north and east, Likoro to the west, and Lukenje to the south. Soils are a thin humus layer over Kalahari sands with several lateritic flushes. Climate is typically continental equatorial, hot and humid with mean annual precipitation of 1,300mm and a slightly drier season from June to August. Mean annual temperature 25.5°C. Temperatures are stable with daily mean variations from 20°C at night to 32°C during the day. Cloud cover is often complete until 1000 hours, associated with fog and storms from midday to 1500 hours, but skies are often clear at night to 0400 hours.

Vegetation Equatorial forest covers most of the area, varying in composition according to the geomorphology. The principal forest types are swamp, riverine, and dry-land forests. A grassland vegetation, rather than savanna, occurs in the north sector, known locally as 'botoka-djoku' or elephant's bath. The total area of grassland is under 0.5% of the park area. Southwards, the vegetation is more open with 'esobe' clearings. Species composition has been little studied.

Fauna No systematic faunal survey has been carried out, but most forest animals appear to be present. The most important species that has been reported is pygmy chimpanzee *Pan paniscus* (T) which is endemic to Zaire. However, it is absent from the north sector and there is now doubt that it still exists in the south sector. Other species include colobus monkeys *Colobus polykomos angolensis* and *C. badius*, *Cercopithecus* spp., long-tailed pangolin *Manis tetradactyla*, giant ground pangolin *M. gigantea*, both subspecies of elephant *Loxodonta africana cyclotis* (T) and *L. africana africana* (T), yellow-backed duiker *Cephalophus sylvicultor*, water chevrotain *Hyemoschus aquaticus*, sitatunga *Tragelaphus spekei*, bushbuck *Tragelaphus scriptus*, bongo *Tragelaphus euryceros*, and pygmy Cape buffalo *Syncerus caffer nanus*. Birds include: cattle egret *Bubulcus ibis*, black stork *Ciconia nigra* (migrant), yellow-billed stork *Mycteria ibis* and the endemic Zaire 'peacock' *Afropavo congensis*. Reptiles include African slender-snouted crocodile *Crocodylus cataphractus* (1).

Population Some groups of pygmies live in the park.

Conservation Management There is no management plan. To date, a policy of non-management of the natural system has been followed to allow natural evolution of the ecosystems. It seems that this will in future be supplemented by a strategy of scientific management aimed at avoiding unexpected disturbance of the natural balance. Representatives of IUCN and WWF visited the park in 1985 and made a number of recommendations. While noting the problems of poaching they suggested that control of this was not the major priority and suggested instead that increased effort should go into improving knowledge of the region; making the population of the area more aware of the value of the park, and if possible involving them in management activities; improvement of information on the relationship between local population and the ecosystems of the park (studies of ethno-botany etc); improvement of park infrastructure, and provision of a research station.

Zoning 20ha zone for administrative services and guard posts

Disturbances or Deficiencies Poaching both by traditional and modern methods. There is some impact from local population pressure, habitat destruction by fire, tree cutting for firewood, and honey gathering. It is not really known, however, to what extent this may be detrimentally affecting the area, if at all. Perhaps more serious is the lack of sufficient management infrastructure, trained staff and management planning.

Scientific Research Phytosociological studies of *Pan paniscus* were carried out by park staff in the south sector. IUCN has requested its Primate Specialist Group to assess the status of *Pan paniscus* in the park. In general knowledge of the area is low, and further research urgently required.

Special Scientific Facilities A permanent research station is planned.

Principal Reference Material

- ° IUCN/WWF (1985). Rapport d'une mission au Zaire et Rwanda. IUCN/WWF, Gland, Switzerland.
- ° Pierret, P.V. and Petit, J.M. (1976). Contribution à l'Etude et Aménagement du Parc national de la Salonga. FAO, Rome.
- ° World Heritage Nomination Form submitted to Unesco.

Staff Chief conservator at Anga, conservator at Monkoto, and 16 patrol posts with 87 guards and 22 workmen.

Budget 1981 - 267.748,03 Zaires

Local Park or Reserve Administration Parc National de Salonga, BP 10 à Monkoto, (via Boende), Région de l'Equateur.

Date 1984

PARC NATIONAL DE L'UPEMBA

Management Category II (National Park)

Biogeographical Province 3.06.04 (Congo Woodland/savanna)

Legal Protection Total as a 'réserve naturelle intégral' in the sense of the 1933 London Convention.

Date Established Established on 15 May 1939 by Royal Decree and reviewed by Ordinance Law 69-041 of 22 August 1969; there has been some modification since independence and the area is now defined by Ordinance 75-241 of 22 July 1975.

Geographical Location In the Shaba Region of Katanga, south-east Zaire. 8°30'-9°50'S, 26°00'-27°20'E.

Altitude Up to 1,800m

Area 1,173,000ha; reduced from 1,773,00ha in 1975

Land Tenure Government

Physical Features The park contains part of the Lake Upemba depression, which includes many lakes and swamps drained mainly by the Lufua and Lualaba Rivers. The lower Lufira crosses the area from the falls at Kiubo to Upemba Lake and there are numerous other watercourses, temporary pools, and permanent lagoons. The high Kibara Plateau in the north is part of an ancient peneplain, now separated from Bianco Plateau in the south by a geological fissure. Parts of these old plateaux are highly eroded and several spectacular gorges occur in the park, such as Pelenge, Munte, and Kipanga. Annual precipitation is 1,200-1,400mm, with a dry season from April to October. Day temperature is 20-22°C during the dry season, dropping as low as 8°C during the night in the high plateaux. Relative humidity is generally low.

Vegetation About 40% of the park comprises lowland aquatic habitats with papyrus, joint vetches, and cattails. Grassy savannas fringe the lakes and swamps. The rivercourses are lined by gallery forests with khayas (mahogany), fig or rubber trees. Lowland wooded savannas (miombo type) have dominant species such as uapaca trees, bark-cloth trees, palmyra palms, *Sansevieria*, *Hyparrhenia* grass, satin-tail grass, and *Panicum*. Highland gallery forest is dominated by raffia palms and bamboos. The open Kantagese forest is dominated by *Isoberlinia* and bark-cloth trees. There is a large grassy savanna on the plateaux with species including *Hyparrhenia*, *Andropogon*, *Paspalum* and *Tricholaena*, and some trees and shrubs of *Dissotis* and *Protea*.

Fauna Hippopotamus *Hippopotamus amphibius*, lechwe *Kobus leche*, waterbuck *Kobus ellipsiprymnus*, buffalo *Syncerus caffer*, and elephant *Loxodonta africana* occur (T) in the lower areas. On higher plateaux, there are: roan antelope *Hippotragus equinus*, eland *Taurotragus oryx*, Lichtenstein's hartebeest *Alcelaphus lichtensteini* and zebra *Equus burchelli*. In the forest are sable antelope *Hippotragus niger*. Other mammals include: six species of monkey, lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), spotted hyena *Crocuta crocuta*, wild dog *Lycaon pictus* (T), bushpig *Potamochoerus porcus*, warthog *Phacochoerus aethiopicus* and eight further species of antelope. Birds include wattled crane *Bugeranus carunculatus* (of special concern), shoebill *Balaeniceps rex* (of special concern), and species possibly in the area include spotted ground thrush *Turdus fischeri* (R). Most of the range of the endemic black-lored waxbill *Estrilda nigriloris* (K) is within this park. Reptiles include *Crocodylus cataphractus* (V).

Conservation Management Fire is an important factor in the park and fire research and management are urgently needed to prevent a change in character of much of the area. At present, a policy of non-direction of the natural ecosystem is followed. This is reinforced with measures to ensure that unexpected disruptions of the equilibrium are avoided.

Zoning Most of the park is managed as a strict nature reserve, but tourist use of certain areas is allowed.

Disturbances or Deficiencies During the period of political unrest (1960-1963) great damage was caused in the area and game was slaughtered by professional hunters and soldiers. Poaching is still a problem and the lower areas of the park are under pressure from encroachment by local people.

Scientific Research Several geological studies have been carried out in the Upemba region.

Special Scientific Facilities A research laboratory is planned at Lusinga station.

Principal Reference Material

* Literature on the park is fairly extensive and some 52 references are included in the bibliography attached to the 1983 World Heritage Nomination for this area. However, most of these references were written during colonial times.

Staff There are two main stations, at Lusinga in the north, and Layo in the south, with a total of 128 guards (1981).

Budget 1981 - 392.369,07 Zaires.

Local Park or Reserve Administration Institut Zairois pour la Conservation de la Nature (IZCN), BP 868, Kinshasa I.

Date 1984

PARC NATIONAL DES VIRUNGAS

Management Category II (National Park)

World Heritage Site (Criteria: ii, iii, iv)

Biogeographical Province 3.20.12 (Central African Highlands)

Legal Protection Total

Date Established Established in 1925 as Albert National Park; revised by Decree No. 69-041 of 22 August 1969 as Virunga National Park. Designated as a World Heritage Site in 1979.

Geographical Location North-east Zaire, on the border with Uganda and Rwanda, 95% in Kivu Province and 5% in Haut-Zaire. 0°55'N-1°35'S, 29°10'-30°00'E.

Altitude 798m in the extreme north to 5,119m in the Ruwenzori range

Area 780,000ha. This was reduced from the original area of 809,000ha when a small area of the park was incorporated into Rwanda. The boundaries have undergone slight modifications on several occasions, but these have affected under 2.5% of the park area. Contiguous to the Gorilla Sanctuary (2,900ha) in Uganda and the Volcanoes National Park (23,000ha) in Rwanda.

Land Tenure Government

Physical Features The park includes: part of Lake Edward (Idi Amin), the Semliki River valley, parts of the Rwindi, Ishasha and Rutshuru valleys south of the lake, the Virunga area within Zaire, and part of the Ruwenzori range. Lake Edward belongs to the Nile river system and Lake Kivu to the Congo Basin river system. Features include hot springs in the Rwindi plains and the Virunga Massif volcanoes, some such as Nyamulagira and Nyiragongo are still active. The areas of lowest and highest rainfall in Zaire are in Virunga National Park - under 75km apart and ranging from 500mm at Lake Edward to over 3,000mm on the west slope of Mt Ruwenzori. The considerable altitude range results in marked climatic variations which affect the overall biological and geographical diversity of habitats. Habitat types include: lakes

at various altitudes, marshy deltas and peat bogs, savannas and lava plains, low altitude equatorial forest, high altitude glaciers, and snow fields (the Ruwenzori peaks have permanent snow cover).

Vegetation Located at the border between several biogeographical zones, the park protects both tropical rain forest and eastern steppe species, and its range of altitudes adds to the habitat variety. The diversity includes: bamboo and *Hagenia* forest on the mountains; equatorial forest along the Semiliki; wooded savanna of the Rwindi; steppes of *Carissa*, *Capparis*, *Maerua* and *Euphorbia calycina*; various low savannas including *Themeda*, *Imperata*, *Pennisetum*, *Hyparrhenia*, *Acacia sieberana*, *A. hebeclada* and *Combretum*; swamps and transitional habitats including *Craterostigma* prairies and *Sporobolus* savanna; dry thick forest of *Euphorbia dawai*; *Neoboutonia macrocalyx* forest on the lava plains; wet thick forest; white heath of *Erica*, *Philippia*, *Podocarpus milanjanus*, *Hypericum ruwenzoriense*, *Hagenia abyssinica* and *Rapanea pellucidostriata*; alpine forests of *Dendrosenecio* and giant *Lobelia*; and sparse vegetation above 4,300m comprising mainly lichens and spermatophyta, although Graminae have been found growing at over 5,000m.

Fauna Some of the largest wild animal concentrations in Africa occur along the rivers of the park. Mammals in the savanna of the Rwindi area include: elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius* (over 20,000), buffalo *Syncerus caffer*, numerous antelope including kob *Kobus kob*, defassa waterbuck *Kobus ellipsiprymnus defassa* and topi *Damaliscus lunatus*, warthog *Phacochoerus aethiopicus*, lion *Panthera leo* and various monkeys. Large numbers of pelicans *Pelecanus* sp. occur on the lower Rutshuru. In the Semiliki Valley and on the slopes of the Virunga mountains are gorilla *Gorilla gorilla berengei* (T) (about 140 were recorded in the Zaire Virungas in 1980), chimpanzee *Pan troglodytes* (T), and okapi *Okapia johnstoni*. In the extreme north are forest hog *Hylochoerus meinertzhageni* and bongo *Tragelaphus euryceros*. Birds include: Nahan's francolin *Francolinus nahani* (R), forest ground thrush *Turdus oberlaenderi* (R), shoebill *Balaeniceps rex* (of special concern) and probably papyrus yellow warbler *Chloropeta gracilirostris* (R).

Conservation Management An 'integral conservation policy' has been in operation for over 50 years. Savanna fires, which maintain the fire-climax vegetation, are managed by the park authorities. IUCN/WWF Project 1941 aims to carry out a survey of the status of the gorilla and provide necessary data for their improved preservation and protection of their habitat.

Zoning No information

Disturbances or Deficiencies Poaching, although not on a large scale, is a chronic threat, particularly to elephant. Fishing is a potential threat, and more than 8,000 people live in the fishing village at Vitshumbi. There is also a potential future threat from the construction of the Semliki and Rutshuru dams.

Scientific Research This park is exceptional in Africa in that it was set up primarily for scientific research, during Belgian Colonial rule. Much detailed work has been carried out on specific taxa, from insects to mammals, particularly in the 1930s and 1950s, largely by Belgians. A 1981 census of the gorilla population, funded by WWF and the New York Zoological Society, showed that numbers are declining and it recommended international co-operation to improve protection measures.

Special Scientific Facilities No information

Principal Reference Material

- ° Many publications obtainable through L'Institut Royal des Sciences Naturelles de Belgique, rue Vautier 29, B-1040 Bruxelles.
- ° Bourlière and Verschuren, J. (1972). *Exploration du Parc national des Virunga*.
- ° IUCN/WWF Project 1941. Conservation of Gorillas.
- ° IUCN/WWF (1985). Rapport d'une mission au Zaire et Rwanda. IUCN/WWF, Gland, Switzerland.

Staff Three major stations (Rwindi, Rumangabo and Mutsora) and 2 subsidiary stations with at least 250 forest guards. About 15 senior staff (1981)

Budget State subsidised

Local Park or Reserve Administration Parc National des Virunga, Station de la Rwindi, Rwindi, D/S Goma, Kivu, Institut Zairois pour la Conservation de la Nature (IZCN), BP 868, Kinshasa 1.

Date 1984

RESERVE NATURELLE DE BOMU

Management Category No category assigned

Biogeographical Province 3.05.04 (East African Woodland/savanna)

Legal Protection Partial

Date Established No information

Geographical Location Bas-Uele. The northern boundary is the Bomu River, which defines the frontier with the Central African Republic. Approximately 5°00'N, 26°00'E.

Altitude About 500m

Area No information

Land Tenure Government

Physical Features No information

Vegetation Congo woodland savanna

Fauna Elephant *Loxodonta africana* (V), buffalo *Syncerus caffer*, and hippopotamus *Hippopotamus amphibius*.

Zoning No information

Disturbances or Deficiencies Poaching

Visitor Facilities No information

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Guards

Budget Provided by IZCN

Local Park or Reserve Administration Institut Zairois pour la Conservation de la Nature (IZCN), BP 868, Kinshasa 1.

Date 1984

DOMAINE DE CHASSE DE BOMBO LUMENE

Management Category No category assigned

Biogeographical Province 3.06.04 (Congo Woodland/savanna)

Legal Protection Partial

Date Established Initially set up in the 1930s, it was regazetted by Ministerial Arrêté No.07 of 10 February 1968, and modified by No.621 of 16 April 1976.

Geographical Location Western Zaire near the border with Congo; 130km east of Kinshasa. Approximately 4°40'S, 16°00'E.

Altitude 650-750m

Area 240,000ha

Land Tenure Government

Physical Features It is part of the Bateke plateau with some very deep valleys.

Vegetation The savanna has vestiges of forest, especially along rivers.

Fauna There are buffalo *Syncerus caffer*, small antelope, bush pig *Potamochoerus porcus*, and possibly some hippopotamus *Hippopotamus amphibius*. The white-headed robin-chat *Cossypha heinrichi*, which has a limited range is only protected within this reserve.

Zoning Part of the area is a hunting area, with a réserve integrale in the middle constituting about one-third of total area.

Disturbances or Deficiencies Heavy poaching

Visitor Facilities Access from Kinshasa is easy and it has good tourist potential. There is some accomodation in the reserve (14 beds), but it is in need of restoration.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Some 24 wardens and rangers

Budget Salaries only are provided by IZCN, operating funds are negligible.

Local Park or Reserve Administration Institut Zairois pour la Conservation de la Nature (IZCN), BP 868, Kinshasa 1.

Date 1984

RESERVE FLORISTIQUE DE YANGAMBI

Management Category I and IX (Strict Nature Reserve and Biosphere Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Strict forest reserve; part of the State Botanical Forest at Yangambi Station, National Institute for Agronomic Study and Research (Institut National pour l'Etude et la Recherche Agronomique, INERA)

Date Established Accepted as a Biosphere Reserve in June 1976

Geographical Location West of Kisangani on the north bank of the Zaire River. 0°00'-0°40'N, 24°00'-25°00'E.

Altitude No information

Area 250,000ha

Land Tenure Government

Physical Features Relatively flat terrain with tropical red (ferrous) soils

Vegetation Dense semi-deciduous rain forests

Fauna Hippopotamus *Hippopotamus amphibius*, bongo *Tragelaphus euryceros*, sitatunga *Tragelaphus spekei*, elephant *Loxodonta africana* (V), and several species of monkey occur.

Population No information

Conservation Management No information

Zoning The reserve contains a strict core zone and a monitored floristic zone.

Disturbances or Deficiencies Some villages have been established, so there is traditional agriculture and hunting.

Visitor Facilities No information

Scientific Research No information

Special Scientific Facilities Yangambi Station has an up-to-date herbarium which could serve as a nucleus for other studies.

Principal Reference Material None listed

Staff At present, there is a chief of the Botanic and Forestry Office assisted by 30 technical personnel.

Budget No information

Local Park or Reserve Administration Direction Générale de l'Institut National pour l'Etude et la Recherche Agronomique (INERA), BP 1513, Kisangani.

Date 1984

RESERVE FORESTIERE DE LUKI

Management Category IV and IX (Managed Nature Reserve and Biosphere Reserve)

Biogeographical Province 3.02.01 (Congo Rain Forest)

Legal Protection Hunting and fishing are prohibited. There has been no tree felling since 1963.

Date Established Forest reserve since 1937, but total protection of the trees only operational since 1963. Accepted as a Biosphere Reserve in May 1979.

Geographical Location Situated in Bas Zaire, north of the Zaire River, about 150km from the Atlantic coast. 5°35'S, 13°10'E

Altitude 160-350m

Area 33,000ha

Land Tenure Government

Physical Features The bedrock is mainly gneisses and schists of the Mayumbe system and the area is drained by the Luki River and a dense network of tributaries. Mean annual precipitation is 1163mm, but very variable. Mean annual temperature is 24°C.

Vegetation Much of the area has sub-equatorial rain forest, now mainly disturbed and secondary, but still diverse. The main forest types represented include high forest dominated by *Gilbertiodendron* and *Gossweilerodendron*; various secondary formations occur, especially of *Terminalia superba*; and there is some savanna.

Fauna The varied fauna includes elephant *Loxodonta africana* (T).

Conservation Management No information

Zoning No information

Disturbances or Deficiencies The area was severely logged until 1963. A small area is cultivated.

Visitor Facilities No information

Scientific Research The region has been the subject of considerable study. There are no proposals for new research at present, but management has been passed to INERA so that research on tropical silviculture can be carried out.

Special Scientific Facilities No information

Principal Reference Material

- ° Baeyens (1938). *Les sols de l'Afrique Centrale, spécialement du Congo Belge. Tome 1 - de Bas-Congo*. Publication INEAC, out of print.
- ° Cahen, L. (1954). *La géologie du Congo Belge*. Vaillant Carmanne, Liège.
- ° Donis, C. (1948). La forêt dense congolaise et l'état actuel de sa sylviculture. *Bull. Agricole du Congo Belge* 2: 261-320.
- ° Donis, C. and Maudoux, E. (1951). Sur l'uniformisation par le haut. Publ. INEAC, scientific series. No. 51.
- ° Katembo Wanzou (1974). Observations phénologiques sur quelques essences forestières importantes du Mayumné à Luki.
- ° Lebrum, J. and Gilbert, G. (1954). Une classification écologique des forêts du Congo. Publ. INEAC, scientific series No. 63.

- ° Meulemberg (1949). L'introduction à l'étude pédologique des sols du Bas-fleuve (Congo-Belge). Bruxelles.
- ° Mutoji, A. and Kazadi (1974). *La cartographie forestière de la réserve forestière de Luki*. INERA, Mayumbé.
- ° Paelink (1958). Note sur l'estimation du volume des peuplements à *Terminalis superbas* au Mayumbé, à l'aide des photos aériennes. *Bull. Agricole du Congo Belge* 44(4): 1045-1054.
- ° Wagemans (1961). Aménagement des forêts dense par la méthode sylvo-agricole à base de plantation de bananiers. Expérience à Luki et au Mayumbé. INEAC, Bruxelles.
- ° Wilten, W. (1955). Aspect de la sylviculture au Mayumbé. *Bull. Agricole du Congo Belge* 46(2): 319-328.
- ° Woodliti, R. (1954). Introduction à la photogéologie. *Bull. Agricole du Congo Belge* 45(b): 1429-1472.

Staff About 70

Budget No information

Local Park or Reserve Administration Forest Reserve of Luki, INERA - Luki Station, Bomna, Bas.

Date 1984

VALLEE DE LA LUFIRA

Management Category IX (Biosphere Reserve)

Biogeographical Province 3.06.04 (Congo Woodland/savanna)

Legal Protection Within Kundelungu National Park

Date Established June 1982 approval as a Biosphere Reserve

Geographical Location The reserve is located within Kundelungu National Park in the Katanga District of Zaire, near the town of Likasi in south Zaire. 10°55'-11°00'S, 26°50'-27°00'E.

Altitude 1,200m

Area 14,700ha with a core area of 2,800ha

Land Tenure Government

Physical Features The Lufira Valley consists of a series of fluvial morphological features. The river rises in the hills near the southern border of Zaire and is dammed up near its source to form a lake known as the Lac de la Retenue. Thereafter, it flows through a wide valley with traces of lacustrine deposits. Being very flat, the river meanders, forms marshes in the wet season, and often lies above the ground level embanked by alluvial levées. The Lufira then cuts through the high plateaux of Kundelungu to the East and Manika to the West, forming deep gorges, before it flows into lake Kisale, where it is joined by other tributaries and becomes one of the headwaters of the River Zaire. The average annual temperatures vary between 16°C and 31°C; rainfall averages 726mm per year.

Vegetation The region is characterised by miombo vegetation dominated by *Cassia singueana*, *Psorospermum febrifugum* and *Azelia quanzensis* with a grass layer. The valley itself consists of aquatic grasslands with species from the following genera *Leersia*, *Oryza*, and *Vossia*, and reedbeds with *Phragmites* and *Typha* spp., which are periodically flooded in the rainy season. These reedbeds cover almost 95% of the shallow Lac de la Retenue. There are also gallery forests along parts of the river, with species such as *Khaya nyasica*, *Chlorophora excelsa* and *Parkia* sp..

Fauna Mammals include: the lechwe *Kobus leche* and a few elephant *Loxodonta africana* (T). Reptiles include *Varanus niloticus*. The area is particularly remarkable for its water birds. A list of bird species is on file at the Division of Ecological Sciences.

Population No information

Conservation Management No information

Zoning There is a core area of 2,800ha and an experimental zone of 6,800ha, but there is no further information about these.

Disturbances or Deficiencies The entire region has been considerably modified by man through: overgrazing, particularly by cattle; tree felling for wood fuel and charcoal; infilling of the artificial lake by organic deposits which causes the water level to rise and an increase in evaporation rate; fishing by the population that live by the lakeside; and bush fires.

Visitor Facilities No information

Scientific Research A considerable amount of fundamental research has been made on the climate, the hydrography and hydrology, soil characteristics, and composition of plant communities, including plankton.

Special Scientific Facilities No information

Principal Reference Material

- ° Duvigneaud, P. (1959). Forêts claires: Composition floristique, classification, affinités et dynamisme des peuplements. CSA/CCTA Publication 52: 115-121.
- ° Freson, R., Goffinet, G. and Malaisse, F. (1974). Ecological effects of the regressive succession Mukulu-Miombo-Savanna in Upper Shaba (Zaire). *Inc. Proc. First Int. Congr. Ecol.* PUDOC, Wageningen, 356-371.
- ° Malaisse, F., Freson, R., Goffinet, G. and Malaisse-Mousset, M. (1975). Litter fall and litter breakdown in Miombo. In: Golley, F.B. and Medina, E (Eds) *Tropical Ecological Systems: Trends in Terrestrial and Aquatic Research*. Springer-Verlag, Berlin. 137-152.

Staff There is a total staff of about 30; two for management, 15 wardens engaged in protection, and about ten research workers.

Budget No information

Local Park or Reserve Administration Réserve de la Biosphère Vallée de la Lufira, BP 736 Likasi, Shaba.

Date 1984





ZAMBIA

Area 752,617 sq.km

Population 6,240,000 (1982)

Parks and Reserves Legislation The National Parks and Wildlife Act gives authority to the President to declare any area as a National Park with the consent of the National Assembly, and also covers management. This Act replaces the earlier Game Ordinance, Fauna Conservation Ordinance and Victoria Falls Trust Ordinance. With the new Act, the new category of Game Management Area was created and the previous categories of Game Reserve, Controlled Hunting Area and Private Game Area were abolished. This left some 30% of the country with some form of wildlife management. Hunting within game management areas is controlled by a permit system, and the areas are regarded as game-cropping areas. This would appear to be the only regulation within these areas - though they are still fairly sparsely populated. A ban was placed on elephant hunting in 1981, in addition to new hunting regulations, and animals such as kudu and sable antelope, which were previously game animals, went on the protected list. Forest Reserves, which cover some 9% of the country, are established either as 'protection reserves' to protect hill ranges and headwaters (where exploitation is prohibited or used only to encourage stand development) or as 'production reserves' (about two-thirds of the total), managed to produce wood on a sustained yield basis. National parks are classified by the Forestry Department as Conservation Forests. Areas were first protected in the area which is now Zambia, by the Northern Rhodesia Game Ordinance of 1925.

Parks and Reserves Administration Responsibility for most natural environmental matters rests with the Ministry of Lands and Natural Resources. Within this Ministry, the National Parks and Wildlife Service is responsible for most management issues relating to wildlife and protected areas. As well as administering the parks system and the game management areas, the National Parks and Wildlife Service is also responsible for wildlife research, and for managing licensing hunting. Hunting safari companies assist with anti-poaching work. Forests and Forestry are the responsibility of the Forest Department.

Address

- ° National Parks and Wildlife Service, Private Bag 1, Chilanga.
- ° Forest Department, Ministry of Lands and Natural Resources, PO Box 70228, Ndola.

Additional Information The country has a relatively low, largely urban based, population which has made a correspondingly lower impact on the land than in many countries. This, coupled with the wide variety of animal species, has led to the development of the large national park system which covers over 8% of the country. A further 20% or more lies in game management areas. Zambian tourism is based almost exclusively on the national parks system, with both photographic, and hunting safaris.

Poaching is considered to be the most severe threat to the integrity of the parks system, with increased poaching of animals in lakes and flood plain areas (where more boats are needed for wardening to be effective). However, the Save the Rhino Trust of Zambia, formed in 1979, has had some success in conserving rhinoceros and elephant. A huge military operation (supported by IUCN/WWF) was mounted in 1981 to round up poachers and buyers of ivory and horn. This brought poaching temporarily under control.

The major deficiencies of the protected areas system recognised by the National Parks and Wildlife Service are lack of national land use plans, and poor staffing levels and transport facilities. For example, because of manpower and transport shortages, most parks were not managed at all in 1981, which led to major uncontrolled bushfires. Wildlife status in over half of the game management areas is assessed as reasonable, although uncontrolled human settlement in some areas continues to be a problem. However, the remaining areas are considered by some to be of relatively lower value to conservation of nature.

Two IUCN/WWF Projects, have been contributing to encouragement of conservation awareness. Chongololo Clubs, for younger children, have been set up in 950 places and there are 145 Conservation Clubs for older students. There is a mobile education unit, and a national resource centre was planned for 1984 to include a library.

IUCN has also been assisting Zambia in the development of a national conservation strategy, published in 1985. The strategy identifies the main problems facing wildlife conservation as loss of wildlife stocks and hunting opportunities; environmental effects of different types of land use in GMA and their compatibility; conflict among users; deficiencies in scientific and technical knowledge to help in decision making; inadequacies in decision making, and poor organisational structure to help the best allocation of resources; and legislation not being conducive to sustained wildlife use by locals. A number of benefits of wildlife conservation are elaborated on. Identified requirements for action include further anti-poaching and educational measures, as well as strengthening the Department of National Parks and Wildlife and exploring ways of sharing the management responsibility for protected areas. Specific mention is also made of the need for revised survey information.

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- IUCN (1976). Proceedings of a regional meeting on the creation of a coordinated system of national parks and reserves in Eastern Africa. IUCN Publications New Series, Supplementary Paper No. 45. IUCN, Morges, Switzerland.
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Protected Areas

(hectares)

National Parks

Blue Lagoon	45,000
Isangano	84,000
Kafue	2,240,000
Kasanka	39,000
Lavushi Manda	150,000
Liuwa Plain	366,000
Lochinvar	41,000
Lower Zambezi	414,000
Luambe	25,400
Lukusuzi	272,000
Lusenga Plain	88,000
Mosi-Oa-Tunya	6,600

Mweru-Wantipa	313,400
North Luangwa	463,600
Nsumbu	202,000
Nyika (Zambia)	8,000
Sioma Ngwezi	527,600
South Luangwa	905,000
West Lunga	168,400
Subtotal	6,359,000

Game Management Areas

Bangweulu	657,000
Bilili Springs	308,000
Chambeshi	62,000
Chibwika-Ntambu	155,000
Chisomo	339,000
Chizera	228,000
Kafinda	386,000
Kafue Flats	517,500
Kalaso Mukoso	67,500
Kansonso-Busanga	778,000
Kaputa	360,000
Luano	893,000
Lukwakwa	254,000
Lumimba	450,000
Lunga-Luswishi	1,334,000
Lupande	484,000
Luwingu	109,000
Machiya-Fungulwe	153,000
Mansa	207,000
Mazabuka	25,400
Mulobezi	342,000
Mumbwa	337,000
Munyamadzi	330,000
Musalangu	1,735,000
Musele-Matebo	370,000
Namwala	360,000
Nkala	19,400
Sandwe	153,000
Sichifula	360,000
Tondwa	54,000
West Petauke	414,000
West Zambezi	3,807,000
Subtotal	16,048,800

BLUE LAGOON NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established 16 February 1973 by Statutory Instrument No. 38; previously a private ranch.

Geographical Location West of Lusaka in Mumbwa District, Central Province. 15°21'–43'S, 27°15'–27°32'E.

Altitude 970–1,010m

Area 45,000ha. Partly surrounded by Kafue Flats Game Management Area (517,200ha)

Land Tenure Government

Physical Features The park is on the north bank of the Kafue Flats with part of the south-eastern boundary formed by Luwato Lagoon, an oxbow lake of the old river channel which tends to dry out only at the end of the dry season. The land slopes up gently northwards from the flood plain. Seasonal inundation reaches a maximum in June, when 30% of the park is under water.

Vegetation There are three vegetation zones: flood plain grasses and sedges with main species near the high flood level *Vetiveria nigritana* and wild millets *Setaria sphacelata* and *Setaria avetiae* and rice grass *Oryza longistaminata*, and small patches of *Cyperus papyrus* in more deeply flooded areas; a narrow intermediate termitaria grassland zone; and open woodland dominated by *Acacia*, *Combretum* and *Terminalia* with an understorey of tall grass. Fig trees *Ficus sycomorus* are common locally.

Fauna Large mammals include: wild dog *Lycaon pictus* (T) (most common carnivore), zebra *Equus burchelli*, bushbuck *Tragelaphus scriptus*, greater kudu *Tragelaphus strepsiceros*, roan antelope *Hippotragus equinus*, sable antelope *Hippotragus niger*, large herds of Kafue lechwe *Kobus leche kafuensis* (T) (25,000 estimated to enter the park seasonally out of a total population in the Kafue Flats of about 40,000), and occasional cheetah *Acinonyx jubatus* (V). The park is an important feeding ground for waterbirds including: glossy ibis *Plegadis falcinellus*, slaty egret *Egretta vinaceigula* (I), wattled crane *Bugeranus carunculatus* (of special concern), and spur-winged goose *Plectropterus gambensis*.

Zoning None

Disturbances or Deficiencies Uncontrolled bush fires, cattle grazing and poaching of animals and fish occur. The expanding population of Lusaka has increased poaching pressure on the park and poaching started in the Lechwe area on the western boundary in 1980. The south-eastern corner of the park was permanently flooded from 1977 to 1981 as a result of the Kafue Gorge Dam. Now flood regime is influenced by regulation at the Itzhi tezhi dam, which may damp the flood peaks and lows. Hunting (particularly of zebra and lechwe), grazing and fishing are the major activities in the game management area and settlements are sparse, but increasing. Since October 1976, the park has been a security area and has been closed to visitors.

Visitor Facilities No visitors permitted since October 1976. Access is by a 90km gravel road branching off the Luaska-Mwumbwa highway and there is an airstrip. A 4km game-viewing causeway has been built out into the flats.

Scientific Research Ecological studies have been started.

Special Scientific Facilities Research is carried out from Lochinvar National Park on the other side of the Kafue valley.

Principal Reference Material

- Dowsett, R.J. (1966). A preliminary list of the birds of the Kafue Flats.
- WWF-UK Mission Report (1978).
- *Zambia Journal of History* No.1.

Staff Wildlife ranger and guards (1977)

Budget About US\$50,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 81344, Kabwe.

Date 1984

ISANGANO NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44; legislated as a game reserve in 1957

Geographical Location At the north-eastern edge of the Lake Bangweulu Flats in the Northern Province. 11°00'-11°25'S, 30°20'-30°45'E.

Altitude 1,100m

Area 84,000ha

Land Tenure Government

Physical Features The flats and flood plain areas are underlain by granite, quartzitic sandstones, and shales of the plateau series. The Chambeshi river forms the eastern boundary and the Lubansenshi river runs through the centre of the park. Rainfall is high, over 1500mm in some years.

Vegetation Much of the area is swamp forest dominated by *Erythrophleum* and *Pterocarpus* with tall grasslands and watershed plain grasslands. Along the main rivers, there are some areas of *Cyperus papyrus* and *Phragmites*. Lake basin chipya woodland of *Acacia albida* and *afromosia Pericopsis angolensis* also occurs.

Fauna Larger mammals include: elephant *Loxodonta africana* (T), zebra *Equus burchelli*, warthog *Phacochoerus aethiopicus*, bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, black lechwe *Kobus leche smithemani* (T) (mainly in Bangweulu Game Management Area to the south-west, but some enter the park seasonally), reedbuck *Redunca arundinum*, roan antelope *Hippotragus equinus*, and Lichtenstien's hartebeest *Alcelaphus lichtensteini*. Water birds are numerous. The Nile crocodile *Crocodylus niloticus* (T) inhabits the rivers.

Zoning None

Disturbances or Deficiencies Poaching and uncontrolled bush fires occur, with fishing villages within the reserve and illegal entry. Low priority under game reserve status has resulted in reduced animal populations with few game present in 1980.

Visitor Facilities No accommodation or facilities exist in the park. There are rough tracks unsuitable for cars near the boundaries, but access into the park is by foot or boat.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Two wildlife officers (guards) (1977)

Budget About US\$15,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 12, Mpilca.

Date 1984

KAFUE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established Originally established on 15 September 1951 by Proclamation No. 8 and given National Park status on 25 February 1972 by Statutory Instrument No. 44.

Geographical Location South-central Zambia, west of Lusaka in the Central, Southern and North-Western Provinces. 14°00'-16°40'S, 25°15'-26°45'E.

Altitude 970-1,470m

Area 2,240,000ha. Surrounded by Kafue Game Management Area

Land Tenure Government

Physical Features The area is a gently undulating plateau area with some hills, situated along the mid reaches of the Kafue river and its two major tributaries, the Lufupa and Lunga, which flow into the park from the north. There is a perennial swamp in the extreme north-west, which drains into the Lufupa via the Busanga flood plain and alluvial areas of varying size occur along the Kafue and other tributaries. Karroo sediments occur in the centre and north-east with Kalahari sands forming the underlying geology in the west.

Vegetation The south has mainly miombo or *Brachystegia* dominated woodland with areas of mopane *Colophospermum mopane*. In the north, the miombo-termitaria woodland surrounds areas of open grassy flood plains or 'dambos'. Patches of teak *Baikiaea plurijuga* such as the Ngoma Forest occur throughout, but are more common in the south.

Fauna Yellow baboon *Papio cynocephalus* and chacma baboon *Papio ursinus* occur within a few kilometres of each other with no signs of morphological intergrading. Numerous large mammals include: lion *Panthera leo*, elephant *Loxodonta africana* (T) (increasing in number), well distributed black rhino *Diceros bicornis* (T), buffalo *Syncerus caffer* including a herd of less than 1,000 in the Busanga area, yellow-backed duiker *Cephalophus sylvicultor*, numerous waterbuck *Kobus ellipsiprymnus crayshawii*, puku *Kobus vardoni*, red lechwe *Kobus leche leche* (T) in the northern area, reedbuck *Redunca arundinum*, and Lichtenstein's hartebeest *Alcelaphus lichtensteini*. Birds include numerous waterfowl such as wattled crane *Bugeranus carunculatus* (of special concern).

Zoning Three zones: visitors allowed in vehicles or on foot; visitors allowed on foot; visitors prohibited

Disturbances or Deficiencies A dam has been constructed at Itezhi-tezhi on the Kafue river just outside the eastern boundary. From 1972, an area of about 31,000ha of the park was flooded by a lake with fluctuating water levels. A squatter settlement has resulted from the labour force for the construction of the dam, and fishing on Lake Itezhi-tezhi has encouraged illegal entry and poaching. The island in Itezhi-tezhi Lake is permanently inhabited by fishermen despite being within the Park. However, 17 villages had fishing rights recognised in 1962, but conflicts arose because commercial fishermen from outside exploited this and it interfered with tourists' fishing. Wastes, including nitrates and phosphorus residues, are discharged into the Kafue. The main road from Lusaka to Mongu bisects the park from east to west. Uncontrolled bush fires occur.

Visitor Facilities Accommodation is in catering lodges at Ngoma (42 beds) or non-catering camps such as La Fapa Camp. Safaris are conducted partially on foot in the Busanga plains area. A fully catering safari village with airstrip at Chunga is just outside the eastern boundary near the Mongu road and two safari villages in the north.

Scientific Research A biologist is responsible for management plans of the park.

Special Scientific Facilities Mapping facilities and a herbarium

Principal Reference Material

- ° Dowsett, R.J. (1966). A preliminary list of the birds of the Kafue Flats.
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- ° Mitchell, B.L. and Ansell, W.F.H. (1971). Wildlife of Kafue and Luangwa. *Zambian National Tourist Bureau, Lusaka*.
- ° Moss, de V.P.F.N. (1974). Kafue National Park, Zambia. N.P.W.S. publication. 76 pp, mimeo.

Staff Warden, 100 support staff, biologist and assistants (1977).

Budget About US\$300,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 17, Itezhi-tezhi. Two Rangers, Kafue National Park, Chunga Station, PO Box 124, Mumbwa.

Date 1984

KASANKA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44; a game reserve since 1941

Geographical Location Serenje district in Central Province. 12°25'-12°35'S, 30°05'-30°23'E

Altitude 1,100-1,300m

Area 39,000ha

Land Tenure Government

Physical Features The flat to gently rolling plateau area includes extensive wetlands. Rocks are mainly sandstone, quartzite, shale, and schist of the Katanga and Muva systems. Two large rivers flow through the park including the Kasanka river passing through the extensive Kapabi swamp in the east. There are also several small lakes. Annual rainfall is 1,200-1,300mm, falling mainly from November to April.

Vegetation The area is dominated by miombo *Brachystegia-Julbernardia* woodlands. The extensive wetlands support papyrus *Cyperus papyrus* and *Phragmites* stands and there are some areas of 'mushitu' swamp forest and open grassland with dambos.

Fauna Large mammals include: sitatunga *Tragelaphus spekei* (seen here more easily than in any other park), numerous puku *Kobus vardonii*, lechwe *Kobus leche*, blue monkey *Cercopithecus mitis* and Moloney's monkey *Cercopithecus mitis moloneyi*, elephant *Loxodonta africana* (T), zebra *Equus burchelli*, warthog *Phacochoerus aethiopicus*, hippo *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, waterbuck *Kobus ellipsiprymnus*, Lichstein's hartebeest *Alcelaphus lichtensteini*, and grysbok *Raphicerus sharpei*. Birdlife includes abundant waterfowl such as shoebill *Balaeniceps rex* (of special concern).

Zoning None

Disturbances or Deficiencies Poaching and uncontrolled burning occur. The construction of the Serenje-Samfya road began to have adverse effects on the park in 1980.

Visitor Facilities No visitor accommodation exists inside the park, but suitable sites for camping can be found near the park boundary. It is accessible only by rough bush track unsuitable for private cars.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Warden, ranger, and 10 wildlife officers (guards) (1977).

Budget About US\$25,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 12, Mpilca.

Date 1984

LAVUSHI MANDA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44. Legislated as a game reserve in 1941

Geographical Location South-west of Mpika in the Northern Province. 12°00'-12°40'S, 30°35'-31°10'E.

Altitude 1,100-1,800m

Area 150,000ha, contiguous to Kafinda Game Management Area (386,000ha) and Bangweulu Game Management Area (647,000ha)

Land Tenure Government

Physical Features The lavushi Manda hills (height 500-600m), along the south-eastern side of the park, roughly divide the plateau series to the west from the basement rocks to the east. They are extremely rugged with high vertical cliff faces on the south-east and are dissected by several narrow canyons containing perennial water courses. The Lukulu river flows from the north to south-west of the park before turning westwards to the Zaire border. The park is noted for dambos and there is a small sandy plain in the north. Annual rainfall 1,300mm, falling mainly from November to April.

Vegetation Most of the area supports miombo *Brachystegia-Julbernardia* woodland interspersed with dambo plains. Dense gallery forest occurs along the rivers and palms in the canyons. Numerous Euphorbiaceae and aloes are a feature of the hill vegetation.

Fauna The rock rabbit or Smith's red hare *Pronolagus rupestris* should occur in the hills but has not yet been reliably recorded. Larger mammals are not numerous but include: leopard *Panthera pardus* (T), lion *Panthera leo*, elephant *Loxodonta africana* (T) (mainly in the north), common duiker *Sylvicapra grimmia*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca arundinum*, roan antelope *Hippotragus equinus*, sable antelope *Hippotragus niger*, hartebeest *Alcelaphus lichtensteini* and klipspringer *Oreotragus oreotragus*. There are no large concentrations of birds but some interesting small species such as bar-throated apalis *Apalis thoracica* and double-collared sunbird *Nectarinia chalybea* are found in the hills.

Zoning None

Disturbances or Deficiencies Uncontrolled fires and poaching occur, the latter has increased by developments along the Tazara railway line. Low protection priority under game reserve legislation has resulted in low stocks of wild animals.

Visitor Facilities No accommodation is available but the park is easily accessible from the Great North Road in the dry season.

Scientific Research A National Parks and Wildlife Service field base has been established to the west of the park at Chiundaponde.

Special Scientific Facilities None

Principal Reference Material None listed

Staff One Ranger and four guards

Budget No information

Local Park or Reserve Administration Wildlife Warden, PO Box 12, Mpilca.

Date 1984

LIUWA PLAIN NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established 25 February 1972 by Statutory Instrument No. 44, previously a game reserve managed by the Paramount Chief of the Lozi people.

Geographical Location Kalabo district in Western province, near the border with Angola. 14°10'-48'S, 22°07'-23°00'E.

Altitude About 1,000m

Area 366,000ha. Surrounded by West Zambezi Game Reserve (3,807ha)

Land Tenure Government

Physical Features An extremely flat sand plain flanked by the Luambimba river to the east and the Luanginga river to the west. Seasonally inundated areas occur along the rivers augmented by floodwaters from the Zambezi. The park experiences three seasons: short cool dry season from May to July; a warm dry season from August to November, and a warm wet season from December to April.

Vegetation Most of the area is Kalahari short grass sand plains with some watershed grasslands. Around the edges of the sand plains (except in the west) is a belt of *Burkea africana* with some *Zambian* teak *Baikiaea plurijuga* forming *Burkea-Colophospermum-Baikiaea* woodland, and *Diplorhynchus condylocarpon* scrub. The river valleys have a narrow belt of valley and floodplain grasslands.

Fauna Large mammals include: zebra *Equus burchelli*, some buffalo *Syncerus caffer*, red lechwe *Kobus leche leche* (T), roan antelope *Hippotragus equinus*, Lichsteinstein's hartebeest *Alcelaphus lichtensteini*, tsessebi *Damaliscus lunatus*, and the largest population of migrating blue wildebeest *Connochaetes taurinus* in Zambia (35,000 in 1975). Birds include: secretary bird *Sagittarius serpentarius*, crowned crane *Balearica pavonina*, wattled crane *Bugeranus carunculatus* (of special concern), and a variety of waterfowl on the pans including slaty egret *Egretta vinaceigula* (1).

Zoning None

Disturbances or Deficiencies Poaching, illegal fishing, uncontrolled bush fires and grazing by domestic animals on the park boundary occur and there are villages within the park and lack of staff transport.

Visitor Facilities No tourism as the park has no accommodation and there are only four-wheel drive tracks.

Scientific Research Vegetation and habitat mapping

Special Scientific Facilities None

Principal Reference Material

° Benson, C.W. (1969). Large Mammals of the Ljiuwa Plain and Sioma-Ngwezi Game Reserves, Barotse. *Puku* 5.

Staff Warden, ranger, and six guards. One biologist includes the park in his terms of reference (1977).

Budget About US\$35,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 910158, Mongu.

Date 1984

LOCHINVAR NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established Originally a private ranch, then a Game Management Area. National Park status on 25 February 1972 by Statutory Instrument No. 44.

Geographical Location North-west of Monze in the Southern Province. 15°43'-16°01'S, 27°11'-27°19'E.

Altitude 970-1,038m

Area 41,000ha; contiguous to Kafue Flats Game Management Area (517,200ha)

Land Tenure Government

Physical Features The park contains three areas: part of the Kafue Flats floodplain in the north, which is subject to a regular pattern of flooding commencing rapidly in December, reaching a maximum in May and gradually receding to the lowest level by November; a flat termitaria zone south of the floodplain with sandy clay to clay soils which become waterlogged in the wet season; and woodland in the south. There are two groups of hot springs on a fault zone towards the west. Annual rainfall is about 1000mm.

Vegetation Floodplain grasses vary, but include rice grass *Oryza longistaminata*, *Vossia cuspidata*, *Echinochloa stagnina*, and *Panicum repens*. Herbs include: *Aeschynomene fluitans* and *Nymphaea capensis* and other species of *Nymphaea*. The termitaria grasslands are dominated by a wild millet *Setaria sphacelata*. Tree growth is confined to termite mounds and is usually *Euphorbia ingens*. The woodlands at higher elevations in the south are dominated fire climax species such as *Acacia*, *Albizia*, and *Combretum*.

Fauna Mammals include: zebra *Equus burchelli*, Kafue lechwe *Kobus leche kafuensis* (T) (large herds of about 35,000), wildebeest *Connochaetes taurinus*, and oribi *Ourebia ourebi*. The southern woodlands also have kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, and duikers *Cephalophus* sp.. The area is very rich in birdlife with more than 400 recorded species including: white pelican *Pelecanus onocrotalus* and pink-backed pelican *Pelecanus rufescens*, darter *Anhinga rufa*, purple heron *Ardea purpurea*, goliath heron *Ardea goliath*, spur-winged goose *Plectropterus gambensis*, fish eagle *Haliaeetus vocifer*, secretary bird *Sagittarius serpentarius*, Swainson's francolin *Francolinus*, helmeted guineafowl *Numida meleagris*, crowned crane *Balearica pavonina*, wattled crane *Bugeranus carunculatus* (of special concern), Denham's bustard *Neotis cafra denhami*, wattled plover *Vanellus senegallus*, slaty egret *Egretta vinaceigula* (1), and red-billed hornbill *Tockus erythrorhynchus*. Reptiles include: geckoes *Lygodactylus capensis* and *Lygodactylus chobiensis*, boomslang *Dispholidus typus*, striped grass snake *Psammodromus tritaenatus* and skinks *Mabuya varia*, *Mabuya striata*,

and *Meizodon semiornatus*. Amphibians include: *Bufo regularis*, *Chiromantis xerampelina*, *Ptychadena mossambica*, and *Pyxicephalus* spp..

Cultural Heritage Archaeological sites have been excavated and described.

Conservation Management There was some prevention of cattle entering the park to graze after the employment of classified daily paid employees in 1980. An assessment of the degradation within the park was undertaken in 1981. An action plan was recommended including anti-poaching law enforcement, creation of a physical barrier, grading of tourist roads, fire control, and a research programme. The problems of fishing, grazing, and poaching were given to Southern Land Commission of Inquiry.

Zoning None

Disturbances or Deficiencies Gypsum has been mined, although this has been abandoned now, but there are uncontrolled bush fires, domestic stock overgrazing, poaching of animals and fish, commercial fishing, and degradation of tourist roads by fishermen persist. There are fishing settlements within the park. Eland have disappeared and lechwe, wildebeest and oribi have decreased. Dense cattle populations (20,000 in the surrounding 40km radius) often stray into the park. The construction of two dams, one upstream (Itezitchezi dam) and one downstream from Kafue Flats (floodplains) has modified the ecological conditions of the area which could affect the population of Kafue lechwe, whose pasture near the water edge is dependant on annual inundation by the Kafue. Some dry season grazing areas on the flats are now under permanent flood due to hydroelectric development and this increases cattle encroachment into the park. Eland and impala have disappeared from the area.

Visitor Facilities There is one small non-catering lodge (18 beds), road access (virtually all-weather) 48km from the turn-off near Monze, and an airstrip near park gate.

Scientific Research Soil, vegetation and ornithological surveys, and research on the Kafue lechwe have been carried out. Further surveys are planned to monitor future population trends.

Special Scientific Facilities Research biologists office, herbarium and records

Principal Reference Material

- ° Douthwaite, R.I. and Van Lavierien, L.P. (1977). Vegetation in Lochinvar National Park. NCSR/TR 34, 1-66.
- ° Dowsett, R.J. (1966). A preliminary list of the birds of the Kafue Flats.
- ° Mulongo, A.H. (1981). Land use conflicts on Lochinvar: an example of contradictions in environmental policy 1950-75. Zambia Journal of History.
- ° Rees, W.A. (1981). Report to the Director NPWS, Zambia on Lochinvar National Park.
- ° Schuster, R. (1980). Will the Kafue lechwe survive the Kafue dams? *Oryx* 15(5): 476-489.

Staff Ranger and eight guards. One biologist and assistants (1977).

Budget About US\$50,000 per annum. WWF made a substantial financial contribution towards the purchase of Lochinvar (1977).

Local Park or Reserve Administration Wildlife Warden, PO Box 60174, Livingstone.

Date 1984

LOWER ZAMBEZI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established 19 March 1983 by Statutory Instrument No 37 of 1983. It was previously an International Game Park.

Geographical Location Along the river Zambezi. 15°10'–15°35'S, 29°10'–30°15'E.

Altitude 390–1,000m

Area 414,000ha

Land Tenure Government

Physical Features The park is predominantly hilly, with rugged residual mountains of the Muchinga Escarpment system. The valley floor rocks belong to the Karroo system, and the meander belt consists of alluvial soils. The climate is generally hot with a mean annual temperature of 25°C, but hottest in October – 36°C and coolest in June – 15°C. Rainfall is low, on average 700mm, falling from November to March.

Vegetation The mountainous area is dominated by miombo *Brachystegia* woodland, whereas the valley floor is covered by mopane *Colophospermum mopane* type. The meander belt is composed of mixed *Kigelia-Diospyros* woodland and grassland types.

Fauna This includes: elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, impala *Aepyceros melampus*, zebra *Equus burchelli*, waterbuck *Kobus ellipsiprymnus*, kudu *Tragelaphus strepsiceros*, eland *Taurotragus oryx*, roan antelope *Hippotragus equinus*, rhinoceros *Diceros bicornis* (T), lion *Panthera leo*, leopard *Panthera pardus* (V), wild dog *Lycaon pictus* (T), and crocodile *Crocodylus niloticus* (V). Birdlife is not as spectacular as the major wetlands.

Conservation Management The National Park had six wildlife camps, but only two are functional at present. An anti-poaching unit was set up here in 1981 by the Save the Rhino trust, under IUCN/WWF Project 1757, with reasonable success.

Zoning None

Disturbances or Deficiencies Uncontrollable bush fires and heavy poaching

Visitor Facilities There are no roads apart from tracks used for anti-poaching operations and no accommodation, but visitors can visit the area on their own with a four-wheel drive vehicle.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- ° Chabwela, H.N. (undated mimeo). *Lower Zambezi: the future many times ignored*. National Parks and Wildlife Service, Chilanga, Zambia.
- ° IUCN/WWF Project 1757. Zambia, Save the Rhino Trust, Anti-poaching operations.

Staff Six wildlife scouts and an Assistant Ranger under Warden.

Budget About US\$15,000 per annum

Local Park or Reserve Administration Wildlife Warden, PO Box 81344, Kabwe.

Date 1984

LUAMBE NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44; established as a game reserve in 1966.

Geographical Location On the east bank of the Luangwa river between the three larger Luangwa valley parks. 12°25'-12°35', 32°10'-32°25'E.

Altitude 500-710m

Area 25,400ha; contiguous to South Luangwa (905,000ha)

Land Tenure Government

Physical Features This predominately alluvial area slopes gently to the Luangwa river, which forms the western boundary. The valley floor bedrock is part of the Karoo system. Temperatures are highest in the late dry season (October) and lowest in the mid dry season (July).

Vegetation Alluvial areas are dominated by *Colophospermum mopane* woodland with miombo *Brachystegia-Julbernardia* woodland on the small areas of free draining sandy soil away from the river.

Fauna Mammals include: lion *Panthera leo*, numerous elephant *Loxodonta africana* (T), occasional black rhinoceros *Diceros bicornis* (T), bush pig *Potamochoerus porcus*, hippopotamus *Hippopotamus amphibius*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, roan antelope *Hippotragus equinus*, impala *Aepyceros melampus*, and the largest concentration of the wildebeest sub-species *Connochaetes taurinus cooksoni*, which is endemic to Luangwa valley.

Zoning None

Disturbances or Deficiencies Uncontrolled bush fires occur and there is local overstocking of elephant, impala, and hippopotamus.

Visitor Facilities A non-catering lodge (12 beds) with cook/waiter service is available. The park is open from mid-June to the end of October, the dates depending on the rains when the dirt roads become impassable.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material None listed

Staff Ten wildlife officers responsible to a wildlife warden (1977)

Budget About US\$30,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 510143, Chipata.

Date 1984

LUKUSUZI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44; Legislated as a game reserve in 1938

Geographical Location Eastern province plateau between Lundazi and Chipata. 12°30'-13°07'S, 32°25'-50'E.

Altitude 800-1,240m

Area 272,000ha

Land Tenure Government

Physical Features The eastern part is a level plateau, but to the west the country is more hilly towards the escarpment overlooking the Luangwa valley. The area is largely underlain by a variety of gneissic and granitic rocks with numerous outcrops and metamorphic quartzite hills. There is a long cool dry season and short hot wet season.

Vegetation There is principally miombo *Brachystegia-Julbernardia* woodland on the plateau and escarpment soils. Different types of vegetation are associated with the frequent granitic outcrops and the riverbanks. Edaphic dambo grasslands follow drainage lines on the plateau.

Fauna Mammals include: hyena *Crocuta crocuta*, elephant *Loxodonta africana* (T), zebra *Equus burchelli*, black rhinoceros *Diceros bicornis* (T), warthog *Phacochoerus aethiopicus*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, roan antelope *Hippotragus equinus*, sable antelope *Hippotragus niger*, and Lichtenstein's hartebeest *Alcelaphus lichtensteini*. Cookson's wildebeest *Connochaetes taurinus cooksoni* occur occasionally in low numbers. The rocky outcrops of this park are one of the main Zambian habitats for klipspringer *Oreotragus oreotragus*.

Conservation Management In 1980, the park was covered by regular patrols conducted by the Save the Rhino Unit based at Mufwe. A management plan to ensure the maintenance of the major habitats and preservation of key areas was prepared in 1970.

Zoning None

Disturbances or Deficiencies There are uncontrolled fires and poaching. Activities associated with prospecting and mining for emeralds pose a serious threat.

Visitor Facilities Public access is by a bush track from the main road to the east which traverses the park and descends the escarpment to the Luangwa. There are no tourist facilities.

Scientific Research Research associated with management plan preparation.

Special Scientific Facilities None

Principal Reference Material

° Sayer, J.A. (1970). *A management plan for the Lukusuzi National Park*. UN/FAO Luangwa Valley Project, Chipata.

Staff Some 30 wildlife officers (rangers, scouts, and guides) responsible to a wildlife warden (1977).

Budget About US\$90,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 510143, Chipata.

Date 1984

LUSENGA PLAIN NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established Legislated as a Game Reserve in 1942. National Park status on 15 February 1972 by Statutory Instrument No. 44

Geographical Location North of Kawambwa in Luapula Province. 9°15'-30'S, 29°05'-29°20'E.

Altitude 800-1,300m

Area 88,000ha

Land Tenure Government

Physical Features The park is in the south-west of a plain formed by the weathering of a volcanic plug dome, which left rocky outcrops of syenite in concentric rings separated by weathered rock, forming a saucer-shaped depression. The ridges form the highest point, the ground sloping away to the north and east to the Kalungwishi river. There are three large waterfalls on the river. Annual rainfall is 1,400mm, falling mainly from November to April.

Vegetation The plain has grassland fairly typical of Northern Province upland dambos. Around the margins are remnants of mushitu swamp forest and dry evergreen forest of *Marquesia acuminata* and *M. macroura*. The remaining area is covered with dense *Brachystegia-Julbernardia* miombo with a few patches of *Pteleopsis anisoptera* on alluvial soils.

Fauna The fauna is depleted, but includes remnant populations of vervet and blue monkeys *Cercopithecus aethiops* and *C. mitis*, leopard *Panthera pardus* (V), elephant *Loxodonta africana* (V), zebra *Equus burchelli*, warthog *Phacochoerus aethiopicus*, bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, yellow-backed duiker *Cephalophus sylvicultor* and blue duiker *Cephalophus monticola*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca arundinum*, roan antelope *Hippotragus equinus* and sable antelope *Hippotragus niger*, and Lichtenstein's hartebeest *Alcelaphus lichtensteini*.

Conservation Management There was vegetation and habitat mapping for preparation of management plans.

Zoning None

Disturbances or Deficiencies Uncontrolled fires and poaching occur. Low priority for protection under game reserve legislation has resulted in depleted animal populations.

Visitor Facilities The park has no accommodation or roads, but there are two good camp sites just outside the boundary near the waterfalls.

Scientific Research Vegetation and habitat mapping

Special Scientific Facilities None

Principal Reference Material None listed

Staff Nine wildlife officers (guards) (1977)

Budget Reported as US\$5000 in 1971 (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 410005, Kasama.

Date 1984

MOSI-OA-TUNYA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection An enclosed portion of 1,000ha is totally protected, except against mining. The remaining area is protected against hunting and destruction of vegetation or geomorphological features.

Date Established National Park status 25 February 1972 by Statutory Instrument No. 44; Previously a trust area

Geographical Location Southern border with Zimbabwe. 17°49'-17°54'S, 25°41'-25°55'E.

Altitude 833-914m

Area 6,600ha. Contiguous to the Victoria Falls and Zambezi National Parks in Zimbabwe

Land Tenure Government

Physical Features The park comprises the left bank of the Zambezi river, half of Victoria Falls, and the series of deep gorges below the falls. The maximum height of the falls is 108m. Maximum waterflow is 540 million litres/minute in March/April. Low water in November can reduce flow to 10.5 million litres/minute. Above the falls, the river is 1,690m wide.

Vegetation The dominant vegetation is mopane *Colophospermum mopane* forest with small areas of teak and miombo woodlands. The narrow riverine forest along the Zambezi is more extensive in the 'rain forest' area, where it is permanently dampened by spray from the falls. In the 'rain-forest' ferns are widespread and there is a profusion of flowering plants.

Fauna Vervet monkey *Cercopithecus aethiops pygerythrus* and baboon *Papio ursinus* are common. Larger mammals include: leopard *Panthera pardus* (T), elephant *Loxodonta africana* (T), warthog *Phacochoerus aethiopicus*, hippopotamus *Hippopotamus amphibius*, bushbuck *Tragelaphus scriptus*, buffalo *Syncerus caffer*, common duiker *Sylvicapra grimmia* and waterbuck *Kobus ellipsiprymnus*. Birds include: Taita falcon *Falco fasciinucha* (uncommon), black swift *Apus barbatus* and carmine bee-eater *Merops nubicus* in the gorge, and shrikes, flycatchers, and sunbirds in the 'rain forest'.

Cultural Heritage There are archaeological remains of stone and iron age man.

Conservation Management Efforts were being made to improve the management of the area in 1980, but management was still reported to be very poor in 1981.

Zoning There is a 1,000ha fenced zoological park up-river from the Falls, which contains exotic and native species.

Disturbances or Deficiencies There was much building and disturbance in the vicinity of the Falls before the existence of the park, including a hydroelectric power station, railway, major highway, customs and immigration posts, and a large hotel. Further inappropriate development will be avoided.

Visitor Facilities This is one of the most frequently visited national parks in Zambia. Facilities include a hotel, two restaurants, a non-catering camp (70 beds) and a camping ground. The park is a few minutes drive from Livingstone where all tourist facilities are available.

Scientific Research None

Special Scientific Facilities None

Principal Reference Material

- * Anon. (n.d.). A Guide to the Victoria Falls. Victoria Falls Trust, Livingstone.
- * Fagan, B.M. (1964). The Victoria Falls. Commission for the Preservation of Natural and Historical Monuments and Relics, Northern Rhodesia.
- * Phillipson, D.W. (Ed.) (1975). Mosi-oa-Tunya. A handbook to the Victoria Falls Region. Longman.

Staff Ten guards under a wildlife ranger (1977)

Budget About US\$90,000 per annum (1977)

Local Park or Reserve Administration Wildlife Ranger, PO Box 60174, Livingstone.

Date 1984

MWERU-WANTIPA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established 25 February 1972, by Statutory Instrument No. 44 of 1972; a game reserve since 1942

Geographical Location Between Lakes Mweru, Tanganyika, and Luapula in the Northern province, 8°27'–9°00'S, 29°15'–30°00'E.

Altitude 900–1,400m

Area 313,400ha

Land Tenure Government

Physical Features The eastern area changes periodically from grassland and swamp to a large open lake, Lake Mweru-Wantipa. The cycle is erratic, but the water level appeared to reach high point in 1974. The area is geologically young with marked faults around the high water mark. To the west of the lake basin, the land slopes gently upwards to a range of highly dissected hills of granites, quartz, and porphyrites. In about one in five years, the annual rainfall may be as high as 1,300mm. The rainy season is from November to April.

Vegetation The swamp and lake area are dominated by dense *Cyperus papyrus* thickets with some reed *Phragmites*. The area close to the lake has thickets of *Bussea* and *Combretum*. The remaining area is covered with miombo *Brachystegia-Julbernardia* woodland on the sandy-loam soils derived from underlying igneous rocks. Large grassy acid dambos occur in the miombo woodland and there is a small permanent swamp (Kabwe marsh) some distance from the main lake.

Fauna Mammals include: blue monkey *Cercopithecus mitis* (numerous), baboon *Papio* sp. and possibly occasional vagrant colobus monkey *Colobus angolensis* from Zaire. The uncommon bushy-tailed mongoose *Bdeogale crassicauda* has been found in the area. Other mammals include: leopard *Panthera pardus* (T), lion *Panthera leo*, black rhino *Diceros bicornis* (T), elephant *Loxodonta africana* (T), zebra *Equus burchelli*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer*, bushbuck *Tragelaphus scriptus*, sitatunga *Tragelaphus spekei* (in Kabwe marsh), eland *Taurotragus oryx*, yellow-backed duiker *Cephalophus sylvicultor*, blue duiker *Cephalophus monticola*, klipspringer *Oreotragus oreotragus*, grysbok *Raphicerus sharpei*, puku *Kobus vardonii*, waterbuck *Kobus ellipsiprymnus*, and reedbuck *Redunca arundinum*. Birds include: white pelican *Pelecanus onocrotalus*, shoebill *Balaeniceps rex* (of special concern), saddlebill *Ephippiorhynchus senegalensis*, openbill *Anastomus lamelligerus*, greater flamingo *Phoenicopterus ruber* and lesser flamingo *Phoeniconaias minor*, and several species of heron. Crocodile *Crocodylus niloticus* (V) is common and *Crocodylus cataphractus* (V) occurs in Lake Mweru-Wantipa.

Conservation Management Cropping of crocodile was undertaken in 1980 and 1981. Carrying capacity of the lake was estimated to be in excess of 4,000.

Zoning There are three zones: total wilderness with access to authorised personnel only; a public access and restricted residence zone; and a commercial fishing zone.

Disturbances or Deficiencies There is a seasonal fishing village near the lake and a permanent village on the road which bisects the park. Poaching and uncontrolled fires still occur. Control measures directed at the red locust have been a recurrent disturbance. The locust bred in great numbers on the short grass plain left by the receding lake particularly in the 15 years up to

1944. There is a problem of man-eating crocodiles, and a dispute between the national parks authority and the people around the park, with respect to siting of the boundary.

Visitor Facilities Tourism is small. Access is by road from east and west and there are suitable camping sites outside the park.

Scientific Research Investigation of the red locust by the International Red Locust Institute afforded opportunities for botanical and zoological research.

Special Scientific Facilities None

Principal Reference Material

- ° Berwick, D. (1959). Mystery Isle Mweru Marsh. *Northern Rhodesia Journal* 2(3): 56-59.
- ° Brelsford, W.V. (1955). The problem of Mweru-Wantipa. *Northern Rhodesia Journal* 2(6): 3-15.
- ° Gunn, D.L. (1955). Mweru Wa Ntipa and the Red Locust. *Northern Rhodesia Journal* 2(6): 3-15.

Staff Warden, ranger and 26 wildlife officers (guards and scouts) (1977).

Budget About US\$45,000 per annum (1977).

Local Park or Reserve Administration Wildlife Warden, PO Box 410005, Kasama.

Date 1984

NORTH LUANGWA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44. Legislated as a game reserve in 1939.

Geographical Location East central Zambia in the upper Luangwa valley. 11°30'-12°00'S, 31°45'-32°35'E.

Altitude 500-1,100m

Area 463,600ha

Land Tenure Government

Physical Features The park extends from Muchinga escarpment (1,400m) in the west, to the northern part of the Luangwa river in the east. The valley floor is a wide area of alluvial flats extending over underlying Karoo rocks. The river is seasonally flooded. There are no grassy plains. Mean annual temperature is 22°C and mean annual rainfall 880mm in a single wet season from November to April.

Vegetation Miombo *Brachystegia* woodland occurs on the freely draining sandy soils and miombo scrubland mixed with *Colophospermum mopane* on heavier soils. A complex of riverine forests is found on the meander belt.

Fauna Mammals include: vervet monkey *Cercopithecus aethiops*, Chacma baboon *Papio ursinus*, leopard *Panthera pardus* (T), lion *Panthera leo*, elephant *Loxodonta africana* (T), zebra *Equus burchelli*, black rhinoceros *Diceros bicornis* (T), hippopotamus *Hippopotamus amphibius*, kudu *Tragelaphus strepsiceros*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, puku *Kobus vardonii*, Cookson's wildebeest *Connochaetes taurinus cooksoni*, and impala *Aepyceros melampus*. The river provides a habitat for Nile crocodile *Crocodylus niloticus* (V).

Conservation Management In 1973, the Luangwa Valley Conservation Project was set up to advise the Government of Zambia on management and development requirements for the full utilisation of natural resources in the valley (Albrecht 1973, Boulton 1973, Dunlap 1973, and Ford 1973). Plans were made in 1980 to man the western boundary with 50 guards to enable adequate control of poaching. Honorary Wildlife Rangers proved effective along the escarpment in 1981.

Zoning There is a zone of strict national park status in which visitor access is restricted to walking trails.

Disturbances or Deficiencies There is poaching particularly for elephant and rhinoceros, and uncontrolled fires.

Visitor Facilities There is an access track, but there are no lodges in the park. Tourism is only permitted as organised camping and walking wilderness trails.

Scientific Research A GRZ/FAO team was responsible for research and a report on the first phase was made in March 1973. However, the project ended in 1973. An aerial survey censused elephant and rhinoceros in 1979 (Douglas-Hamilton *et al.*, 1979).

Special Scientific Facilities None

Principal Reference Material

- ° Albrecht, R.W. (1973). Land Use Development Proposals for the Mid and Upper Luangwa Watershed. UNDP/FAO, Rome. FO: DP/ZAM/68/510. Working Document No. 3.
- ° Astle, W.L., Webster, R. and Lawrence, C.J. (1959). Land classification for management planning of the Luangwa valley of Zambia. *J. Appl. Ecol.* 6(2): 143-171.
- ° Boulton, M.N. (1973). Conservation Education in Zambia. UNDP/FAO: Rome. FO: DP/ZAM/68/510. Working Document No.5.
- ° Douglas-Hamilton, I., Hillman, A.K.K., Holt, P. and Ansell, P. (1979). *Luangwa Valley Elephant, Rhino and Wildlife Survey*. Report to IUCN/WWF/NYZS, Nairobi, Mimeo.
- ° Drysdall, A.R. and Kitching, J.W. (Date unknown). A re-examination of the Karoo succession and fossil locations of parts of the upper Luangwa valley. *Geological Survey Memoir* No. 1, Lusaka.
- ° Dunlap, R.C. (1973). A Tourism Plan for the Luangwa Valley. UNDP/FAO, Rome. FO: DP/ZAM/68/510. Working Document No. 4.
- ° Ford, L.P. (1973). Fire Control in the Luangwa Valley. UNDP/FAO, Rome. FO: DP/ZAM/68/510. Working Document No. 2.
- ° Giardino, J.R. (1974). When elephants destroy a valley. *Geographical Magazine* 47: 175-181.
- ° Kuper, J.H. (1975-1976). Reports to Luangwa Valley Research Project, FAO (Rome), on mopane vegetation, elephant and rhinoceros of the park and a management plan for the park.
- ° Mitchell, B.L. and Ansell, W.F.H. (1971). Wildlife of Kafue and Luangwa. Zambian National Tourist Board.

Staff Thirty wildlife officers (rangers, scouts and guards) responsible to a wildlife warden (1977)

Budget About US\$120,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 510143, Chipata.

Date 1984

NSUMBU NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo woodland/savanna)

Legal Protection Total, except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44; legislated as a game reserve

Geographical Location On the south-west shore of Lake Tanganyika in the Northern province. 8°30'–9°05'S, 30°15'–30°45'E.

Altitude 800–1,250m

Area 202,000ha

Land Tenure Government

Physical Features The park includes about 100km of the rocky shoreline of Lake Tanganyika interspersed with some small beaches. It includes Cape Nundo which features a great balanced boulder of ritual significance. The remaining area is a plateau traversed by the Lufubu river. To the north-west of the river is the Chansamansaka escarpment (700m), and to the east the Kapembwa escarpment. Annual rainfall 1,400mm, falling mainly from November to April.

Vegetation The valleys opening on to the lake are dominated by tall *Acacia albida* and *Trichilia roka*. Valley sides, the hills near the lake and some plateau areas have dense *Bussea-Combretum* thicket. At higher elevations and further from the lake, the vegetation is light miombo dominated by *Pericopsis angolensis* or dense *Brachystegia-Julbernardia* type of miombo woodlands. Wide alluvial flats with open grassland and *Pteleopsis anisoptera* gallery forest occur along the Lufubu and Nkamba rivers.

Fauna Mammals include: leopard *Panthera pardus* (T), lion *Panthera leo*, elephant *Loxodonta africana* (T), zebra *Equus burchelli*, hippopotamus *Hippopotamus amphibius*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, yellow-backed and blue duiker *Cephalophus sylvicultor* and *C. monticola*, puku *Kobus vardonii*, waterbuck *Kobus ellipsiprymnus*, reedbuck *Redunca arundinum*, roan antelope *Hippotragus equinus* and sable antelope *Hippotragus niger*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, grysbok *Raphicerus sharpei*, klipspringer *Oreotragus oreotragus*, and dassies *Heterohyrax brucei*. Bird species of the rivers and lakeshore include: grey-headed gull *Larus cirrhocephalus* and lesser black-back gull *Larus fuscus*, white-winged tern *Chlidonias leucoptera*, whiskered tern *Chlidonias hybrida*, and skimmer *Rhynchops flavirostris*. In the lake, Nile crocodile *Crocodylus niloticus* (V) and the Tanganyika water cobra *Boulengerina annulata* are also present.

Cultural Heritage The area has numerous small sites of archaeological interest, mainly near the beaches.

Conservation Management Management plans for monitoring future development and conservation were in preparation prior to 1977.

Zoning Two zones have been defined: the lakeshore for tourist development and the remaining area as a wilderness area.

Disturbances or Deficiencies Poaching, uncontrolled bush fires occur due to shortage of proper water supply, transport and manpower and therefore lack of adequate management. There is one permanent and one temporary fishing village in the park.

Visitor Facilities Accommodation is in two lodges that are open all year. A small non-catering lodge has been established at Nsumbu. Access is by all-weather airstrip at Kasaba Bay or by gravel road. Sport-fishing activities are organized by private tourist operators. There about 3,500 visitors annually.

Scientific Research Research for preparation of management plans prior to 1977.

Special Scientific Facilities None

Principal Reference Material None listed

Staff Warden, ranger, and 25 wildlife officers (guards) (1977)

Budget About US\$100,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 410005, Kasama.

Date 1984

NYIKA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.20.12 (Central African Highlands)

Legal Protection Total, except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44; previously a controlled hunting area with game reserve provisions

Geographical Location North-east Zambia adjoining the border with Malawi. 10°32'-10°45'S, 33°35'-33°43'E.

Altitude 1,295-2,225m

Area 8,000ha; contiguous to Nyika National Park (304,385ha) and Vwaza (174,960ha) in Malawi

Land Tenure Government

Physical Features The park comprises the small Zambian portion of the Nyika plateau, a steeply undulating area bounded by precipitous escarpment country on the west which slopes sharply down to the Luwumbu river valley. The soils are uniformly deep, well-drained, sandy clays derived from underlying basement schists. Annual rainfall is about 1,000mm, but cloud

and mist at ground level is common in the dry season from June to September keeping the area well watered. Frost of -5°C to -10°C may occur between May and October.

Vegetation The escarpment soils support miombo *Brachystegia-Julbernardia* woodland. There are relict patches (not exceeding 20ha) of montane forest on the plateau, the largest being Chowo forest in the east and Manjanjere forest in the north-west. The three vegetation types on the plateau include dry evergreen forest with *Myrica*, *Nuxia*, *Olea*, and *Rapanea*, to moist riparian forest with *Aningeria*, *Cola*, *Parinari*, and *Podocarpus*, and wet seasonal swamp forest with *Agauria*, *Maesa* and *Myrica*. The park is of great botanical interest, including upland grasslands and a great variety and abundance of orchids.

Fauna There is a rich mammal fauna including: Moloney's monkey *Cercopithecus mitis moloneyi*, bush squirrel *Paraxerus lucifer*, four-striped grass mouse *Rhabdomys pumilio* (only Zambian locality), long-tailed pouched rat *Beamys hindie major*, two-spotted palm civet *Nandinia binotata*, yellow-spotted hyrax (dassie) *Heterohyrax brucei*, three species of the vlei rat *Otomys*, and a sun squirrel *Heliosciurus* sp.. Larger mammals are infrequent, but include bushbuck *Tragelaphus scriptus*, blue duiker *Cephalophus monticola*, red duiker *Cephalophus natalensis* (uncommon), reedbuck *Redunca arundinum*, and klipspringer *Oreotragus oreotragus*. Birds include: secretary bird *Sagittarius serpentarius*, white-necked raven *Corvus albicollis*, many sunbirds *Nectarinia* spp., and wattled crane *Bugeranus carunculatus* (of special concern). An endemic subspecies of the chameleon *Chamaeleo goetzei nyikae* is present and the dwarf species *Rhampholeon nchisiensis* may also occur. The bush viper *Atheris nitschei rungwensis* has been recorded. The area is rich in Lepidoptera including the very common green swallowtail *Papilio phorcas* and broad blue-banded swallowtail *P. bromius*.

Zoning None

Disturbances or Deficiencies Uncontrolled fires.

Visitor Facilities There is a non-catering rest house (10 beds) and walking trails. The only vehicle access is through Malawi which tends to be difficult during the rains.

Scientific Research Comparative studies of avifauna, butterflies, and mammals with other montane areas in Central Africa prior to 1977

Special Scientific Facilities None

Principal Reference Material

* Cater, J.C. (1954). The Nyika plateau and its faunal significance. *Oryx* 2(3): 158-164.

Staff Warden, ranger, and two guards (1977)

Budget About US\$8,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 510143, Chipata.

Date 1984

SIOMA NGWEZI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44; previously a game reserve managed by the Paramount Chief of the Lozi people.

Geographical Location In the Sesheke and Senanga Districts of south-west Zambia bordering the Caprivi Strip. 16°55'-17°40S', 23°02'-50'E.

Altitude 900m

Area 527,600ha

Land Tenure Government

Physical Features A relatively flat area west of the Zambezi bordered by the Mashi River in the south-west. Very sandy being underlain by Kalahari sands with a mosaic of woodland and sandy plains. Very arid with a few isolated waterholes.

Vegetation Kalahari sandveld with good stands of teak *Baikiaea plurijuga*, areas of mopane *Colophospermum mopane*, and small patches of a mixed woodland of *Burkea-Colophospermum-Baikiaea* associations.

Fauna Large mammals include: lion *Panthera leo*, cheetah *Acinonyx jubatus* (V), elephant *Loxodonta africana* (V), giraffe *Giraffa camelopardalis* (abundant and one of only two populations in Zambia), kudu *Tragelaphus strepsiceros*, buffalo *Syncerus caffer*, roan antelope *Hippotragus equinus*, sable antelope *Hippotragus niger*, and tsessebe *Damaliscus lunatus*. Steenbok *Raphicerus campestris* are present, but rarely seen. There are no spectacular concentrations of large birds, but interesting and varied dry country species include the greater kestrel *Falco rupicoloides*, Bradfield's hornbill *Tockus bradfieldi*, white-wing black tit *Parus leucomelas*, Burchell's glossy starling *Lamprolornis australis*, and black-cheeked waxbill *Estrilda erythronotos*. The ostrich *Struthio camelus* was present, but is now extinct in this area.

Zoning None

Disturbances or Deficiencies Poaching, uncontrolled bush fires and possible extraction of teak for timber.

Visitor Facilities No visitor permits are issued at present. The park contains only tracks for four-wheel drive vehicles and there is no accommodation.

Scientific Research Vegetation and habitat mapping

Special Scientific Facilities None

Principal Reference Material

° Benson, C.W. (1969). Large Mammals of the Liuwa Plain and Sioma-Ngwezi Game Reserves. *Puku* 5.

Staff Warden, ranger, and six guards (1977)

Budget About US\$35,000 per annum (1977)

Local Park or Reserve Administration Wildlife Warden, PO Box 910158, Mongu.

Date 1984

SOUTH LUANGWA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established 25 February 1972, by Statutory Instrument No. 44 of 1972; Legislated as a game reserve in 1938, but gazetted in 1904 to protect Thornicroft's giraffe

Geographical Location North-east of Lusaka and mainly to the west of the middle reaches of the Luangwa river. 12°28'-13°14'S, 30°58'-32°08'E.

Altitude 500-1,100m

Area 905,000ha

Land Tenure Government

Physical Features The Luangwa river in the park area is at about 580m altitude. The valley floor rises gently westwards to 760m at the foot of the Muchinga escarpment (1,400m), which forms the north-west boundary. The valley is a rift filled with Karoo sediments and overlain by recent sediments along the main river courses which are finely dissected into ridges with low interfluvies. Mudstone plains occur at Chifungwe and Lunda. The main river and tributaries have a meander belt. Mean annual temperature is 25°C. The annual rainfall is 832mm, and in the rainy season, from November to March, there are often heavy storms.

Vegetation Woodland savanna with *Acacia* sp., *Combretum* sp., and *Terminalia sericea* occurs on freely draining alluvium and thickets. Older alluvial soils support patches of *Colophospermum mopane* woodland with a 15m canopy. The floodplain grassland includes *Oryza*, and *Echinochloa* species bordered by some riparian forest. Miombo woodland up to 25m high of mainly *Brachystegia* sp., *Julbernardia* sp., and *Isoberlinia angolensis* is widespread on deeper sandy soils. In the shallow stony soils near the escarpment *Brachystegia stipulata* and *Julbernardia globiflora* are dominant.

Fauna A variety of larger mammals are abundant, especially ungulates. Mammals include wild dog *Lycaon pictus* (T), hyena *Crocuta crocuta*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), elephant *Loxodonta africana* (T)(high density), black rhinoceros *Diceros bicornis* (T), hippopotamus *Hippopotamus amphibius*, Thornicroft's giraffe *Giraffa camelopardalis thornicrofti* (endemic subspecies of the valley and found mainly in the southern area), impala *Aepyceros melampus* (numerous), greater kudu *Tragelaphus strepsiceros*, buffalo *Syncerus caffer*, puku *Kobus vardonii*, sable antelope *Hippotragus niger*, and roan antelope *Hippotragus equinus*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, and Cookson's wildebeest *Connochaetes taurinus cooksoni* (local subspecies present in small numbers). Primates include vervet monkey *Cercopithecus aethiops*, Moloney's monkey *Cercopithecus mitis moloneyi*, and chacma baboon *Papio ursinus*. Birdlife is prolific and the park is particularly noteworthy for storks, geese, cranes, and the riparian colonies of carmine bee-eater *Merops nubicus*. The Luangwa river is now one of the major remaining refuges for the Nile crocodile *Crocodylus niloticus* (V).

Conservation Management In 1973, the Luangwa Valley Conservation Project was set up to advise the Government of Zambia on management and development requirements for the full utilisation of natural resources in the valley (Albrecht 1973, Boulton 1973, Dunlap 1973, and Ford 1973). A management plan was written for the area in 1976 by J.H. Kuper for FAO, Rome. A new line of camps was established along the western boundary in 1980 staffed with 50 guards to facilitate better control over elephant and rhino poaching. Reinforcement by Honorary Wildlife Rangers on the escarpment during 1981 proved effective against poachers. The Save the Rhino Trust began operations in 1980 with a mobile anti-poaching unit using

vehicles and radios under IUCN/WWF Project 1757. As manpower and funds are limited, activities were restricted to intensive patrols of the main elephant and rhinoceros strongholds. It is hoped that funds from the Norwegian Agency for International Development (NORAD) will enable the units to continue.

Zoning There are three zones: part of the Luangwa riverine area with visitor access by vehicle or foot; the Luangwa river and two major tributaries with access on foot only; and the remaining area with no visitor access.

Disturbances or Deficiencies Prospecting for minerals and uncontrolled bush fires due to poor land management occur. Poaching, particularly for elephant and rhinoceros, has been encouraged by an increase in the world demand for ivory and rhinoceros horn. The elephant population in the park has been reduced by about 50,000 between 1975 and 1980. Despite the efforts by the Save the Rhino Trust, large areas of South Luangwa National Park and the entire North Luangwa National Park are at the mercy of poachers, due to lack of finance. Commercial poaching has not decreased. Trees are damaged or ring-barked by elephant during the dry season when grazing is poor and migration to wetter regions is restricted by the park boundary. Overgrazing of grasses by overcrowded populations exposes the soils to sheet erosion. Gully erosion of mudstone soils is caused by trampling compaction, followed by rain run-off erosion.

Visitor Facilities Access is by air or road. Facilities include two catering lodges (48 beds) and three non-catering lodges (30 beds). Walking safaris are possible in zone 2. The park is open from June to October.

Scientific Research Research teams from the Department of National Parks and Wildlife Service, and FAO have been carrying out work in the area. In 1981 and 1983, a rhinoceros census was carried out and recommended concentration of anti-poaching efforts in well-defined key areas of South Luangwa National Park.

Special Scientific Facilities There is laboratory and office accommodation and transport including vehicles, aircraft, and boats.

Principal Reference Material

- ° Albrecht, R.W. (1973). Land Use Development Proposals for the Mid and Upper Luangwa Watershed. UNDP/FAO, Rome. FO: DP/ZAM/68/510. Working document No. 3.
- ° Astle, W.L., Webster, R. and Lawrence, C.J. (1959). Land classification for management planning of the Luangwa valley of Zambia. *J. Appl. Ecol.* 6(2): 143-171.
- ° Boulton, M.N. (1973). Conservation Education in Zambia. UNDP/FAO, Rome. FO: DP/ZAM/68/510. Working document No.5.
- ° Drysdall, A.R. and Kitching, J.W. (Date unknown). A re-examination of the Karoo succession and fossil locations of parts of the upper Luangwa valley. *Geological Survey Memoir* No. 1, Lusaka.
- ° Dunlap, R.C. (1973). A Tourism Plan for the Luangwa Valley. UNDP/FAO, Rome. FO: DP/ZAM/68/510. Working Document No. 4.
- ° Ford, L.P. (1973). Fire Control in the Luangwa Valley. UNDP/FAO, Rome. FO: DP/ZAM/68/510. Working Document No.2.
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- ° Kuper, J.H. (1975-1976). Reports to Luangwe Valley Research Project, FAO (Rome), on mopane vegetation, elephant and rhinoceros of the park and a management plan for the park.
- ° Leader-Williams, N. (1985). Black rhino in South Luangwa National Park: their distribution and future protection. *Oryx* 19: 27-33.
- ° Mitchell, B.L. and Ansell, W.F.H. (1971). Wildlife of Kafue and Luangwa. Zambian National Tourist Board.

Staff Warden, 60 wildlife officers, and two biologists (1977)

Budget About US\$400,000 per annum (1977); US\$438,000 from WWF from 1980-1983

Local Park or Reserve Administration Wildlife Warden, PO Box 510143, Chipata.

Date 1984

WEST LUNGA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, except against mining

Date Established National Park status on 25 February 1972 by Statutory Instrument No. 44; legislated as a game reserve in 1951

Geographical Location Mwinilunga district in North Western Province; 12°30'-13°07'S, 24°35'-25°00'E.

Altitude 1,120-1,200m

Area 168,400ha

Land Tenure Government

Physical Features The park is situated on a flat or gently undulating area with some rock outcrops between the West Lunga river on the west and the Kabompo river on the east, which have their confluence in the south-west corner of the park. Permanent swamps occur along the Kabompo and there are three seasonally inundated grassy plains.

Vegetation Most of the area has dry evergreen *Cryptosepalum pseudotaxus* forest characterised by dense thickets of shrubs, climbers, scramblers, and saplings on the Kalahari sands. Small patches of *Brachystegia-Julbernardia* miombo woodland occur on the alluvial soils. An intermediate type of woodland known as 'chipya' is dominated by *Acacia goetzei* and *Burkea africana* with an admixture of *Cryptosepalum* forest. The park also contains significant areas of open grassland and some *Cyperus papyrus* swamp.

Fauna Mammals include: the blue monkey *Cercopithecus mitis* along the major rivers, elephant *Loxodonta africana* (T)(common particularly in the *Cryptosepalum* forest), zebra *Equus burchelli*, numerous bush pig *Potamochoerus porcus*, hippopotamus *Hippopotamus amphibius*, sitatunga *Tragelaphus spekei*, eland *Taurotragus oryx*, buffalo *Syncerus caffer*, yellow-backed duiker *Cephalophus sylvicultor* and blue duiker *Cephalophus monticola*, puku *Kobus vardonii*, Lichtenstein's hartebeest *Alcelaphus lichtensteini*, klipspringer *Oreotragus oreotragus*, oribi *Ourebia ourebi*, and impala *Aepyceros melampus*. Most common carnivores are present. Birdlife is varied and abundant including a local subspecies of red-throated crested guinea fowl *Guttera edouardi kathleenae*. Crocodile *Crocodylus* sp. are present.

Zoning None

Disturbances or Deficiencies Poaching and uncontrolled bush fires

Visitor Facilities No visitor accommodation exists, but there are good camping sites on the Kabompo river and near the park headquarters at Jivindu. Access is by a pontoon ferry from Jivindu and there is a system of rough tracks within the park. The area is often closed for security reasons.

Scientific Research Vegetation and habitat mapping

Special Scientific Facilities None

Principal Reference Material

° Ansell, W.F.H. (1960). Little Known Game Reserves. *African Wildlife* 14(3).

Staff Warden, ranger, and 10 guards. A biologist includes the park in his terms of reference (1977)

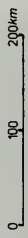
Budget About US\$30,000 per annum (1977).

Local Park or Reserve Administration Wildlife Warden, PO Box 110102, Solowezi.

Date 1984



- Key
- National Parks
 - National Monument
 - Sanctuaries
 - Recreation Parks
 - Botanical Reserves
 - Safari Areas
 - Nature Reserve



Zimbabwe

ZIMBABWE

Area 389,361 sq.km

Population 7,500,000 (1982)

Parks and Reserves Legislation The Parks and Wild Life Act 1975 (amended 1 January 1982) provides for establishment of National Parks (Part II), Safari Areas (Part V), Recreational Parks (Part VI), Sanctuaries (Part IV) and Botanical Reserves and Gardens (Part III). Use of these areas is covered in the Parks and Wild Life (General) Regulations, Statutory Instrument 900 of 1981. The various areas combine to form the Parks and Wild Life Estate. The Act and Regulations outline general procedure and are further refined by Area Policy Documents approved by the Minister on the recommendation of an advisory Parks and Wild Life Board. These documents describe the key objectives for an area or group of areas, application of these objectives and the legislation, an outline plan, and preparation for management and development plans. National Parks are established to protect landscapes, conserve ecosystems and their elements (with particular emphasis on large mammals and their habitats), and to protect important sites for research, education and their intrinsic aesthetic value. They normally consist of one or more of the following zones: Special Conservation Area (usually small and designed to protect especially sensitive biological features, or for defined research, with access strictly controlled), Wilderness Area (with visitor access strictly controlled, and a level of development which depends on local conditions), Wild Area (with greater visitor access and improved access roads), and Development Area (containing staff and visitor facilities with permanent or seasonal accommodation). Controlled sport hunting is permitted in Safari Areas, and wild populations may be harvested or otherwise used providing that this is not in conflict with species/ecosystem conservation or with the wilderness qualities or future resource values of the area. Recreation Parks are established to preserve and protect the natural features they contain for the enjoyment, long-term benefit, cultural inspiration and recreation of the people of Zimbabwe and visitors. A number of parks and reserves are a part of the estate of the late Cecil John Rhodes and as such are also covered by the terms of the Rhodes Estates Act of 1978.

Parks and Reserves Administration The Department of National Parks and Wild Life Management, within the Ministry of Natural Resources and Tourism, is responsible for management, administration and development of the protected areas system. The Department is a scientifically based and ecologically orientated land use agency with a special responsibility to ensure the proper conservation and use of the nation's parks and wildlife resources. Its key objectives include the administration and management of the Estate, which covers the protection of landscapes of special quality, the conservation of representative samples of natural ecosystems, and all organisms indigenous to Zimbabwe, and to conserve and manage natural and semi-natural areas for a range of outdoor recreational pursuits, for the long-term benefit, enjoyment and cultural inspiration of the citizens of this country and their visitors. These responsibilities and objectives are accomplished by protecting and managing the Estate, research and development of appropriate land management practices inside and adjacent these areas, promoting public awareness in all sectors of society of the values of this Estate, promoting appropriate uses of the Estate, providing an appropriate administration and the training and development of staff to facilitate and support these functions and to encourage a rationalised and appropriate industry based on the Estate.

Address

- ° Department of National Parks and Wild Life Management, PO Box 8365, Causeway, Harare.
- ° Forestry Commission, PO Box 8111, Causeway, Harare.

Additional Information To try and encourage appreciation of protected areas by local populations, the Department of National Parks and Wild Life introduced the buffer zone concept in 1960. In addition, park values that can be appreciated by neighbouring rural communities are nurtured by the government. Considerable emphasis is placed on the role of protected areas in raising rural living standards and generating material revenue through domestic and foreign tourism and utilization of wildlife (Child, 1984a). Where overt action in

a national park is determined by ecological considerations, useful products are disposed of to local people, or to the best advantage for revenue e.g. 'Operation Windfall' (1980-1), where elephants in certain regions had degraded the habitat to such an extent that an elephant cull was deemed necessary. The best possible use of products was arranged, as well as considerable research studies (Child, 1984c).

Outside the protected areas there are efforts in various parts of the country to develop more rational land-use policies in inhabited regions. For example in the area just south of the Kariba valley there are currently plans to identify the better soils for arable farming, leaving much of the poorer land for wildlife (which will be managed so that local people benefit). This strategy and others like it will certainly help to ensure the long-term survival of Zimbabwe's wildlife (de Toit 1985). However, realisation of such plans brings a number of problems in terms of land-use and resource utilisation, as well as sociological issues (Department of National Parks and Wildlife Management, 1984).

Beef exports to the EEC are threatening the buffalo population as EEC regulations stipulate that an exporting country must be free of foot-and-mouth disease. Beef is an important source of foreign exchange. The Zimbabwe government has allowed over 1,000 buffalo to be killed and a system of fences, vaccination zones and buffer zones constructed around Hwange and Gonarezhou National Parks. Buffalo are to be eradicated from the other zones, although about 100 have been vaccinated. Ironically these areas are better suited to multi-species ranching, as cattle grazing will cause deterioration of these areas which may need restocking with buffalo in the future (Pitman, 1985).

References

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- ° Child, G. (1984a). Zimbabwe's Approach to Protected Area Management. Proceedings of the 22nd Working Session Commission on National Park and Protected Areas, Victoria Falls, Zimbabwe, 22-27 May, 1983.
- ° Child, G. (1984b). A Rationalized Approach to Promoting the Preparation of Management Plans for Protected Areas in the Afrotropical Realm. Proceedings of the 22nd Working Session, Commission on National Park and Protected Areas, Victoria Falls, Zimbabwe, 22-27 May, 1983.
- ° Child, G. (1984c). Managing Wildlife for People in Zimbabwe. In: McNeely, J.A. and Miller, K.R. (Eds) *National Parks, Conservation, and Development. The Role of Protected Areas in Sustaining Society*. Proceedings of the World Congress on National Parks Bali, Indonesia, 11-22 October 1982. Smithsonian Institution Press, Washington D.C.
- ° Department of National Parks and Wild Life Management (1984). Communal Area Management Programme for Indigenous Communities. Proceedings of the 22nd Working Session, Commission on National Park and Protected Areas, Victoria Falls, Zimbabwe, 22-27 May, 1983.
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- ° Pitman, D. (1981). *Wild Places of Zimbabwe*. Bulawayo, Zimbabwe. 192 pp.
- ° Pitman, D. (1985). Zimbabwe's buffalo die for Europe's beef. *IUCN Press Service*. Gland: Switzerland.
- ° Readers Digest (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.
- ° de Toit, R. (1985). A middle way for wildlife parks. *New Scientist* Jan. 1985.

Protected Areas

	(hectares)
<i>National Parks</i>	
Chimanimani	17,100
Chizarira	191,000
Gonarezhou	505,300
Hwange (Wankie)	1,465,100
Inyanga	28,900
Kazuma Pan	31,300
Mana Pools	219,600

Mana Pools NP, Sapi and Chewore Safari Areas	676,600
Matobo (Matopos)	43,200
Matusadona	137,000
Mtarazi Falls	2,495
Victoria Falls	1,900
Zambezi	56,400
Subtotal	3,375,895
<i>Wildlife Research Areas</i>	
Sengwa	37,300
<i>Nature Reserves</i>	
Cecil Kop	1,740
<i>Game Parks</i>	
Imire	1,000
Iwabe	20,000
Subtotal	21,000
<i>Botanical Reserves</i>	
Bunga Forest	1,558
Rusitu Forest	150
Vumba	200
Subtotal	1,908
<i>Sanctuaries</i>	
Chimanimani Eland	1,200
Mushandike	12,900
Tshabala	
Subtotal	14,100
<i>Natural Monuments</i>	
Great Zimbabwe	746
<i>Parks</i>	
Gweru Antelope	1,214
<i>Safari Areas</i>	
Charara	169,000
Chegutu	71,597
Chete	108,100
Chewore	339,000
Chipinga A	26,100
Chirisa	171,300
Dande	52,300
Deka	
Doma	76,400
Matetsi	292,000
Sapi	118,000
Sibilobilo	2,270
Tuli	41,600
Umfurundzi	76,000
Urungwe	287,000
Subtotal	1,830,667
<i>Forest Reserves</i>	
Chirinda	949

Recreation Parks

Bangala	2,800
Lake Kariba	283,000
Lake Kyle	18,000
Lake Robertson	8,100
Manjirenji	3,500
Matobo (Matapos)	2,900
Mayfaire Lake	
McIlwaine	55,000
Ngezi	5,800
Sebakwe	2,700
Sinoia Caves	
Umfuli	
Umzingwane	

Subtotal 381,800

Other areas

Ewanrigg Botanical Garden	286
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CHIMANIMANI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total, but fishing is allowed by permit during certain seasons

Date Established 1953

Geographical Location In the Eastern Highlands of Zimbabwe, 75km south of Mutare in Manicaland Province, on the border with Mozambique. 19°35'-19°50'S, 33°00'E.

Altitude Rising to 2,400m

Area 17,100ha

Land Tenure Government

Physical Features The park includes the main massif of the Chimanimani Mountains within Zimbabwe, an area of rugged grandeur with peaks rising to over 2,400m and deeply dissected gorges with magnificent waterfalls. It was formed some 1,600 million years ago when the quartzite massif was forced against the plateau, shattering in folds over its leading edge. The region is subject to sudden storms and mists. It is an important catchment area for the surrounding land.

Vegetation Mainly montane plant communities including open grassland and relict forest patches in sheltered areas with some *Brachystegia* woodland. The flora includes elements of the south-western Cape flora which spreads north along the eastern mountain chain of Southern Africa. There are also some low altitude rain forests, uncommon in Zimbabwe, which include *Filicium decipiens*, *Blighia unijugata*, *Parinari* sp., and *Erythrophleum* sp..

Fauna Mammals include: sable antelope *Hippotragus niger*, eland *Taurotragus oryx*, blue duiker *Cephalophus monticola*, klipspringer *Oreotragus oreotragus*, and occasional leopard *Panthera pardus* (T). The bird fauna is unique in Zimbabwe and includes violet-crested turaco *Tauraco porphyreolophus*, malachite sunbird *Nectarinia famosa*, laughing dove *Streptopelia senegalensis*, trumpeter hornbill *Bycanistes bucinator*, secretary bird *Sagittarius serpentarius*, francolins *Francolinus* spp., and eagles (Accipitridae).

Conservation Management There is a draft policy document for the park.

Zoning Most of the park is planned as a mountain Wilderness Area with three small Development Areas to serve mountaineers or visitors interested in low altitude forests and their fauna.

Disturbances or Deficiencies The main problem is the frequency of fire which threatens the relict forest patches in particular. It spreads from outside the park and is very difficult to control.

Visitor Facilities Camping is allowed in the park. There is a base camp and information office 20km from Chimanimani village. There are no access roads beyond the base camp. Easier access and more public facilities are possible in the extreme north. An Outward Bound School adjacent to the park uses the area extensively.

Scientific Research Scientific research has been limited to work by visiting researchers on surveys and inventories.

Special Scientific Facilities No information

Principal Reference Material

- ° Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.
- ° Departmental reports augmented by scientific publications treating the area separately or relating its resources to those of a larger region.

Staff Scouts based in the park are under the command of the Ranger based at Melsetter (18km west).

Budget No information

Local Park or Reserve Administration Senior Ranger, Chimanimani National Park, Private Bag 2063, Chimanimani.

Date April 1985

CHIZARIRA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established Area set aside in 1963; National Park status 1975

Geographical Location In central Binga District of Matabeleland North Province. 17°32'–18°01'S, 27°36'–28°14'E.

Altitude 648–1,433m

Area 191,000ha. Virtually contiguous to Chirisa Safari Area (171,300ha)

Land Tenure Government

Physical Features Most of the park is on undulating, dissected plateau descending in the north in wooded ridges, mountains and rocky valleys to the 500m escarpment overlooking Lake Kariba. Rivers from ridges on the plateau have cut deep gorges in their passage through the escarpment. The area is a well watered 'island' of rivers, perennial springs and natural springs in the fairly arid Zambezi Valley, and forms an important catchment area. The park includes some low-lying country along the Busi River in the south-east. Mount Tundazi (1,370m) is a prominent feature in the north-east. Geologically the area is dominated by rocks and grits of the Sijirira system often overlain with shallow sandy soils. Chizarira is a Batonka word meaning 'barrier'; the plateau is a barrier to winds and causes higher rainfall over it.

Vegetation Due to the generally higher rainfall of the plateau areas the vegetation has affinities with that usually found further east in Zimbabwe. Much of the plateau is dominated by *Brachystegia/Julbernardia* of drier Zambesian Miombo woodland with areas of *B. boehmii* and mopane *Colophospermum mopane*, or open grassland. More scrubby and diversified types occur towards the west and at low altitudes in the south-east. The gorges support riverine communities.

Fauna The park supports a wide spectrum of large mammals including: elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, black rhinoceros *Diceros bicornis* (T), lion *Panthera leo*, leopard *Panther*

pardus (T), cheetah *Acinonyx jubatus* (T), zebra *Equus burchelli*, warthog *Phacochoerus aethiopicus*, and a range of antelope including roan *Hippotragus equinus* and tsessebi *Damaliscus lunatus*. The island effect results in a westerly extension in the range of several bird species. Birds include: taita falcon *Falco fasciinucha* (uncommon in Zimbabwe and present in some of the gorges), crowned eagle *Stephanoaetus coronatus*, fish eagle *Haliaeetus vocifer*, brown hooded kingfisher *Halcyon albiventris*, red-billed wood hoopoe *Phoeniculus* sp., golden-tailed woodpecker *Campethera abingoni*, and Meyer's parrot *Poicephalus meyeri*.

Conservation Management Elephant culls have been used to prevent overpopulation which is thought to be a main cause of forest destruction. In 1980, £112,000 was raised by Operation Windfall when 500 elephants were culled. The money went to local rural communities to encourage their involvement in park management. Black rhinoceros, roan and tsessebi conservation are emphasised in the policy for the area. The Frankfurt Zoological Society has lent the park a Cessna light aircraft to supplement two Piper Super Cubs.

Zoning Four zones are proposed: Special Conservation, Wilderness, Wild (served by roads), and Development.

Disturbances or Deficiencies Frequent fires and the rapidly increasing elephant population have severely depleted the woodland and encouraged grassland. There is a threat of poaching as, apart from the safari area, the park is almost surrounded by inhabited areas.

Visitor Facilities Few visitors use the park, which is remote and access difficult. There is an airstrip at park headquarters at Manzituba in the west, but no visitor facilities in the park. Visitors must obtain permission to enter from the Provincial Warden.

Scientific Research An ecologist was based in this area for some 10 years, but most of his records were destroyed during the independence war.

Special Scientific Facilities New laboratories are to be built

Principal Reference Material Draft policy document and departmental records augmented by a paper on the role of elephant, fire and other agents in the decline of *Brachystegia* woodland.

Staff Warden, ranger and subsidiary staff. The warden is also responsible for Chete Safari Area to the north.

Budget No information

Local Park or Reserve Administration The Provincial Warden (Matabeleland North), P Bag 5925, Victoria Falls.

Date April 1985

GONAREZHOU NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established Established as a Nature Reserve in 1968. National Park status in 1975.

Geographical Location In Chiredzi district, Masvingo Province on the south-east border of Zimbabwe adjacent to Mozambique. 21°06'-22°12'S, 31°20'-32°25'E.

Altitude 162-578m

Area 505,300ha

Land Tenure Government

Physical Features The flat to undulating country interrupted by the valleys of the Nuanetsi, Lundi and Sabi Rivers and by isolated hills including the Chikunja Range. Chipinda Pools encompass almost 50% of the park area and attract large numbers of migrating game. Chilojo cliffs form a spectacular backdrop on the south bank of the Lundi for about half its distance through the park. The park includes Gorheve Pans 30km north of Mabalanta (filled with water during the rainy season). Soils are mainly derived from Cretaceous sandstones and range from deep sands of the regosol group to medium-textured soils of the siallitic group with considerable granophyre in the Chikunjas in the north. Rainfall is low, and falls mainly between November and April.

Vegetation The wide variety of vegetation types includes: mixed *Brachystegia glaucescens* woodland on the granophyre hills, with steeper slopes dominated by *Kirkia*, *Commiphora*, and *Adansonia digitata*. *Colophospermum mopane* is dominant on the limited basalt areas and in the drainage lines and eroded areas of the Cretaceous sandstones. Also characteristic of alluvial areas are *Xanthocercis zambesiaca* and *Cordyla africana* with *Acacia tortilis*, and *Croton megalobotrys*. *Androstachys johnsonii* of the monogeneric family Androstachyaceae is confined in Zimbabwe to this area and forms small, dry, evergreen forest and thicket patches on the Cretaceous sandstone and granophyre. *Guibourtia conjugata* occurs in pure stands on the edges of the level sands associated with the Lundi Valley. The dominant vegetation of the non-eroded, level Cretaceous sands is a mixed community of deciduous

woody species of the major genera *Combretum*, *Strychnos*, *Terminalia*, *Pteleopsis*, *Xeroderris*, and *Pterocarpus*. A patch of relict riverine forest contains several giant *Chlorophora excelsa* (threatened in Zimbabwe). *Adenium obesum*, *Pachypodium saundersii*, *Trichilia* sp., *Albizia* sp. and *Ficus capreifolia* are present. Gonarezhou is the only location in Zimbabwe for aloes *Aloe suffulta* and *A. lutescens*, and a number of species with a coastal distribution.

Fauna The reserve forms part of a natural migratory triangle for the game population of Kruger National Park in South Africa and the neighbouring game area in Mozambique. 800 eland and several herds of elephant are known to have crossed into Gonarezhou from Kruger National Park. Fauna include: elephant *Loxodonta africana* (T), reintroduced black rhinoceros *Diceros bicornis* (T) (which appear to be prospering), and hippopotamus *Hippopotamus amphibius* (important breeding location; population periodically curbed). The area is the Zimbabwe stronghold for nyala *Tragelaphus angasi*, suni *Neotragus moschatus*, and Lichtenstein's hartebeest *Alcelaphus lichtensteini*. The sympatric occurrence of steenbok *Raphicerus campestris*, grysbok *Raphicerus melanotis*, grey duiker *Sylvicapra grimmia*, Livingstone's suni *Neotragus moschatus livingstonianus* and oribi *Ourebia ourebi* with klipspringer *Oreotragus oreotragus* on nearby hills is probably a unique association of these small antelope. Red squirrel *Paraxerus palliatus* is sympatric with common bush squirrel *P. cepapi*. River fauna include: freshwater turtle *Cycloderma frenatum*, lung fish *Protopterus annectens*, a threatened top minnow *Nothobranchius* sp., tiger fish *Hydrocynus vittatus* and bream *Tilapia* spp.. Marine tarpon *Megalops cyprinoides* and sword fish *Pristis microdon* have been taken in the Lundi river many kilometres from the sea. There is a significant crocodile population.

Conservation Management There is a draft park policy document and associated management and development plans. The park has been sealed with a game fence to counteract the spread of foot-and-mouth disease by buffalo movements.

Zoning Four zones are specified: Special Conservation, Wilderness, Wild, and Development. The park is divided into two major sections for administration: Chipinda Pools (north) and Mabalauta (south).

Disturbances or Deficiencies The park has a rather attenuated shape and is bordered mainly by peasant agricultural areas which pose a constant poaching threat especially from across the Mozambique border. A combination of burning and bush clearing associated with past tsetse control, wildfire and the presence of numerous large herbivores especially elephant (who have been excluded from their former range) has had considerable deleterious impact on some vegetation-types. The flow regime and water quality of the Lundi and Sabi rivers have been influenced by upstream impoundment for irrigation and run-off from extensive irrigation schemes. Manjinji Pan on the south bank of the Nuanetsi River previously supported substantial birdlife with water being pumped into the pan by a local resident. However, this scheme has now been abandoned and the pan is silting up.

Visitor Facilities The park is open to visitors in the dry season from May to October. Well established restcamp at Chinguli in the centre and campsites throughout the park.

Scientific Research The emphasis of research has been on understanding the ecology of the area as a basis for management policy designed to achieve ecological stability despite outside influences.

Special Scientific Facilities An ecologist and support staff are based at Chipinda Pools in the north.

Principal Reference Material Departmental reports and scientific papers deal with the vegetation and fauna of the area and their management. Much literature concerning Kruger National Park has relevance to this park.

* Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff The warden and support staff at Chipinda Pools are responsible for the northern sector and warden at Mabalauta responsible for the southern sector and contiguous Malapati Safari Area.

Budget No information

Local Park or Reserve Administration The Warden, Chipinda Pools, P Bag 7003, Chiredzi, and The Warden, Mabalauta, P Bag 7017, Chiredzi.

Date 1983

HWANGE (WANKIE) NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established 1928 as a Game Reserve; National Park status in 1930

Geographical Location Situated in Hwange Province on the border with Botswana, about 200km north-west of Bulawayo. 18°30'-19°53'S, 25°48'-27°27'E.

Altitude 938-1,152m

Area 1,465,100ha. Contiguous to Deka Safari Area, Matetsi Safari Area (292,000ha), and Kazumu Pan National Park (31,300ha). Matetsi Safari Area is also contiguous to the Zambezi and Victoria Falls National Parks (56,300 and 7,900ha).

Land Tenure Government

Physical Features Aeolian Kalahari sand covers some 947,000ha of the park area. The gently undulating country has 'fossil' river lines draining south-west towards the great Makgadikgadi Pans in Botswana. Parallel 'fossil' dunes occur in the centre and west. The park contains temporary seasonal pools or pans with high salt content. The more broken country in the north includes basalts, grits, sandstones, gneisses, and paragneisses where streams and rivers rise and drain north towards the Zambezi River. The climate is dry and tropical with annual precipitation about 655mm decreasing towards the south and west. The dry winter is followed by a hot dry season before the rains in the period November-March. Mean maximum temperature occurs in October 35°C and mean minimum temperature in June and July 3.5°C when frost is frequent.

Vegetation This represents the transition between dry western deserts and moist savanna woodlands with vast teak *Tectona grandis* forests in the north giving way in the south to the Kalahari sandveld which supports some typical woodland areas in the east dominated by *Baikiaea plurijuga*, *Guibourtia coleosperma* with *B. africana*, and *Pterocarpus angolensis* locally conspicuous over an understorey of *Terminalia sericea*, *Combretum* spp. and *Acacia* spp. due in part to the influences of fire and/or frost, which may lead to thicket conditions. The 'fossil' rivers and other areas with underlying calcrete are characterised by areas of open grassland often with *Acacia erioloba* as a conspicuous fringing tree. Mopane *Colophospermum mopane*, *Combretum* spp. and *Commiphora* woodland occurs on the deeper basaltic vertisols and on shallower soil in the north with open grassland in the vleis.

Fauna There are 35 large mammal species recorded (jackal-sized or larger) and 401 bird species. The fauna represents a merging of elements from the southern savanna and south-west arid faunal elements of Africa with species typical of the Kalahari penetrating into the park from the south-west. Black rhinoceros *Diceros bicornis* (T) and white rhinoceros *Ceratotherium simum* have been reintroduced and appear to be prospering. There are strong populations of elephant *Loxodonta africana* (T) (15,000), buffalo *Syncerus caffer* (30,000), giraffe *Giraffa camelopardalis*, zebra *Equus burchelli*, hippopotamus *Hippopotamus amphibius*, warthog *Phacochoerus aethiopicus* and a wide range of antelope including wildebeest *Connochaetes* sp., greater kudu *Tragelaphus strepsiceros*, impala *Aepyceros melampus*, and sable *Hippotragus niger*. Other mammals include: lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), wild dog *Lycaon pictus* (T), and two hyena species. Birdlife varies with season with flocks of waxbills (Estrildidae), canaries *Serinus* spp., doves (Columbidae), francolins *Francolinus* spp., guinea fowl (Numididae), sandgrouse (Pteroclididae), and starlings (Sturnidae) during the dry season and migrant cuckoos (Cuculidae), swallows (Hirundinidae), swifts (Apodidae), warblers (Muscicapidae), nightjars *Caprimulgus* spp., Egyptian goose *Alopochen aegyptiacus*, red-billed teal *Anas erythrorhynchos*, and knob-billed goose *Sarkidiornis melanotos* on the pans during the wet season. Raptors include: Bateleur eagle *Terathopius ecaudatus* and lappet-faced vulture *Torgos tracheliotus*, white-backed vulture *Gyps bengalensis*, Cape vulture *Gyps coprotheres*, white-headed vulture *Trigonoceps occipitalis*, and hooded vulture *Necrosyrtes monachus*.

Conservation Management There are some 1,500 km of 100m-wide fire breaks in the park allied to a network of fire towers and the whole park is divided into fire-control blocks. Management policy is designed to curb habitat deterioration and includes the prevention of soil erosion and the preservation of vleis. Problems have been created by the provision of 62 artificial waterholes to render otherwise seasonally waterless areas suitable for year-round occupation by substantial numbers of water-dependent animals. The elephant population of 2,000-4,000 at the time of national park proclamation has now increased to 12,000-14,000, despite population control exercises initiated in 1962. There is a park policy document and associated management and development plans. The park has been sealed with a game fence to counteract the spread of foot-and-mouth disease by buffalo movements.

Zoning Special Conservation Areas or Refuges, Wilderness Areas, Wild Areas, and Development Areas are delimited.

Disturbances or Deficiencies There is local evidence in the park of habitat changes due to former ranching, agriculture, and logging activities and the more widespread effects of too-frequent wildfire. The park is now isolated by settlements from the Gwai River to the north-east, animals apparently congregated along the river during the dry season when much of the present park was waterless. Adjacent areas of Botswana in the west are very sparsely settled, but to the south, the park abuts peasant farming areas.

Visitor Facilities The area is an internationally popular tourist destination. Development for visitors includes roads, shops, caravan, and campsites concentrated in the north of the park, which is also served by five hotels near the park. Access is by paved and gravel roads, rail, and an airport outside the park. There is a network of game-viewing roads, but the number of vehicles in the park is limited. Other facilities include observation platforms and hides.

Scientific Research The scientific staff is based at Main Camp. Research concerns ecological monitoring and broadly based studies designed to promote the ecological stability of the area.

Special Scientific Facilities At park headquarters

Principal Reference Material Fairly substantial literature includes departmental reports since the 1930s on history, geology, orology, pan formation, biological inventories, ecology, and interpretative material.

Staff The provincial warden and four other wardens have a support staff including ranger, tourist officers, scouts, and general workers. Three ecologists and their staff are based at Main Camp.

Budget No information

Local Park or Reserve Administration Wankie National Park, P Bag DT 5776, Dett.

Date April 1985

INYANGA AND MTARAZI FALLS NATIONAL PARKS

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, but sport fishing by permit in some of the waterways and lakes

Date Established Protected since 1902. The parks contain large areas of land bequeathed to the nation.

Geographical Location Situated in the Eastern Highlands in Manicaland Province on the Mozambique border. About 200km east-south-east of Harare. 18°20'S, 32°50'E.

Altitude 880-2,592m (mainly above 2,000m)

Area 31,395ha: Inyanga National Park 28,900ha and Mzarazi Falls National Park 2,495ha are contiguous.

Land Tenure Land held in trust. Most of the area was bequeathed to the nation in the will of the late Cecil John Rhodes.

Physical Features Inyanga National Park comprises a giant plateau consisting of uplifted doleritic intrusions over granite and includes part of Mount Inyangani (highest peak in Zimbabwe). This mountainous area is the source of several important rivers (Pungwe, Odzi, Gairezi, Inyangombe, and Mtarazi) and includes a number of waterfalls. In Mtarazi National Park the river cascades 762m down the cliff face into the Honde Valley. Many of the rivers have been dammed to form small lakes. The soils are mineralised, but leached and susceptible to erosion.

Vegetation The natural vegetation climax appears to have strong affinities physiologically and taxonomically with the sclerophyll of the southern Cape Province of South Africa, but this is readily suppressed by fire to extensive montane grassland. The area contains stunted *Brachystegia* woodland, patches of submontane lowland forest, introduced pines and wattles, and high altitude heathlands. A planted stand of the indigenous conifer *Widdringtonia whytei* may be used to reintroduce the tree to other areas.

Fauna Inyanga is an important mountain sanctuary for wildlife in a region where plantations of exotic conifers and wattle tend to dominate the landscape and contains an interesting montane fauna which is unique in Zimbabwe. In Mtarazi National Park, the rain forest created by spray from the waterfall provides a home for the blue duiker *Cephalophus monticola*. There are relatively few large herbivores on the veld. Lions *Panthera leo* are present. The avifauna includes: cisticolas *Cisticola* sp., waxbills (Estrildidae), mannikins *Lonchura* spp.,

widow-birds *Euplectes* spp., buzzards, and eagles. Stream fish include trout *Salmo trutta* and *S. gairdneri*.

Cultural Heritage The area contains important archaeological sites indicating past high density occupation of the area by an agricultural culture of remarkable technical sophistication.

Conservation Management There is a park policy document for Inyanga. The two national parks are administered as one unit.

Zoning There are two Wilderness Areas (Pungwe-Nyazengu and Mtarazi), six Wild Areas, and one large Multiple Use Area which contains all significant staff and visitor facilities, five trout angling dams, and a number of managed exotic plantations which the public now regard as a feature of the Inyanga landscape. Wild Areas and Wilderness Areas total about 26,000ha. Provision exists for the creation of Special Conservation Areas with access only for scientific purposes.

Disturbances or Deficiencies One major and several secondary roads pass through Inyanga. The feral exotic vegetation needs expensive long-term control. The disappearance of low altitude natural forest outside the boundaries is a threat to birds and perhaps other animals that migrate to it seasonally from the parks. The area would benefit by including the whole of Mount Inyangani, particularly more of the submontane rain forest of the south-east aspect.

Visitor Facilities The parks are essentially scenic, but also provide for a range of outdoor recreational activities including quality angling for introduced rainbow, brown, and brook trout in specially built dams. Other facilities include a hotel and lodges in the park, six hotels near the park, caravan and campsites and well maintained gravel roads.

Scientific Research The trout hatchery in the Inyanga National Park is a cornerstone of trout research and propagation for angling and table fish in Zimbabwe and the park is an important centre for horticultural research by the Ministry of Agriculture. Research includes small mammal surveys. Investigations are being carried out as to whether the plantation timber in the park could be used to supply the timber needs for all parks and reserves in Zimbabwe. The area is also a useful ecological benchmark.

Special Scientific Facilities A research station concentrating on fruits and seed potatoes forms an 'island' in the park.

Principal Reference Material The archaeology, history, management and research in the park is fairly well documented in formal publications and in departmental archives. Also the Will of the late Cecil John Rhodes.

Staff Warden, five rangers and support staff. There is also a fishery ecologist, technician and support staff.

Budget No information

Local Park or Reserve Administration The National Parks Central Booking Office, PO Box 8151, Causeway, Harare.

Date April 1985

KAZUMA PAN NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established Proclaimed as a National Park in 1949, deproclaimed 1964, reproclaimed 1975. An extension is planned.

Geographical Location Western Matabeleland North Province on the border with Botswana

Altitude 900-1,200m

Area 31,300ha. Kazuma Pan National Park is part of the Hwange-Matetsi- Victoria Falls complex and is surrounded by Matetsi Safari Area (195,500ha) which is contiguous to Hwange National Park (1,462,000ha), Zambezi National Park (56,300ha) and Victoria Falls National Park (7,900ha).

Land Tenure Government

Physical Features There are flat grassland plains of basalt clays and gravels with large seasonally inundated natural pans in the southwest.

Vegetation The park protects the natural ecosystems of a unique physiognomic vegetation type in Zimbabwe. Open grassland in the east is fringed by mopane *Colophospermum mopane* and Kalahari woodland.

Fauna There is a wide spectrum of large mammal species, but populations are generally sparse and seasonal. Locally threatened species have a high incidence and include: gemsbok *Oryx gazella*, oribi *Ourebia ourebi*, roan antelope *Hippotragus equinus*, tsessebi *Damaliscus lunatus*, and cheetah *Acinonyx jubatus* (T). This is the only area in Zimbabwe where the western populations of the southern African oribi occur. Game tends to concentrate in the more watered and tree-covered western sector of the park. The pans are important to waterfowl.

Conservation Management There is a policy document for the Victoria Falls-Matetsi Complex and departmental reports cover the resources, planning and management of the complex. Park policy gives particular emphasis to conservation of gemsbok, roan and oribi and their habitats. The park is well insulated in Zimbabwe by other conservation areas and adjacent parts of Botswana, which remain undeveloped.

Zoning Agreed policy dictates that most of the park will be a Wilderness Area with limited development in one small area, but this has not yet been developed.

Disturbances or Deficiencies Wildfire spreads into the park from surrounding areas.

Visitor Facilities Game-viewing on foot is allowed, but there are no tourist facilities. The area is remote and four-wheel drive vehicles are essential. Visitors must obtain prior permission from the Provincial Warden.

Scientific Research No information

Special Scientific Facilities The park forms part of the Victoria Falls-Matetsi Complex for research purposes with laboratories and scientists at Isidumuka, some 20km from the eastern boundary.

Principal Reference Material None listed

Staff Administered by the Warden at Matetsi with two rangers and support staff.

Budget No information

Local Park or Reserve Administration Provincial Warden, P Bag 5925, Victoria Falls.

Date April 1985

MANA POOLS NATIONAL PARK AND ASSOCIATED SAFARI AREAS

Management Category II and VIII (National Park and Multiple Use Management Areas)

World Heritage Site (Criteria: ii, iii, iv)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Fully protected, but strictly controlled recreational hunting permitted in the safari areas. Chewore and Sapi are due for elevation to national park status.

Date Established Mana Pools National Park 1963; Chewore Safari Area and Sapi Safari Area 1964; Dande Safari Area 1968; Urungwe Safari Area 1976; no information on Doma Safari Area. Much of the area had been protected as a non-hunting area since 1930.

Geographical Location North-east of Lake Kariba in the Zambezi Valley on the south bank of the river (which forms the border with Zambia). 15°35'-16°30'S, 29°00'-30°25'E.

Altitude Under 500m to 1,062m

Area Mana Pools 219,600ha, Chewore 339,000ha, Urungwe 287,000ha, Sapi 118,000ha Dande 52,300ha and Doma 76,400ha. Contiguous to Charara Safari Area (169,000ha).

Land Tenure Public ownership under the Parks and Wildlife Act 1975.

Physical Features The areas (excluding Dande) have extensive frontages along the lower Zambezi River from Kariba Dam to near the Mozambique border and include large areas of the rugged Zambezi escarpment, which rises to 1,000m from the valley floor. The geology of the region ranges from the recent river alluvia of the extensive valley floor to the ancient gneiss and paragneiss overlain by thin lithosols of the basement complex. Mana Pools are former channels of the Zambezi. Much of Chewore is heavily dissected with Mupata Gorge (30km long) along the northern boundary. Between the gorges of Kariba and Mupata, the river is broad and sandy. Mean annual rainfall is 700mm, falling mainly in summer. Mean annual temperature is 25°C.

Vegetation Well-grassed *Brachystegia* communities dominate the mountainous escarpment and higher Chewore areas. The valley floor is dominated by mopane *Colophospermum mopane* woodlands or dry highly deciduous thickets known as jesse. Seasonal tributaries crossing the valley floor support extensive riparian communities. On the younger sandier alluvial deposits along the Zambezi are well-developed communities of the unusual *Acacia albida* with more diverse woodlands containing *Kigelia africana* and *Trichilia emetica* on the higher deposits (old islands or levées).

Fauna The rich and varied fauna mammal populations tend to concentrate on the floodplains during the dry season when water elsewhere (except in the escarpment) is scarce and when the numerous *Acacia albida* shed their protein-rich pods. Mammals include: black

rhinoceros *Diceros bicornis* (T)(Chewore has one of the most numerous populations in Africa), elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, lion *Panthera leo*, leopard *Panthera pardus* (T), spotted hyena *Crocuta crocuta*, honey badger *Mellivora capensis*, warthog *Phacochoerus aethiopicus*, bushpig *Potamochoerus porcus*, zebra *Equus burchelli*, cheetah *Acinonyx jubatus* (T), wild dog *Lycaon pictus* (T) and a wide range of antelope species including mixed herds of greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, nyala *Tragelaphus angasi*, eland *Taurotragus oryx*, waterbuck *Kobus ellipsiprymnus*, sable antelope *Hippotragus niger*, grysbok *Raphicerus melanotis*, and steenbok *Raphicerus campestris*. Nile crocodile *Crocodylus niloticus* (V) are present. Birdlife on the river and in the bush is prolific with over 380 species including: Nyasa lovebird *Agapornis lilianae*, yellow-spotted nicator *Nicator* sp., white-collared pratincole *Glareola nuchalis*, banded snake-eagle *Circaetus* sp., and Livingstone's flycatcher *Erythrocerus livingstonei*. Common fish include tiger fish *Hydrocynus vittatus*, bream *Tilapia* spp., vundu *Heterobranchus longifilis*, kupi *Distichodus mossambicus*, chessa *Distichodus schenga*, cornish Jack *Mormyrops deliciousus*, and lungfish *Protopterus annectens*.

Population There is virtually no permanent human habitation due to an array of tropical diseases including sleeping sickness, biharzia, and malaria.

Zoning Zonation is implicit in the legal status of the five areas. Each area may be divided into: Special Conservation Areas with no development and entry only for scientific purposes; Wilderness Areas of sufficient size to contain the complete biota of the locality and bearing no more than incidental signs of occupation by man; Wild Areas serviced by roads and tracks, but where the interests of fauna and flora are paramount; and Development Areas for visitor, management and administrative facilities. Hunting rights in Sapi, Chewore and Urungwe (part) are divided into lots which are sold by tender on an annual basis; in the remainder of Urungwe they are sold to a local hunting association, and in Dande they are leased to a safari company.

Disturbances or Deficiencies Natural seasonal flooding of low-lying areas was seriously curtailed by the completion of Kariba Dam in 1958. These areas including the rich alluvium and the ecological heart of the area are further threatened by a proposed hydroelectric scheme at Mapata Gorge which would create a 85,000ha lake obliterating much of the Zambezi floodplain and halving the carrying capacity of Mana Pools. An environmental assessment is being completed. The proposed dam is unlikely to be considered until the 21st century. Other problems include poaching, especially of fish in the Zambezi, and destruction of habitats by elephants. The Harare/Lusaka main road passes through the area with associated settlements and there is a private estate on the Zambezi near Chirundu. The area is of limited agricultural potential and has never been used extensively for livestock grazing.

Visitor Facilities The areas provide opportunities to experience some of the greatest seasonal mammal concentrations in a natural environment and it is ensured that recreational hunting will not impair the essential wilderness qualities and resource values for future generations. The number of cars allowed into Mana Pools National Park at any one time is limited. Mana Pools is only partially developed as a tourist centre, but is so popular that the available facilities are prone to saturation. There is a tourist camp at Chikwenya on the confluence of the Sapi and Zambezi Rivers, but there are no tarred roads and visitors are strictly confined. Visitors are allowed to walk in the riparian woodlands in the park.

Scientific Research Scientific research and education concern ecological stability and man's impact on the environment. In particular long term studies have been made of the ecological effects of land-use systems applied in neighbouring areas and effects on riparian communities of the formation of Lake Kariba. Regular aerial game counts are carried out.

Special Scientific Facilities Research laboratory is located at Mana Pools. An ecologist and workers have been posted to the area after a break of several years.

Principal Reference Material

Numerous departmental reports augmented by published papers on the biology of the area and including a population census as a basis for setting hunting quotas.

- ° Barkham, J.P. (1981). Report on the environmental impact assessment of proposed hydro-electric schemes on the Zambezi River. Duplicated report. IUCN, Gland. 30 pp.
- ° du Toit, R.F. (1982). A preliminary assessment of the environmental implications of the proposed Mupata and Batoka hydro-electric schemes (Zambezi River, Zimbabwe). Natural Resources Board, Harare. 209 pp.
- ° Guy, P.R. (1977). Notes on the vegetation types of the Zambezi Valley, Rhodesia between Kariba and Mupata Gorges. *Kirkia* 10: 543-557.
- ° Jarman, P.J. (1972). Seasonal distribution of large mammal populations in the unflooded middle Zambezi Valley. *Journal of Applied Ecology* 9: 283-299.
- ° Policy document covering the five areas (24 February 1981).

Staff The complex is administered by the Warden at Marangora with seven rangers, support staff, one ecologist and his junior staff.

Budget No information

Local Park or Reserve Administration Warden at Marangara.

Date April 1985

MATOBO (MATOPOS) NATIONAL PARK AND LAKE MATOBO RECREATIONAL PARK

Management Category II and VIII (National Park and Multiple Use Management Area)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total, but the use of the areas differs according to the legal definition of their status. The recreational park is excluded from the national park as it contains four leased sites. Fishing is permitted in the dam.

Date Established Matobo National Park 1902 and Lake Matobo Recreational Park 1926

Geographical Location 54km south of Bulawayo in Matabeleland South Province, western Zimbabwe. 20°40'S, 28°30'E.

Altitude 1,300-1,466m

Area Matobo National Park 43,200ha and Lake Matobo Recreational Park 2,900ha are contiguous.

Land Tenure Partially Trust Land bequeathed to the nation by the late Cecil John Rhodes

Physical Features The complex occupies the core of the Matobo Hills, an agglomeration of granite kopjes with numerous caves. Geological faults have created domes (dwalas) which sometimes have huge isolated boulders on their smooth surfaces. The hills are an important water catchment area for the southern Matabeleland feeding tributaries of rivers such as the Tuli, Mtsheli, Maleme, and Whovi. The hills are interspersed by valleys with deeper soils, vleis, and streams. Although located in the drier western part of Zimbabwe, the area represents a western extension for many species characteristic of the east of the country because of the nature of the habitats.

Vegetation The flora reflects a wide diversity of habitats and includes xerophytes on exposed granite; well wooded kloofs on the kopjes with *Euphorbia candelabrum*, mnyondo trees and golden flowered umsehla *Peltophorum africanum* around the bases; open woodland in well drained valleys; and grassy vleis and swamps. The vegetation is characterised by a diversity of species and communities. Tree species include *Julbernardia globiflora*, *Erythrina lysistemon*, *Streptocarpus eytesii*, and *Calodendrum capense*. Other plants include the winter flowering *Crassula*, *Clematis* and *Pterolobium exosum*, ground orchid *Habenaria*, and over 100 grass species. Lichens are common on the massive boulders and dwalas and vary widely in colour.

Fauna The 88 recorded mammal species include 71% of the hare-sized and larger species recorded in Zimbabwe. High densities of leopard *Panthera pardus* (T), klipspringer *Oreotragus oreotragus*, red hare *Pronolagus randensis*, and two hyrax species occur. Twelve large mammal species have been reintroduced. Over 300 bird species occur, which is over half the number known to occur in Zimbabwe. They include 40 raptor species such as: black eagle *Aquila verreauxii* (highest known density), Wahlberg's eagle *Aquila wahlbergi*, tawny eagle *Aquila rapax*, banded harrier-hawk *Polyboroides typus*, secretary bird *Sagittarius serpentarius*, black-shouldered kite *Elanus caeruleus*, snake eagle *Circaetus* spp., little sparrow-hawk *Accipiter minullus*, Gabar goshawk *Melierax gabar*, Peregrine falcon *Falco peregrinus* (T) and Lanner falcon *Falco biarmicus*. The 71 reptile species with 39 snake species include a thriving population of the highly venomous black mamba. Records of 27 amphibian species and 16 fish species include several exotics introduced to the streams and dams: bream *Tilapia* spp., black bass *Micropterus salmoides*, barbel *Clarias gariepinus*, and Hunyani salmon *Labeo altivelis*.

Cultural Heritage The biological diversity of this important catchment area has attracted inhabitants from the stone age to the present, notably the San bushmen and the Matabele. The area has great archaeological, historical, and spiritual significance. Caves in or near the park include Nswantugi with bushman giraffe paintings, Bambata (the first cave to be excavated in Africa), and Silozwane once used by the Ndebele for rainmaking ceremonies.

Conservation Management The controlled availability of thatching grass in the park has proved a valuable tool over the past 20 years for convincing local rural communities of the value of the park. The re-establishment of vleis and sponges is particularly valuable as the area is important for water catchment. There are policy documents for Matobo National Park (9 April 1979) and Lake Matobo Recreational Park, and associated biological management and development plans.

Zoning Zonation is implicit in the legal status of the national park and contiguous recreational park. The complex is also divided into areas of Special Sociological Importance, Special Conservation, Wilderness (Maleme and Toghwe), and the Wild and Recreational Area (including Matabo Dam). There is a 16,500ha game reserve in Whori Wild Zone.

Disturbances or Deficiencies A highway passes through the parks. Problems include poaching and illegal cattle grazing.

Visitor Facilities Matobo National Park was a gift to the people of Bulawayo by the late Cecil John Rhodes. Facilities in the parks include nine lodges at Maleme Dam, four caravan and campsites, a network of gravel game-viewing roads, and horse trails.

Scientific Research The area has been important for biological and archaeological research by the National Museum in Bulawayo since the early 1900s.

Special Scientific Facilities Laboratories at Maleme have a permanent scientific staff of one aquatic and one terrestrial ecologist, and support staff.

Principal Reference Material Numerous reports, scientific papers, and popular or semi-popular publications concerning the archaeological, historical, physical, biological and cultural features of the Matobo.

Staff Warden, two ecologists, four rangers (officers), 45 scouts, and 94 support staff

Budget About US\$70,000

Local Park or Reserve Administration Park Headquarters are at Maleme. Most of the recreational park is administered as part of the national park. Matobo National Park, P Bag K5142, Bulawayo.

Date April 1985

MATUSADONA NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established Proclaimed as a non-hunting reserve in 1963, but managed as a national park and elevated to this status in 1975

Geographical Location On the southern shore of Lake Kariba in western Mashonaland North Province. 17°00'S, 28°25'E.

Altitude Up to 1,201m

Area 137,000ha. Contiguous to Lake Kariba Recreational Park (283,000ha)

Land Tenure No information

Physical Features Matusadona comprises an abrupt and rugged escarpment separated from the lakeshore by an apron of flat land. Most of the park is inaccessible by road and extends over the upland area high above the lake. The numerous bays of the lakeshore are formed by drowned valleys. The Bumi River forms the western boundary, and the flooded Sanyati gorge the eastern boundary. Soils are shallow and stony.

Vegetation Well grassed *Brachystegia* communities dominate the mountainous two-thirds of the park. Elephant have caused modification of the physiognomic character of plant communities and elimination of many large trees. Below the escarpment fairly dense woody vegetation dominates, comprising mainly small trees and bushes. Lake Kariba is a man-made lake with evolving shore communities in which the swamp grass *Panicum repens* is conspicuous.

Fauna Black rhinoceros *Diceros bicornis* (T) (estimated 400), elephant *Loxodonta africana* (T) (1,000), buffalo *Syncerus caffer* (several thousand), sable and roan antelopes *Hippotragus niger* and *Hippotragus equinus*, greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, waterbuck *Kobus ellipsiprymnus*, hippopotamus *Hippopotamus amphibius*, lion *Panthera leo*, leopard *Panthera pardus* (V), impala *Aepyceros melampus*, hyena, and crocodile (estimated 400 adult crocodile). Birds include: fish eagle *Haliaeetus vocifer*, African darter *Anhinga rufa*, comorants *Phalacrocorax* sp., heron, stork, plover, lilytrotter *Actophilornis africana*, and numerous woodland birds. Lake fish include bream *Tilapia* sp., vundu *Heterobranchus longifilis*, tigerfish *Hydrocynus vittatus*, and Tanganyika sardine *Limnothrissa miodon*.

Conservation Management The park policy document puts particular emphasis on protection of black rhinoceros, hippopotamus, and crocodile. It provides for the creation of Special Conservation Areas with no development and access only for scientific purposes.

Zoning Most of the hill area has been declared as Mafuchi Wilderness Area with access only by special permission. Jenje Wild Area comprises the flat land between the escarpment and lakeshore and is served by game-viewing roads. There are several Development Areas for staff and visitor facilities with park headquarters located in the largest of these, Tashinga.

Disturbances or Deficiencies Lake Kariba is a man made lake. Inshore and offshore commercial fishing are permitted in the contiguous Lake Kariba Recreational Park, with inshore fishing limited to a section of the northern shoreline of Matusadona.

Visitor Facilities Only one-third of the park is open to the public. Organized tourism facilities include three lodges, bush camps at Muwu and Ume River and an airstrip at Tashinga. Boat, canoe, and walking safaris are operated from Fothergill Island which provides excellent game viewing opportunities following Operation Noah in the late 1950s when thousands of animals were rescued from the rising waters of Lake Kariba.

Scientific Research Research is concentrated on management and the impact of Lake Kariba on the natural biota.

Special Scientific Facilities An ecologist and basic facilities at Tashinga.

Principal Reference Material Numerous departmental reports, plans for the management of resources and development of the park, and popular and scientific publications have been published over the last 20 years.

Staff Warden, ecologist, and two rangers with support staff

Budget No information

Local Park or Reserve Administration Warden, based at Tashinga.

Date April 1985

VICTORIA FALLS NATIONAL PARK

Management Category III (Natural Monument)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established The area is part of the original Victoria Falls National Park established in 1931, subdivided in 1979 into the contiguous Victoria Falls and Zambezi National Parks.

Geographical Location In the extreme west of Matabeleland North Province on the southern bank of the Zambezi River, which forms the border with Zambia. 17°90'S, 25°90'E

Altitude 913m

Area 1,900ha. Contiguous to Zambezi National park (56,400ha) and the Matetsi, Kazuma Pan, Hwange (Wankie) complex. Total contiguous conservation area of over 1,846,700ha.

Land Tenure Government (the last private lands were acquired in 1972)

Physical Features The park contains the Victoria Falls: the largest sheet of falling water in the world - over 545 million litres per minute during the flood season, hence the African name of 'Mosi oa Tunya' - the smoke that thunders. The park includes the Zambezi River above and below the falls within Zimbabwe and the upper Batoka Gorges. Annual rainfall is 600-700mm and mean annual temperature 20°C. The spray thrown up from the falls is partly responsible for sustaining the rain forest.

Vegetation Dominant types are riverine communities associated with the upper Zambezi River, the Victoria Falls rain forest and open grassland which constitutes a type locality for several species. Scrub on the shallow basaltic soils adjacent to the gorges gives way to Kalahari woodland on the deeper aeolian sands.

Fauna Many large mammal species here also occur in the Zambezi National Park including: hippopotamus *Hippopotamus amphibius*, lion *Panthera leo*, warthog *Phacochoerus aethiopicus*, and numerous antelope species. The rich avifauna includes: cormorant *Phalacrocorax* sp., darter *Anhinga* sp., heron, duck, egrets, bitterns, pygmy goose *Nettion auritus*, and white-fronted bee-eater *Merops bullockoides* along the river; in the rain forest are Heuglin's robin *Cossypha heuglini*, Knysna turaco *Tauraco corythaix*, and trumpeter hornbill *Bycanistes bucinator*. The gorges provide breeding places for the rare taita falcon *Falco fasciinucha*. Victoria Falls forms a geographical barrier between the distinct fish faunas of the upper and middle Zambezi River. Fish species include: breams *Oreochromis mossambica*, *T. macrochir*, *T. andersoni*, *Serranochromis robustus*, *Sargochromis condingtoni*, chessa *Distichodus schenga*, tigerfish *Hydrocynus vittatus*, and barbel *Clarias gariepinus*.

Conservation Management Large mammals are being encouraged in the Gorges Wild Area while ensuring that any increase does not adversely affect the perennial vegetation. Development has been confined to aesthetically designed and located paved or gravel paths, entrance gates, and limited interpretative displays. There is a policy document for the Victoria Falls-Matetsi complex.

Zoning The park is divided into two Wild Areas separated by the road and railway linking Zambia and Zimbabwe across the Victoria Falls Bridge (itself a feature of historical interest).

Disturbances or Deficiencies Victoria Falls town lies next to the park and is a major visitor destination. The town and intense visitor throughput caused drainage and erosion problems, now successfully rehabilitated at considerable cost. The road, railway and low-flying aircraft cause some adverse auditory and visual impacts.

Visitor Facilities These are well developed with hotels available in Victoria Falls town. Visitors to the Falls and rain forest area are limited to about 1,000 persons per day. There are good paths to the Falls and through the rain forest.

Scientific Research Research is carried out by local Parks and Wild Life Department scientists on protection of all riparian vegetation including the rain forest. Basic plant and animal monitoring programmes are carried out.

Special Scientific Facilities The park is part of the Zambezi-Matetsi complex for research purposes with laboratories at Isidumuka, 89km south of Victoria Falls.

Principal Reference Material Extensive literature covers the archaeology, history, geology, fauna and flora of Victoria Falls and environs with more specific reports and papers dealing with planning development, the management of the biological resources, and reclamation of the Falls rain forest area.

Staff Administered by a ranger with a complement of scouts and general workers under the direction of the Warden, Victoria Falls.

Budget No information

Local Park or Reserve Administration The Warden, P Bag 5920, Victoria Falls.

Date April 1985

ZAMBEZI NATIONAL PARK

Management Category II (National Park)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total, but fishing without licence allowed

Date Established The park area is part of the original Victoria Falls National Park established in 1931, subdivided in 1979 into the contiguous Victoria Falls and Zambezi National Parks

Geographical Location Western Matabeleland Province, north-west Zimbabwe, on the southern bank of the Zambezi River, which forms the border with Zambia. 17°19'S, 25°75'E.

Altitude 1,000m

Area 56,400ha (extension planned). Contiguous to Victoria Falls National Park (1,900ha) and Matetsi-Kazuma Pan-Hwange (Wankie) complex. Total contiguous conservation area of over 1,846,700ha.

Land Tenure Government (the last private lands in the whole complex were acquired in 1972).

Physical Features The Kalahari sand sheet has been eroded to expose underlying basalt in the north along the Zambezi River frontage (about 50km). It forms undulating country in the remainder of the area with 2 extensive vleis draining towards the Zambezi below the Victoria Falls.

Vegetation Typical Kalahari woodland with *Azelia quanzensis*, *Combretum* spp., and *Pterocarpus* sp., typifies the sand sheet between the open grassed vleys, modified in parts by past logging and fire. A mixed scrub community has developed on the basalt areas giving way to riparian vegetation with *Acacia* spp. such as *A. albida*, *Albizia harveyi*, *Tamarindus indica*, *Combretum mossambicense* and *Ziziphus mucronata* along streams, at springs, and especially along the Zambezi. *Cyperus papyrus* swamp occurs among the riparian communities.

Fauna The area has a wide range of large African mammals, rich avian and invertebrate fauna with the river supporting fish typical of the upper Zambezi/Kafue systems. Large mammals include: elephant *Loxodonta africana* (T), hippopotamus *Hippopotamus amphibius*, black rhinoceros *Diceros bicornis* (T) and white rhinoceros *Ceratotherium simum* (reintroduced), lion *Panthera leo*, leopard *Panthera pardus* (T), spotted hyena *Crocuta crocuta*, giraffe *Giraffa camelopardalis*, zebra *Equus burchelli*, warthog *Phacochoerus aethiopicus*, and some 12 antelope species including sable *Hippotragus niger* and waterbuck *Kobus ellipsiprymnus*. Rich and varied avifauna including: fish eagle *Haliaeetus vocifer*, goliath heron *Ardea goliath*, malachite kingfisher *Alcedo cristata*, egrets, and darter *Anhinga rufa*. River fish include: tigerfish *Hydrocynus vittatus*, bream *Tilapia* sp., and vundu *Heterobranchus longifilis*.

Conservation Management There is a policy document for the Victoria Falls-Matetsi complex.

Zoning Most of the park is Wild Area where game viewing from roads is allowed. There is a substantial Development Area for staff and visitors adjacent to Victoria Falls town and other smaller Development Areas for administrative and management purposes.

Disturbances or Deficiencies The main highway from Victoria Falls to the border post with Botswana at Kazangula passes through the park but is located some distance from the Zambezi River so as to minimise disturbance to the natural ecosystems.

Visitor Facilities The park is closed to visitors in the wet season from November to April. Facilities in the park include lodges on the banks of the Zambezi, fishing camps, and a road network.

Scientific Research Research to improve management and protection of the ecosystems has particular reference to large mammals. Monitoring is carried out.

Special Scientific Facilities The park is part of the Zambezi-Matetsi complex for monitoring and research purposes with scientists and laboratory facilities at Isidumuka, about 89 km south of Victoria Falls.

Principal Reference Material Extensive literature covering the archaeology, history, geology, fauna and flora of the Victoria Falls and environs. Specific reports and papers dealing with planning of development, management of the biological resources and reclamation of the Falls/rainforest area.

Staff Warden and ranger with support staff

Budget No information

Local Park or Reserve Administration The Warden, P Bag 5920, Victoria Falls.

Date April 1985

SENGWA WILDLIFE RESEARCH AREA

Management Category I (Scientific Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total

Date Established No information

Geographical Location North-east Zimbabwe. 18°07'S, 28°10'E.

Altitude No information

Area 37,300ha

Land Tenure No information

Physical Features The area includes the Lutope River and its floodplain. There is a single rainy season from December to April, a cool dry season from May to July, and a hot dry season from August to December. Mean annual rainfall is 673mm and mean annual temperature 22.5°C to 25°C.

Vegetation Major vegetation types are: *Colophospermum mopane* woodland, *Brachystegia-Julbernardia* woodland, *Combretum* sp. deciduous thickets, *Acacia* riverine communities on alluvial soil, and river terrace grasslands.

Fauna Mammals include: impala *Aepyceros melampus*, buffalo *Syncerus caffer*, lion *Panthera leo*, and leopard *Panthera pardus* (T).

Conservation Management No information

Zoning No information

Disturbances or Deficiencies No information

Visitor Facilities No information

Scientific Research Studies on impala ranging behaviour

Special Scientific Facilities Hostes Nicolle Institute of Wildlife Research, Gokwe.

Principal Reference Material

° Dunham, K.M. and Murray, M.G. (1982). Fat reserves of impala. *African Journal of Ecology* 20(2): 81.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date No information

VUMBA BOTANICAL RESERVE AND GARDEN AND BUNGA FOREST BOTANICAL RESERVE

Management Category II (National Park)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total

Date Established Proclaimed a National Park in 1958 following aquisition of land from estate of F. Taylor in 1957. Portions have been constituted as Botanical Reserve and Botanical Garden by Parks and Wild Life Act 1975.

Geographical Location About 30km from Mutare in Manicaland Province on the road to Chimanimani. 19°30'S, 32°40'E.

Altitude Up to 2,000m

Area Vumba Botanical Garden 200ha contains Vumba Botanical Reserve 76ha and is contiguous to Bunga Forest Botanical Reserve 1,558ha.

Land Tenure Government

Physical Features These are located in the Vumba Mountains (known as the 'mountains of mist') overlooking the plains of Mozambique, and include wooded granite hills. The annual rainfall is 1,676mm.

Vegetation Thick montane evergreen forest and open scrub vegetation with aloes occurs on steep rocky slopes. The Botanic Garden contains cycads, orchids and many trees and shrubs found nowhere else in Zimbabwe.

Fauna Mammals include: blue duiker *Cephalophus monticola*, bushbuck *Tragelaphus scriptus*, bushpig *Potamochoerus porcus*, and Samango monkey *Cercopithecus albogularis*. Rich birdlife including: orange ground thrush *Zoothera gurneyi*, wood owl *Ciccaba woodfordii*, red-winged starling *Onychognathus morio*, bronze sunbird *Nectarinia kilimensis*, augur buzzard *Buteo rufofuscus*, forest weaver (Ploceidae), Nyasa crimson-wing *Pyrenestes minor*, Swynnerton's robin *Pogonocichla swynnertoni* (R) and two species endemic to Zimbabwe, chirinda apalis *Apalis chirindensis*, and Roberts prinia *Prinia robertsi*.

Conservation Management The management policy for Vumba Botanical Reserve and Vumba Botanical Garden approved by the Director of Parks and Wild Life. The area is protected from wildfire. Blue duiker and Samango monkey are encouraged within tolerable limit of their impact on the developed garden. The policy of the developed garden is to emphasise indigenous highland flora.

Zoning Vumba Botanical Garden contains the Botanical Reserve and two Development Areas with camping and tourist amenities.

Disturbances or Deficiencies No information

Visitor Facilities The reserves have camping facilities, scenic drives and a network of footpaths, and there is a hotel nearby.

Scientific Research Ornithological and botanical studies have been made from the naturalist centre.

Special Scientific Facilities Seldomseen Naturalist Centre

Principal Reference Material

° Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff Provincial warden

Budget No information

Local Park or Reserve Administration Provincial Warden, PO Box 69, Mutare.

Date 1983

CHIMANIMANI (MELSETTER) ELAND SANCTUARY

Management Category IV (Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established Established in 1975 with funds from the small Chimanimani community and the Conservation Trust of Zimbabwe

Geographical Location Near the town of Melsetter in eastern Zimbabwe. 19°45'S, 32°55'E.

Altitude No information

Area 1,200ha

Land Tenure No information

Physical Features The mountainous terrain includes the Bridalveil Falls. Annual rainfall is high.

Vegetation The area is in the undifferentiated afro-montane vegetation zone with a diverse canopy flora.

Fauna There is a relict eland *Taurotragus oryx* population. Wild eland had long been present in the forests of the area, the species being the only large antelope to adapt to the artificial environment of pine plantations. The sanctuary also has waterbuck *Kobus ellipsiprymnus* and zebra *Equus burchelli*.

Zoning No information

Disturbances or Deficiencies No information

Visitor Facilities There are no tourist facilities in the sanctuary, but a hotel and caravan/campsite at Melsetter.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

- ° Child, G.F.T. (1977). Supplement to Koedoe. Pp 116-137.
- ° Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff No information

Budget No information

Local Park or Reserve Administration No information

Date 1983

MUSHANDIKE SANCTUARY

Management Category IV (Nature Reserve)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established No information

Geographical Location 26km west of Masvingo, centred on the Mushandike Dam. 17°50'S, 30°30'E.

Altitude No information

Area 12,900ha, including Mushandike Dam (417ha)

Land Tenure No information

Physical Features Mushandike Dam is ringed by mountains. The annual rainfall is under 1,000mm.

Vegetation The area lies within the drier Zambezian miombo woodland vegetation zone dominated by *Brachystegia* spp. and contains *Julbernardia globiflora*. Contains a complexity of habitats.

Fauna Mammals include: white rhinoceros *Ceratotherium simum*, sable *Hippotragus niger*, waterbuck *Kobus ellipsiprymnus*, duiker *Cephalophus* sp., grysbok *Raphicerus melanotis*, greater kudu *Tragelaphus strepsiceros*, klipspringer *Oreotragus oreotragus*, wildebeeste *Connochaetes* sp., zebra *Equus burchelli*, and leopard *Panthera pardus* (T). The many birds include red-billed teal *Anas erythrorhyncha*, comb duck *Sarkidiornis melanotos*, herons (Ardeidae), and cormorants *Phalacrocorax* sp. on the dam. Fish in the dam include black bass *Micropterus salmoides*, *Tilapia* sp., and barbel *Clarias gariepinus*.

Conservation Management Environmental education for primary school children

Zoning No information

Disturbances or Deficiencies No information

Visitor Facilities Internal gravel roads (subject to seasonal flooding), caravan and camping facilities exist and licensed sport fishing is permitted.

Scientific Research Ungulate grazing research predominates. The Department of National Parks maintains an experimental eland herd at Mushandike as the species has potential for domestication.

Special Scientific Facilities Eland research station (closed to the public)

Principal Reference Material

° Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff No information

Budget No information

Local Park or Reserve Administration The Warden, Mushandike Sanctuary, P Bag 9036, Masvingo.

Date 1983

GREAT ZIMBABWE NATIONAL MONUMENT

Management Category III (Natural Monument)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection No information

Date Established Established as Zimbabwe National Park

Geographical Location Near Kyle Recreational Park, south-west of Lake Kyle. 29km from Nyanda in Masvingo Province. 20°15'S, 31°00'E.

Altitude 1,140m

Area 746ha

Land Tenure Central Government

Physical Features The area is in a rugged kopje-strewn valley.

Vegetation The bushveld includes *Senecio* spp. and *Albizia adianthifolia*.

Fauna Mammals include: greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, duiker *Cephalophus* sp., steenbuck *Raphicerus campestris*, klipspringer *Oreotragus oreotragus*, leopard *Panthera pardus* (T), and baboon *Papio* sp.. The rich birdlife includes hornbills (Bucerotidae), greenpigeon *Treron australis*, freckled nightjar *Caprimulgus tristigma*, and purple-crested heron *Ardea purpurea*.

Cultural Heritage Great Zimbabwe was first occupied in the 8th century AD but most of the 'dzimba dzemabwe', or houses of stone, were built by the Karanga, ancestors of the present Shona people between the 11th and 15th centuries. Then, it was the royal capital of a state that dominated the central plateau and the gold trade to the coast. A solid stone conical tower forms the centrepiece of a huge elliptical building, wall and hut complex. The outer wall is 249m in circumference and in parts over 10m high and 5m thick. Excavations have yielded articles from China, India and Asia, but the most spectacular find was the soapstone zimbabwe birds adopted as the symbol of Zimbabwe.

Zoning None

Disturbances or Deficiencies No information

Visitor Facilities It is a major tourist attraction and there is a site museum, 4ha of aloe gardens and a hotel nearby.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Ross-McDonald, M. (1972). World Wildlife Guide. Viking, New York.

Staff No information

Budget No information

Local Park or Reserve Administration Administered with Lake Kyle Recreation Park.
Regional Director, P. Bag 9158, Nyanda.

Date 1983

CHARARA SAFARI AREA

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Fully protected with limited recreational hunting permitted. All landscapes and ecosystems are protected in as natural a state as possible facilitating a wide range of outdoor activities with emphasis on game viewing of more spectacular species such as elephant, buffalo, black rhinoceros, and lion.

Date Established Undesignated land owned by the Parks and Wildlife Department since 1968; designated a Safari Area in 1975

Geographical Location Eastern shores of Lake Kariba in Kariba/Urungwe districts of Mashonaland North Province near the border with Zambia. 16°30'-17°00'S, 29°00'-29°40'E.

Altitude 490-1,209m

Area 169,000ha

Land Tenure Government (Parks and Wild Life Department)

Physical Features The broken Zambezi Valley escarpment country gives way to limited areas of flat land along the shores of Lake Kariba.

Vegetation This is similar to that of the Mana Pools National Park and other Zambezi Valley conservation areas with *Brachystegia* communities dominating the upland slopes and mopane *Colophospermum mopane* woodlands or dry deciduous thickets on the low ground by the lake, and localised riparian communities.

Fauna The fauna is similar to that of Mana Pools National Park and other Zambezi Valley conservation areas, but with limited riparian communities. Mammals include: elephant *Loxodonta africana* (T), black rhinoceros *Diceros bicornis* (T), lion *Panthera leo*, leopard *Panthera pardus* (T), greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, and eland *Taurotragus oryx*.

Conservation Management There is a policy document

Zoning Policy recognises Special Conservation, Wilderness, Wild, and Development areas.

Disturbances or Deficiencies Poorly planned ribbon development along the shore of Lake Kariba is a threat to the integrity of the area. A tsetse control game fence running east-west through the area is a significant disruption. The power lines from Kariba serving the Zimbabwe electrical grid are a visual disfigurement. Local poaching occurs.

Visitor Facilities Lake Kariba is an important visitor destination and benefits substantially by the proximity of the Charara Safari Area which offers good game viewing and is popular with anglers.

Scientific Research The area has been included with neighbouring conservation areas for purposes such as population censuses, but there has been little research specific to Charara Safari Area.

Special Scientific Facilities No information

Principal Reference Material References include the findings of a cabinet sub-committee working group examining development and its potential in the Kariba Basin. Much literature relevant to Lake Kariba, Mana Pools and associated areas is relevant to this area.

Staff Administered by the warden at Kariba with ranger and support staff

Budget No information

Local Park or Reserve Administration The Warden, Lake Kariba.

Date 1983

CHETE SAFARI AREA

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total protection, but strictly controlled recreational hunting is permitted

Date Established 1963

Geographical Location In north-central Matabeleland North Province along the southern shores of Lake Kariba. 17°11'-17°37'S, 27°35'-27°59'E.

Altitude 300-900m

Area 108,100ha

Land Tenure Government

Physical Features Broken country in the east gives way to more undulating country overlain with Kalahari sand in the west. The area is dissected by numerous watercourses flowing into three seasonal river systems (Ruziruhuru, Senkwi/Murambare and Mwenda). Soils are generally poor, stony and shallow on Upper Karoo sediments. The artificial Lake Kariba has inundated the northern fringe of the area and the lakeshore is characterised by many bays formed in drowned valleys.

Vegetation Vegetation is somewhat varied, but generally scrub or mopane *Colophospermum* communities with open miombo woodland of *Julbernardia globiflora* and *Brachystegia* spp. occurs on the deeper sands. Riverine vegetation along the watercourses with steeper slopes is characterised by species of *Commiphora* and *Combretum* and occasional baobabs *Adansonia digitata*. Grass cover is varied. Water fern *Salvinia molesta* is common on lakeshore.

Fauna The wide spectrum of large mammals characteristic of the Zambezi Valley includes: elephant *Loxodonta africana* (T), buffalo *Syncerus caffer*, leopard *Panthera pardus* (T), black rhinoceros *Diceros bicornis* (T), eland *Taurotragus oryx*, sable antelope *Hippotragus niger*, greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*, duiker *Cephalophus* sp., impala *Aepyceros melampus*, warthog *Phacochoerus aethiopicus*, and baboon *Papio* sp., Nile crocodile *Crocodylus niloticus* (V) is present. The avifauna includes fish eagle *Haliaeetus vocifer* and marabou *Leptoptilos crumeniferus*.

Zoning Not yet planned

Disturbances or Deficiencies Minor poaching from the south and east may increase as the human population of these areas increases. The numerous elephant cause extensive damage to the vegetation along lakeshore. Uncontrolled fires have been a problem.

Visitor Facilities No information

Scientific Research Research has been limited to population surveys of large mammals (necessary for setting safe hunting quotas), enumeration of the elephant which form part of the Sebungwe population and study of the crocodile population.

Special Scientific Facilities The eastern sector is devoted to research centred on the Nuffield Research Centre at the mouth of the Mwenda River.

Principal Reference Material The area is not well documented, but there are some department reports.

Staff Ranger and small support staff under the warden at Chizarira National Park.

Budget No information

Local Park or Reserve Administration Chete Safari Area, c/o Private Bag DT 5776, Dett.

Date 1983

CHIRISA SAFARI AREA

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total but recreational hunting is permitted outside the Research Area. Hunting rights are leased to a safari hunting company whose activities are strictly controlled by the Department of National Parks and Wild Life Management.

Date Established 1968. National Park status is planned

Geographical Location In the Gokwe region of north-west Zimbabwe. 18°10'S, 28°25'E.

Altitude 600-1,200m

Area 171,300ha. Virtually contiguous to Chizarira National Park (191,000ha)

Land Tenure No information

Physical Features The area is dominated by the valley of the Sengwa River, a large, but somewhat seasonal stream draining northwards into Lake Kariba. The rivers are usually in deeply incised valleys or canyons. The topography varies from rough steep broken scarps and hills to gently undulating sandveld.

Vegetation The vegetation is characterised by local diversity with a number of defined communities including open grassland on the floodplain of the Sengwa and scrub, tree thickets and woodland on self-churning clays. The woodland includes *Brachystegia* spp. on sandy soils and *Colophospermum mopane* on heavier soils. Riverine communities occur along some of the tributaries of the Sengwa, but have generally been severely modified by elephant.

Fauna The wide spectrum of large mammals includes: elephant *Loxodonta africana* (T) (9,000), buffalo *Syncerus caffer*, impala *Aepyceros melampus*, black rhinoceros *Diceros bicornis* (T), lion *Panthera leo*, leopard *Panthera pardus* (T), cheetah *Acinonyx jubatus* (T), wild dog *Lycaon pictus* (T), warthog *Phacochoerus aethiopicus*, bushpig *Potamochoerus porcus*, zebra *Equus burchelli*, and various antelope species.

Conservation Management Rationalised use of wildlife in the area offers one of the few opportunities for sustained production within the constraints of an ecologically delicate area. There is an expanding wildlife population and a plan is being implemented to crop the abundant large mammals using local labour and returning the products to local communities.

Zoning 38,900ha Research Area in the south. The remaining area has not been subdivided.

Disturbances or Deficiencies Poaching from surrounding tribal areas is a problem, but the area is otherwise remote. There is little competition from livestock due to infestation by tsetse fly. Chirisa Safari Area is separated from Chizarira National Park by a narrow unprotected corridor.

Visitor Facilities The area caters for a range of outdoor activities, including recreational hunting.

Scientific Research A research programme was initiated in 1964 to study tsetse-vertebrate relationships in the research area in the south (38,900ha). Research has included extensive studies on warthog, elephant, impala, tsetse and tsetse-game relations, monitoring of trends in large mammal populations over the past 15 years, and work on the community structure of the vegetation. Lesser projects have included work on bats, small mammals, lion, buffalo and kudu. Scientific data is collected on all culled animals. The research programme has evolved in line with a policy of improved welfare of remote tribal communities.

Special Scientific Facilities The Sengwe Institute of Wildlife Research was established in 1970 and comprises well-equipped laboratories and housing for staff and visiting research workers. The institute has developed and constructed much of its own equipment for radio-tracking large mammals and has a good herbarium, teaching facilities and a range of other facilities needed for sophisticated research in a remote area.

Principal Reference Material

- Documents outlining draft policy for the Safari Area and research objectives at Sengwa Research Institute. Range of scientific papers, theses, and departmental reports of a more general nature.
- Child, G. (1982). Managing Wildlife for People in Zimbabwe. Proceedings of the World National Parks Congress, Bali, Indonesia, 11-22 October 1982.

- ° Martin, R.B., Conway, A. and P. Dix (1977). Project Windfall, Sebungwe Department National Parks and Wild Life Management, Zimbabwe. Report.
- ° Martin, R.B. and R.D. Taylor (1982). Towards a resolution of wildlife conservation problems in the Sebungwe through regional land use planning. *Symposium on the management of large mammals in African conservation areas*. Pretoria, 29-30 April 1982.

Staff Warden, ranger, and support staff. Institute staff comprise an ecologist-in-charge, two ecologists, one technician, and scouts trained in the collection of scientific data.

Budget No information but safari concessions in 1980/1981 yielded US\$158,300, and wildlife products - US\$416,969.

Local Park or Reserve Administration No information

Date 1982

MATETSI SAFARI AREA

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Fully protected, but controlled recreational hunting is permitted pending the transfer of some portions to contiguous national parks. Those areas remaining will persist as Safari Area.

Date Established Land acquired in 1973; Safari Area proclaimed under Parks and Wildlife Act in 1975

Geographical Location North-west Zimbabwe on the border with Botswana and Zambia. 18°30'S, 25°35'E.

Altitude 1,000m

Area 292,000ha (will reduce as portions are incorporated in existing contiguous national parks). Contiguous to Zambezi NP (56,400ha), Kazuma Pan NP (31,300ha), Hwange NP (1,465,100ha), Victoria Falls NP (1,900ha) and Deka SA.

Land Tenure Government

Physical Features The area occupies the almost imperceptible watershed separating the Zambezi and the inland drainages of the great Makgadikgadi salt pans in Botswana. It is the source of several rivers including the Matetsi, Gwai and Deka. Karoo basalt lithosols cover about 75%, which is well watered with perennial streams and rivers. The remaining area is overlain with Kalahari sands. On one side is a 30km stretch of the Zambezi River.

Vegetation Zambezian dry deciduous forest with *Baikiaea plurijuga* predominant on the deep sands. The basalts provide a complex of vegetative communities including mopane *Colophospermum mopane* woodland, scrub communities, and open grassland on the self-churning clays of the vleis.

Fauna The rich, diverse fauna includes large mammals similar to those found in Zambezi National Park such as: lion *Panthera leo*, leopard *Panthera pardus* (T), zebra *Equus burchelli*, buffalo *Syncerus caffer*, greater kudu *Tragelaphus strepsiceros*, bushbuck *Tragelaphus scriptus*,

impala *Aepyceros melampus*, waterbuck *Kobus ellipsiprymnus*, klipspringer *Oreotragus oreotragus*, reedbuck *Redunca redunca*, and warthog *Phacochoerus aethiopicus*. The area is renowned for sable antelope *Hippotragus niger*.

Conservation Management There is a policy document for the Victoria Falls and Matetsi complex.

Zoning The Safari Area is divided into seven concession areas offering high quality recreational hunting. It also contains a Development Area at Isidumuka and a Wildlife Resort (6ha).

Disturbances or Deficiencies Police and border posts at Kazangula and Pandamatenga on the Botswana border are served by roads running through the Safari Area. Recreational hunting under the control of the Parks Department is permitted.

Visitor Facilities Facilities include lodges and game viewing walks. Access is by road or rail and there is an airstrip.

Scientific Research The area is part of the Victoria Falls/Matetsi protected area complex for research and monitoring purposes. Research in Matetsi Safari Area is mainly directed towards the provision of sustainable and economically justifiable hunting.

Special Scientific Facilities Laboratories at Isidumuka at the Safari Area headquarters

Principal Reference Material Numerous departmental reports detailing the resource and plans for the development and management of the area and including population estimates.

Staff The warden based at Isidumuka, with two rangers and a complement of scouts and junior staff

Budget No information

Local Park or Reserve Administration PO Box 160, Victoria Falls.

Date 1983

SIBILOBILO SAFARI AREA

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.07.04 (Miomba Woodland/savanna)

Legal Protection Total. Recreational hunting is allowed, although permits are seldom given.

Date Established 1979

Geographical Location A system of islands in the central reaches of Lake Kariba in northern Zimbabwe on the border with Zambia. 16°50'S, 28°10'E.

Altitude 1,622m

Area 2,270ha (12 islands)

Land Tenure Government

Physical Features The area comprises the crests of a range of hills isolated by the formation of Lake Kariba.

Vegetation The islands lie within the Zambebian mopane woodland vegetation zone. Mixed deciduous trees include *Colophospermum mopane* and scrub.

Fauna The fauna varies from island to island, but mainly represents populations that were isolated by the formation of the lake including a substantial number of large mammals such as buffalo *Syncerus caffer*, impala *Aepyceros melampus*, sable antelope *Hippotragus niger*, zebra *Equus burchelli*, and greater kudu *Tragelaphus strepsiceros*.

Conservation Management It has been necessary to curb some populations which have exceeded the supporting capacity of the area. There is an area policy document.

Zoning None

Disturbances or Deficiencies Possible conflict with offshore commercial fishing near the islands

Visitor Facilities No information

Scientific Research Population numbers of large mammals have been periodically assessed and research on the behaviour of large mammals during the formation of Lake Kariba has been supplemented by an examination of the populations of mammals surviving on the islands. Shore erosion and development are monitored periodically.

Special Scientific Facilities None

Principal Reference Material Departmental reports and some relevant scientific papers dating back some 20 years.

Staff Administered by the warden and support staff at Bumi on the mainland, as there are no resident staff.

Budget No information

Local Park or Reserve Administration Administration is at Bumi.

Date 1983

TULI SAFARI AREA

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Total, but with recreational hunting by permit in most of the area excluding the three Botanical Reserves.

Date Established 1963

Geographical Location In the southwestern lowveld, Gwanda/Beitbridge districts, Matabeleland South Province, protruding into Botswana. 21°50'-22°7'S, 29°2'-29°16'E.

Altitude 695m

Area 41,600ha

Land Tenure Government

Physical Features Relatively flat basalt country gives way in the east to the eroded valley of the Shashi River. Annual rainfall is 300mm.

Vegetation The area lies within the Zambesian mopane woodland vegetation zone and is dominated by *Colophospermum mopane* with open to fairly dense scrub and small trees and a well-developed riparian fringe along the Shashi River. Species in the Botanical Reserves include: fuschia *Schotia brachypetala*, monkey thorn *Acacia galpinii* and Nyala tree *Xanthocercis zambesiaca*.

Fauna Mammals include: eland *Taurotragus oryx*, duiker *Cephalophus* sp., impala *Aepyceros melampus*, zebra *Equus burchelli*, grysbok *Raphicerus melanotis*, steenbok *Raphicerus campestris*, and wildebeeste *Connochaetes* sp.. Some species such as elephant *Loxodonta africana* (T) move in and out of the area.

Conservation Management There is a draft policy document, management and development plan.

Zoning The Safari Area contains three Botanical Reserves: Tolo River - 44ha, Poiner - 38ha and South Camp - 26ha. There are areas where hunting is prohibited.

Disturbances or Deficiencies Some poaching and cattle trespassing occurs. Available hunting is fully used each season, but other visitor use is not heavy due to the remoteness of the area. Sable antelope *Hippotragus niger* and roan antelope *H. equinus* have disappeared from the area within historical times, apparently as a result of habitat deterioration.

Visitor Facilities No information

Scientific Research No ecologist is resident, but monitoring of ecosystems, erosion control trials, and the setting of annual hunting quotas are undertaken by a visiting ecologist who has special responsibility for Tuli.

Special Scientific Facilities No information

Principal Reference Material Scientific papers and departmental reports which include hunting returns

Staff Senior ranger in charge and support staff

Budget No information

Local Park or Reserve Administration No information

Date 1983

LAKE KARIBA RECREATIONAL PARK

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Total, but angling and commercial fishing are permitted and encouraged.

Date Established 1979

Geographical Location On the north-west border with Zambia in Mashonaland, North/Matabeleland North Province. It excludes the waters contained in Matusadona National Park. 16°30'-18°00'S, 27°-29°05'E.

Altitude 482m

Area 283,000ha. Contiguous to Matusadona National Park (137,000ha)

Land Tenure No information

Physical Features Kariba is a man-made lake resulting from the damming of the Zambezi River at Kariba in 1958. The water covers 518,000ha of what was once the Gwembe trough. The lake has currents and sudden storms. The rivers Mlibizi, Zambezi, Sanyati, Ume, and Sebungwe still flow through it.

Vegetation 100,000ha of forest were cleared prior to flooding. Explosive growth of the exotic floating fern *Salvinia molesta* on the lakeshore acted as a stabiliser. The fern once covered 15% of the lake surface but has now declined to under 2%. Emergent vegetation is not particularly well developed, apart from extensive beds of torpedo grass *Panicum repens* which provide valuable grazing for fish when submerged, and for ungulates when exposed. The phytoplankton of the lake is currently under investigation.

Fauna Lake birds include egrets: *Egretta* spp., kingfishers (Alcedinidae), little bee-eater *Merops pusillus*, black-collared barbet *Lybius torquatus*, fish eagle *Haliaeetus vocifer*, and herons such as Goliath heron *Ardea goliath*. The lake is not particularly productive, but 42 fish species are known to exist including bream *Tilapia* sp., vundu *Heterobranchius longifilis*, Hunyani salmon *Labeo altivelis*, kipi *Distichodus mossambicus*, chessa *Distichodus schenga*, bottlenose *Mormyrus longirostris*, and cornish Jack *Mormyrops deliciosus*. Tigerfish *Hydrocynus vittatus* are a popular sporting species. The Tanganyika sardine *Limnothrissa miodon* has been introduced and is prospering in the vacant lacustrine habitat. The future survival of eels is uncertain. The lake is rich in crocodile *Crocodylus* sp..

Conservation Management There is a park policy document which promotes the development of a productive, sustained and efficient commercial fishery and the proper utilisation of other biological resources.

Zoning Particular activities may be precluded from certain areas of the lake; commercial fishing is prohibited in major river estuaries.

Disturbances or Deficiencies Minimal, but include poaching and danger from pollution of rivers flowing into the lake

Visitor Facilities The lake is a popular tourist destination served by the town of Kariba. Facilities include lodges, campsites, walking and canoe trails, watersports, boat hire, and various safaris.

Scientific Research Lake Kariba Fisheries Research Institute at Kariba provides a monitoring service and has undertaken extensive research into characteristics of the lake, biology and fishing gear. It is part of the Department of National Parks and Wild Life Management.

Special Scientific Facilities The University of Zimbabwe and the University of Witwatersrand jointly sponsor the Nuffield Research Institute, which is concerned with fundamental research on the lake.

Principal Reference Material There are many departmental reports, scientific papers, and theses covering the formation of the lake and its effects on terrestrial animals; physical characteristics of the habitats; the biology of important organisms including fish and clam species; and productivity.

Staff Warden and ranger with support staff at Kariba assisted by wardens at Matusadona, Bumi Hills and Binga and ranger and staff at Chete. The Kariba Institute has a staff of four ecologists, a senior technician, a technician, and support staff.

Budget No information

Local Park or Reserve Administration Warden at Kariba.

Date 1983

LAKE KYLE RECREATIONAL PARK

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Commercial fishing permitted

Date Established 1963

Geographical Location 32km south-east of Masvingo (formerly Fort Victoria) in Masvingo Province, eastern Zimbabwe. 20°15'S, 31°10'E.

Altitude 1,200m

Area 18,000ha including 9,105ha water

Land Tenure No information

Physical Features Lake Kyle is an artificial lake constructed to provide water for the vast irrigation schemes of the lowveld. It is located at the confluence of the Mshagashe and Mtilikwe Rivers. The park is bounded on three sides by tributaries of the Mtilikwe.

Vegetation The grassy plains are interrupted by densely wooded ravines.

Fauna Many mammals have been reintroduced including: white rhinoceros *Ceratotherium simum*, giraffe *Giraffa camelopardalis*, buffalo *Syncerus caffer*, gnu *Connochaetes gnou*, greater kudu *Tragelaphus strepsiceros*, nyala *Tragelaphus angasi*, bushbuck *Tragelaphus scriptus*, eland *Taurotragus oryx*, reedbuck *Redunca arundinum*, impala *Aepyceros melampus*, sable antelope *Hippotragus niger*, zebra *Equus burchelli*, oribi *Ourebia ourebi*, duiker *Cephalophus* sp., steenbuck *Raphicerus campestris*, hippopotamus *Hippopotamus amphibius*, warthog *Phacochoerus aethiopicus*, and Lichtenstein's hartebeest *Alcelaphus lichtensteini*. Birds include ostrich *Struthio camelus*. Crocodiles *Crocodylus* sp. are present. Fish include black bass *Micropterus salmoides*, bream *Tilapia* spp., yellowfish *Barbus marequensis*, and bottlenose *Mormyrus longirostris*.

Zoning The 7,600ha Game Park is on the northern lakeshore. A game fence restricts the movement of larger ungulates.

Disturbances or Deficiencies No information

Visitor Facilities There are many visitors because of high quality gameviewing. Facilities include caravan and campsites, four hotels on the lakeshore, pony trails, and water-sports. The lake is renowned for bass fishing.

Scientific Research Ungulate grazing research

Special Scientific Facilities No information

Principal Reference Material

- ° Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.
- ° Ross-McDonald, M. (1972). *World Wildlife Guide*. Viking, New York.

Staff No information

Budget No information

Local Park or Reserve Administration The Warden, Lake Kyle Recreational Park, P Bag 9136, Masvingo.

Date 1983

ROBERT MCILWAINE RECREATIONAL PARK

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.07.04 (Miombo Woodland/savanna)

Legal Protection Under the control of the Parks and Wild Life Department, but managed for recreation with fishing by licence

Date Established Originally established as Robert McIlwaine National Park

Geographical Location On the shores of Lake MacIlwaine about 30km south-west of Harare in Mashonaland South Province. 17°55'S, 30°50'E.

Altitude 1,300m

Area 55,000ha including 30,000ha water and contiguous with Lake Robertson Recreational Park (8,100ha)

Land Tenure Some areas on the north lakeshore are leased out, but remain under the control of the Parks and Wild Life Department. These may in future become freehold, while still remaining part of the park.

Physical Features The park is located on a 14.5km long lake created by a dam across the Hunyani River, where it flows through a ridge of ironstone hills which form the northern boundary. The lake supplies water to Harare. Fairly uniform topography with scattered

granite kopjes and dolerite dyke intrusions. Soils are generally sandy. Water temperatures range from 14 to 27°C and the lake stratifies in summer.

Vegetation The typical Mashonaland highveld has four main plant communities. The woodland area is dominated by *Brachystegia* with msasa and mnondo wooded communities associated with the granite kopjes and numerous termitaria. The remaining area is mainly vleigassland varying from generally dry to marshy. Heavy msasa scrub in the Game Park is affecting the grass cover. It is proposed to introduce a number of indigenous trees to the area, including *Acacia* species. Msasa veld is retained in its natural state in certain parts of the park and does not occur in other conservation areas in Zimbabwe. Dense algal blooms occur in the lake.

Fauna The Game Park contains: reedbuck *Redunca arundinum*, steenbuck *Raphicerus campestris*, duiker *Sylvicapra grimmia*, sable antelope *Hippotragus niger*, leopard *Panthera pardus* (T), olive baboon *Papio* sp. and other monkeys, buffalo *Syncerus caffer*, oribi *Ourebia ourebi*, and warthog *Phacochoerus aethiopicus*. Introduced mammals include: giraffe *Giraffa camelopardalis*, zebra *Equus burchelli*, greater kudu *Tragelaphus strepsiceros*, eland *Taurotragus oryx*, blue wildebeest *Connochaetes taurinus*, impala *Aepyceros melampus*, waterbuck *Kobus ellipsiprymnus* and tsessebe *Damaliscus lunatus*, some of which have become well established. Crocodile are present. The 250 bird species include: ostrich *Struthio camelus* in the scrub; fork-tailed drongo *Dicrurus adsimilis*, northern grey tit *Parus griseiventris*, spotted creeper *Salpornis spilonotus*, blue-eared glossy starling *Lamprotornis chalybaeus*, white-throated robin chat *Cossypha humeralis* and Mashona fly-catcher *Hyliota australis* in the Brachyshegia woodland; and darters *Anhinga rufa*, cormorant *Phalacrocorax* sp., herons, egrets and ducks on the lake. At least 23 fish species have been recorded in the lake including: bream *Tilapia* spp., yellowfish *Hydrocynus vittatus*, barbel *Clarias gariepinus*, tigerfish *Hydrocynus vittatus* and Hunyani salmon *Labeo altivelis*.

Cultural Heritage Many Bushman paintings have been found in the area.

Conservation Management There is a park policy document. There have been game introductions and programmes to control water hyacinth.

Zoning Most of the southern lakeshore is managed as a Game Park (1,600ha), though it is essentially an artificial park. A bird sanctuary is proposed on the northern lakeshore in an area containing a wide variety of natural and man-made habitats. The remainder of the north bank is set aside for visitor facilities.

Disturbances or Deficiencies Tourist pressure is very high and this has some deleterious effects on the natural value of the area. Control of water-hyacinth in the lake is necessary and there have been problems of water pollution. Fish poaching is common.

Visitor Facilities Lake Mcllwaine is Harare's premier recreation park and tourism is encouraged with game viewing, water-sport facilities, tennis and croquet lawns, swimming pools, chalets, lodges, and caravan and campsites. Good sport fishing for tigerfish, bream, yellowfish, barbel and Hunyani salmon. Bilharzia and crocodile discourage swimming.

Scientific Research An ornithologist is stationed permanently in the park studying, in particular, *Quelea* control, waterfowl and pesticide build-up in eggs of long-crested eagle *Lophaelus occipitalis*. The Zimbabwean Ornithological Society carries out ringing, feeding studies, and observations in the area. Fish research concentrates on production and management of sport fish stocks.

Special Scientific Facilities There are research stations in the park managed by the Parks and Wild Life Department with facilities including accommodation and laboratories. University field base for fish research.

Principal Reference Material None listed

Staff No information

Budget No information

Local Park or Reserve Administration The Warden, Lake Mchlwane, P Bag 962, Norton.

Date 1983

SEBAKWE RECREATIONAL PARK

Management Category VIII (Multiple Use Management Area)

Biogeographical Province 3.08.04 (South African Woodland/savanna)

Legal Protection Angling and commercial fishing permitted.

Date Established 1969

Geographical Location 54km east of Kwekwe in central Zimbabwe. 19°00'S, 30°10'E.

Altitude No information

Area 2,700ha including Great Dyke Reservoir 1,518ha.

Land Tenure No information

Physical Features Spectacular cliff scenery. The park includes the artificial Great Dyke Reservoir.

Vegetation Lies within the drier Zambezian Miombo woodland zone and is dominated by *Brachystegia* spp., and *Julbernardia globiflora*. Flora within the Botanical Reserves includes *Acacia karroo* and mountain acacia *Brachystegia glaucescens*.

Fauna The migratory game population includes sable antelope *Hippotragus niger*, impala *Aepyceros melampus*, and greater kudu *Tragelaphus strepsiceros*. Reservoir fish include tiger fish *Hydrocynus vittatus* and bream *Tilapia* spp..

Zoning No information

Disturbances or Deficiencies No information

Visitor Facilities Year-round coarse fishing on the dam is the main tourist attraction. Also yachting, and game-viewing on foot.

Scientific Research No information

Special Scientific Facilities No information

Principal Reference Material

° Readers Digest, (1983). *Game Parks and Nature Reserves of Southern Africa*. Cape Town, South Africa.

Staff No information

Budget No information

Local Park or Reserve Administration The Senior Ranger, PO Box 636, Kwekwe.

Date 1983

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