

Ecologically Sensitive Sites in Africa

Volume IV: West Africa

Ghana
Guinea-Bissau
Liberia
Nigeria
São Tomé e Príncipe
Sierra Leone

Compiled by the World Conservation Monitoring Centre

For



The World Bank

5460

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Volume IV: West Africa

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**World Conservation Monitoring Centre
Cambridge, UK**

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ECOLOGICALLY SENSITIVE SITES IN AFRICA

PREFACE

During the last two decades, there has been growing evidence that environmental degradation in its many forms constitutes a threat of growing significance to economic development. In addition, the rapid evolution of the environmental agenda has led to an increased understanding of the interdependence among economic activities and their environmental consequences, both within and between countries. The economic and physical interdependence between nations is illustrated by the emergence of new kinds of environmental problems, such as the deterioration of the ozone layer, the greenhouse effect, tropical deforestation, and the transboundary movement of hazardous wastes.

The Bank has been active in the field of environmental protection and, in the last decade, has financed numerous projects containing environmental components as well as several free standing environmental projects, which have had solely environmental objectives, such as reforestation, watershed management and pollution control. Through the introduction of new directives on environmental assessment, environmental action plans, forestry policy, the global environmental facility, resettlement, indigenous people and wildlands, the Bank has definitely distinguished itself as a leader in environmental protection.

Despite the above efforts, it became evidently clear that the Bank's response did not match the changing realities in the degree of effort devoted to environmental matters or in the approaches actually used. This combined with a few well publicised cases in which World Bank projects actually had some negative environmental consequences - such as contributing to the destruction of tropical rain forests and posing threats to wildlife populations, indigenous people, and established human settlements, prompted the Bank to rethink and adjust its policies toward environmental management. In its recent reorganisation, the Bank management decided to bring environmental concerns more systematically into the mainstream of its operation by establishing a Vice Presidency on Environmentally Sustainable Development.

This new action reiterates the Bank's commitment to bringing environmental issues into the mainstream of the lending operations and policy work. Partly influenced by global events such as the Rio Summit and from the Bank's own experience in environmental work, there continues to be a general consensus on five priority areas which will require the Bank's special attention and also the attention of its member countries. These include destruction of natural habitats; land degradation; degradation and depletion of fresh water resources; urban, industrial, and agricultural pollution; and degradation of the "global commons". Although these five areas have been addressed in the Bank's operations through various country focused environmental action plans, through coverage of environmental issues in country economic and sector work, and through actual lending operations, there has been expressed concern by task

managers on the availability of environmental information on which to base certain decisions.

This publication is made in response to requests from task managers in the Africa region who wanted to know the location and properties of the ecologically sensitive sites in Africa to which they could refer while implementing Bank projects in the region. This publication is also made to assist task managers to comply with the Bank's Operational Policy Note No. 11.02 on "Wildlands: Their Protection and Management in Economic Development". The publication has been compiled by the World Conservation Monitoring Centre, UK in collaboration with the Africa Environment Division of the Technical Department at the World Bank. It contains the most up-to-date available data and we hope it will find wider application beyond the Bank's operations.

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SECTION I

ECOLOGICALLY SENSITIVE SITES IN AFRICA

A summary of key issues

INTRODUCTION

The challenge facing nations today is no longer deciding whether conservation is a good idea, but rather how it can be implemented in the national interest and within the means available to each country. (WCED, 1987)

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it. (Principle 4, Rio Declaration on Environment and Development, UNCED 1992)

Environmental concerns are much in the news. Drought, poacher wars and civil strife are evident in many African countries, and a general feeling of malaise affects much of the continent. As a result, the natural and semi-natural ecosystems of Africa are having increasing stresses put upon them, and ecologically sensitive areas are being degraded through mismanagement, rather than conserved through effective management. This has serious implications for human well-being, as a wide range of benefits can result from investment in conserving ecologically sensitive areas. The value of such benefits will vary considerably from area to area and resource to resource, but most will fall into one or other of the following categories:

- ▶ Fixation of solar energy through photosynthesis, transfers energy through green plants into natural food chains, providing the support system for species which are harvested
- ▶ Maintenance of evolutionary processes and genetic variability
- ▶ Maintenance of water cycles, including recharging groundwater, protecting watersheds, and buffering extreme water conditions (such as flood and drought)
- ▶ Regulation of climate, at both macro- and micro-climatic levels (including influences on temperature, precipitation, and air turbulence)
- ▶ Production of soil and protection of soil from erosion, including protecting coastlines from erosion by the sea

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- ▶ Storage, cycling and buffering of essential nutrients, including carbon, nitrogen, and oxygen
- ▶ Absorption and breakdown of pollutants, including the decomposition of organic wastes, pesticides, and air and water pollutants
- ▶ Provision of direct support to local communities through sustainable resource use
- ▶ Provision of recreational-aesthetic, socio-cultural, scientific, educational, spiritual, and historical values

Because the benefits of conservation are so important to society, the rate of natural habitat loss (see Table 1) and threats to species in Africa (see Table 2) is a source of great concern throughout the world.

Many development plans fail to recognize that retention of natural systems may constitute the optimal use of certain areas, in economic as well as ecological terms. Instead of conserving the rich resources of forest, wetland, and sea and managing them on a sustainable basis, current processes of development are depleting many biological resources at such a rate that they are rendered essentially non-renewable, thereby potentially reducing the benefits to society in the longer term. Experience has shown that market forces alone will often lead to such over-exploitation, largely because many of the costs are external and simply ignored.

Since biological resources will be inadequately conserved by market forces alone, given current means of assessing costs and benefits, effective government intervention is required to meet the conservation needs of society. Environmental management measures available to governments for promoting conservation include:

- ▶ establishing national parks and other types of protected area
- ▶ promoting citizen awareness and action through public education and supporting non-governmental conservation organizations
- ▶ modifying resource exploitation through legal or administrative means
- ▶ implementing international conservation conventions, particularly the *Convention on Biological Diversity*
- ▶ establishing government departments or ministries responsible for environmental matters
- ▶ implementing special action to conserve threatened species and habitats

Table 1 Original extent of closed canopy moist forest in four regions of Africa, compared with remaining extent as judged from maps and FAO (1988) statistics for 1980.

	Approximate original extent of closed tropical moist forests (sq.km)	Remaining extent of moist forests (sq.km)		Percentage of moist forest remaining	
		From atlas maps* (moist forests)	FAO (1988) data for 1980 (closed broadleaved forest)	From map data	From FAO (1988) data
Occidental and Central Africa	1,777,400	488,973	715,040	28	40
Eastern Africa	658,300	--	77,500	--	12
South Central Africa and Indian Ocean	2,301,936	1,234,419	1,189,890	54	52
West Africa	770,760	101,063	111,300	13	14

* Table adapted from table 10.1 in J.A.Sayer, C.S.Harcourt and N.M.Collins (Eds.) 1992. *The Conservation Atlas of Tropical Forests: Africa*. Macmillan, Basingstoke, Hants, UK. 288pp.

Table 2 Numbers, by country, of endemic and threatened mammals and birds

	Known species	Endemic species	Threatened species	Threatened endemics
Angola	1,148	16	26	4
Benin	818	0	12	0
Botswana	723	0	15	0
Burkina Faso	644	1	11	0
Burundi	740	0	9	0
Cameroon	1,145	21	44	8
CAR	877	2	14	0
Chad	630	0	22	0
Congo	700	1	15	0
Cote d'Ivoire	913	2	27	1
Djibouti	?	0	9	1
Equatorial Guinea	576	4	18	1
Ethiopia	1,091	52	39	16
Gabon	807	3	21	4
Gambia	597	0	8	0
Ghana	943	1	21	0
Guinea	719	1	23	0
Guinea-Bissau	484	0	7	0
Kenya	1,376	17	35	7
Lesotho	321	0	9	0
Liberia	783	3	28	1
Libya	156	4	21	0
Madagascar	355	164	81	78
Malawi	825	0	17	0
Mali	784	0	20	0
Mauritania	110	1	19	0
Mozambique	845	2	21	0
Niger	604	0	16	0
Nigeria	1,105	4	35	3
Rwanda	820	0	18	0
Senegal	780	1	16	0
Sierra Leone	761	0	20	0
Somalia	810	19	24	6
Sudan	1,205	7	25	1
Swaziland	428	0	5	0
Tanzania	1,322	25	56	19
Togo	826	1	10	0
Tunisia	251	1	20	0
Uganda	1,304	7	28	3
Zaire	1,501	48	58	19
Zambia	961	3	20	3
Zimbabwe	831	2	15	0

Data from: World Conservation Monitoring Centre 1992. *Global Biodiversity Status of the Earth's Living Resources*. Chapman and Hall. 594pp.

- ▶ building information gathering and monitoring capabilities as the basis for improved resource planning
- ▶ establishing special training programs for government officials
- ▶ promoting integrated rural development schemes which incorporate conservation
- ▶ developing *ex situ* facilities for preserving threatened genetic resources, in support of *in situ* conservation programs

However, conservation actions have been underway in Africa many years, yet natural habitats are still being lost at a rapid rate. Experience has taught the hard lesson that traditional protected areas will be unable to conserve most biological resources by themselves. Additional approaches to conservation are required to more effectively integrate protected areas within the broader processes of land-use planning, and to bring about policy shifts in a wide variety of sectors which have impacts on ecologically sensitive areas.

This has been the message of a number of reports and meetings in recent years, and is clearly stated within the articles of the *Convention on Biological Diversity*.

Article 8 of the *Convention* deals specifically with *in situ* conservation. It calls on contracting parties to:

- ▶ establish a system of protected areas where special measures are needed to conserve biodiversity
- ▶ develop guidelines for the selection, establishment and management of such areas
- ▶ manage biodiversity both within protected areas and in the wider landscape
- ▶ promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species
- ▶ promote environmentally sound and sustainable development in areas adjacent to protected areas
- ▶ restore degraded ecosystems and promote the recovery of threatened species
- ▶ control or eradicate alien species that threaten indigenous biodiversity
- ▶ respect and maintain the knowledge and practices of indigenous and local communities, including the equitable sharing of benefits arising from the utilization of such knowledge and practices

- ▶ develop appropriate environmental legislation

These measures are all highly pertinent to the identification and conservation of ecologically sensitive areas, and one of the top priorities in promoting sustainable development must be to encourage countries to ratify the convention. The first step in implementation is to undertake a comprehensive national assessment of the status of, and threats to, the country's biodiversity, its utilization and management, the economic benefits it provides and the costs of its effective management. This process includes the identification of ecologically sensitive areas, both within and outside existing protected area systems. The management of these areas to maintain their ecological integrity, and thus to maximise their potential economic benefits, is then prescribed in the national biodiversity strategies and action plans countries are called upon to produce under Article 6 of the Convention.

Particularly important therefore is the development of management programs using a broad systems approach based on an increasingly sophisticated ecological understanding of ecosystem productivity, processes, and dynamics. Integrated rural development can draw on national conservation strategies, river basin development strategies, environmental impact assessment, Geographic Information Systems and other technologies to promote environmentally sound management of large ecosystems containing both natural and transformed habitats. While such programs can make important contributions to conservation of biodiversity, they also contribute indirectly through stabilizing resource use in areas which are not biologically diverse. These activities focus upon maintaining, or restoring, natural ecosystems so that the ecological and hydrological processes which they support are maintained, and the benefits which they provide to human society are made available on a sustainable basis.

By managing these ecosystems sustainably and stabilizing land-use, the root cause of many human population movements can be addressed, with biological diversity being a beneficiary. For example, in many parts of Africa, forests are being lost because of slash and burn agriculture. In most areas, the expansion of this agricultural practice is a consequence of non-sustainable resource use and declining agricultural productivity in other ecosystems which the rural poor have been forced to abandon. By focusing attention on restoring formerly productive agro-ecosystems, and by maintaining the ecological and hydrological processes which maintain the productivity of these systems, agricultural pressure on the marginal lands can be reduced and they can be allocated to activities which are more conducive to the conservation of biological diversity.

It is apparent that mechanisms need to be developed for identifying ecologically sensitive areas in a systematic manner and establishing minimum quality criteria for managing such areas. To enhance its contribution to sustainable development, the World Bank requires guidelines for rapid identification of ecologically sensitive areas, and needs to develop means of promoting special measures that could be incorporated

in project planning and implementation to maintain the ecological integrity of such areas. The aim of this report is to assist in this process.

However, no simple recipe exists for determining how resources should be used. Ecological, social, political, economic, and technological factors all enter into the decision. Each of these factors can change over time, and because the factors are inter-related, a change in one can affect all the others. Therefore, while this discussion will concentrate on ecological factors, it will consider the others as well. In the final analysis, guidelines need to be applied by people exercising their best judgement given the current state of knowledge. The dynamic state of development in the Africa region is likely to continue, and building the capacity to adapt to constant change will require concerted action.

This section of the report is based on material drafted by Jeffrey A. McNeely, Chief Conservation Officer at IUCN - The World Conservation Union. The section was originally drafted in December 1991, and then revised in early 1993 by Robin Pellew and Jeremy Harrison of the World Conservation Monitoring Centre to take account of subsequent developments.

WHAT IS AN ECOLOGICALLY SENSITIVE AREA?

1. Introduction

- 1.1 While many natural habitats are being converted into uses -- such as agriculture, aquaculture, or forestry -- which yield greater productivity to humans (at least in the short term), the natural value of some areas is so significant that they need to be converted with great care, or even left in their natural state. Areas of significant value in their natural state can be termed *Ecologically Sensitive Areas* (ESAs) (see Box 1). They may contain unique features, maintain key natural processes, support rare plants or animals and their habitats, or provide important breeding areas for wildlife. Some ESAs are natural, while others have been significantly altered by certain human activities. In terms of management, some ESAs will prosper through "benign neglect" while others will require intensive management to restore or maintain their natural values.

Box 1: Ecologically Sensitive Areas

Criteria for ecologically sensitive areas would include:

- provide protection of steep slopes, especially in watershed areas, against erosion
- support important natural vegetation on soils of inherently low productivity that would yield little of value to human communities if transformed
- regulate and purify water flow
- provide conditions essential for the perpetuation of species of medicinal and genetic conservation value
- maintain conditions vital for the perpetuation of species that enhance the attractiveness of the landscape or the viability of protected areas
- provide critical habitat that threatened species use for breeding, feeding or staging

Source: McNeely *et al.* 1990

- 1.2 In order to ensure effective management of ecologically sensitive areas, and to avoid inappropriate conversion, it is essential that criteria are developed which can be used to guide decisions on whether an area can be converted freely to alternative uses, can be converted to only certain uses (such as forest production), or should not be converted at all.

Ecologically Sensitive Sites in Africa

- 1.3 A useful scale for seeking an answer is the ecosystem, a community of organisms interacting with the local living and non-living elements of the environment and forming a system in which life-sustaining processes are maintained. The ecosystem involves the accumulation, circulation, and transformation of matter and energy through such biological processes as photosynthesis and decomposition. The processes often work through the means of water, which provides a means of transfer and storage of energy and materials used by living organisms within the ecosystem.
- 1.4 The boundaries of an ecosystem are often identified by changes in vegetation, soil, or landscape form. The scale of the ecosystem depends on the purpose of analysis; a small mountain pond is an ecosystem, and so is the mountain on which it is located. Almost all ecosystems are connected with others of various scales. Protected areas with artificial boundaries may be whole or partial ecosystems, depending on the size of the area and the form of the boundary; a protected area surrounded by forest is a much different ecosystem to a similar one surrounded by agricultural land.
- 1.5 Some ecosystems are relatively robust and resist permanent damage, while others are very sensitive to disturbance and may require long periods to recover from disruption. Grasslands naturally subject to periodic fires, are robust, while mature tropical rain forests may be easily disturbed and require decades or even centuries to recover. Particularly sensitive ecosystems include those which lie on geologically unstable substrata, such as steep slopes subject to landslides, and those which are dependent on influences from outside the system, such as estuaries and deltas. Ecosystems need to be classified according to their sensitivity to certain kinds of treatment by people, and the most useful indicators of sensitivity need to be identified.
- 1.6 People have shown the capacity to convert almost any piece of natural habitat into agricultural land which can produce a crop for at least a few growing seasons. But areas which are inappropriate to such use quickly degrade into wastelands, such as the great expanses of *Imperata* grasslands found in much of tropical Asia; worse, inappropriate conversions of watersheds, such as through illegal logging, can contribute to very high human costs downstream through floods, erosion, siltation, and other external factors.
- 1.7 Logically, an objective survey of all remaining natural habitats should first be conducted to ascertain which have the highest value in their present state, and the least value if transformed. In practical terms, and as a working rule of thumb where complete information is not yet available, it may be best to accept the rationale behind the process of selection of protected areas already followed. This would mean that first priority ESAs should include areas which are already given legal protection (though recognizing that not all areas given legal protection really qualify as an ESA); second priority ESAs should include all

areas which have been proposed for protection; and third priority ESAs should be all other areas where natural habitat remains.

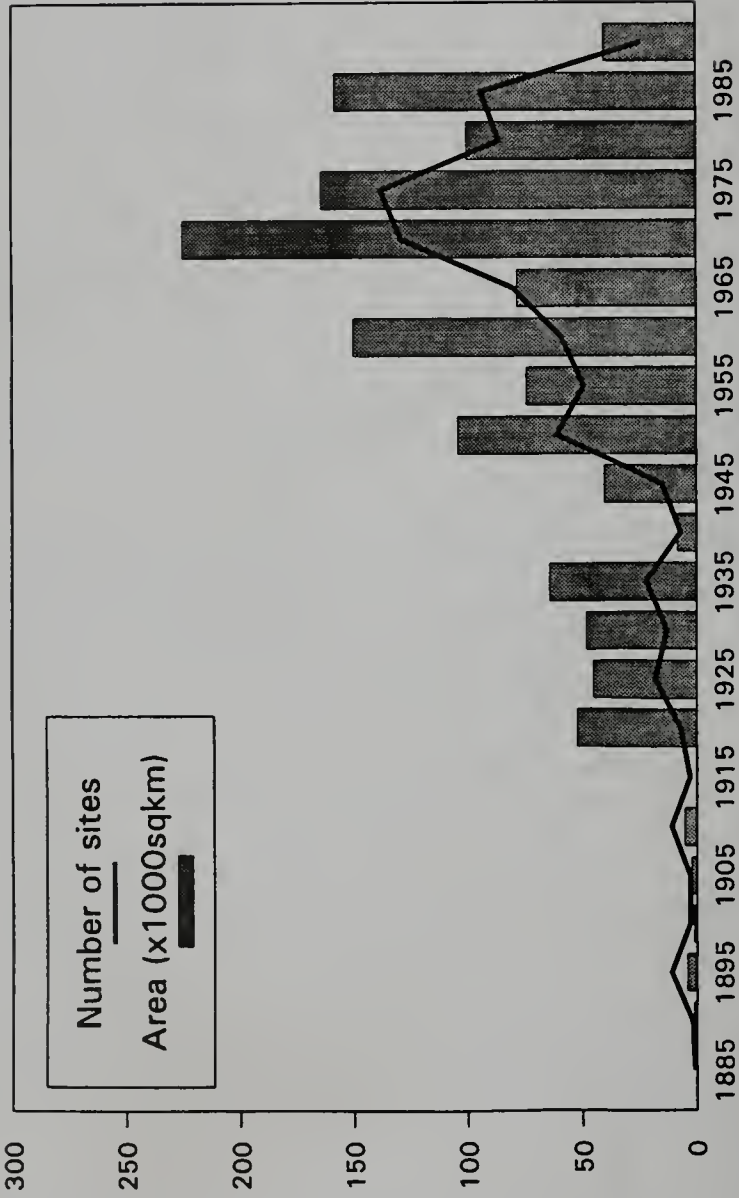
2. Legally protected areas

- 2.1 Areas which have been given legal protection preventing conversion to other uses should be among those not considered for alteration or conversion; their contribution to development is through maintaining their relatively natural state. In fact, the World Bank's policy on wildlands (World Bank, 1986) expressly prohibits the use of IBRD funds to convert legally protected areas to any other uses except under the most stringent and exceptional conditions.

As development has accelerated in the past few decades, the governments in the region have recognized the importance of legally protected areas as part of the overall pattern of land use, though of course the effectiveness of such legal regimes varies widely. Many of these areas have been established in the past 30 years (see Fig. 1), and over that period administration and management of protected area systems has also changed in many countries. WCMC (1992) summarises how each of the national protected area systems is set up in Sub-Saharan Africa, and Lusigi (1992) discusses many of the challenges and issues facing protected areas management in Africa.

- 2.2 However, it would be a mistake to consider that once an area is legally established, then all threats have been removed. In fact, virtually all protected areas in the Africa have an uneasy relationship with the people living around them. The reasons for this are apparent: the local people pay most of the costs of conservation by not being able to harvest resources as they might wish, while the bulk of the benefits go to the nation at large or even to the international community. Governments need to seek additional means of redressing this imbalance, by ensuring that the costs of conservation are shared more widely, and that more of the benefits are delivered to the local communities.
- 2.3 Protected areas within the wildlife sector are often augmented by a range of designated areas established and managed by other sectors (such as forestry or fisheries) with management objectives which support a nature conservation function. The World Conservation Monitoring Centre (WCMC) has carried out research on areas within the forest sector, and is working on a series of reports which will show the extensive nature of their contribution in some countries. Review of the conservation value of some of these areas on the ground may be a valuable next step (the development community is currently funding such a study in Sri Lanka).
- 2.4 In addition to being protected under national legislation, some areas are given further protection under international legislation, notably the *Convention on Wetlands of International Importance* (Ramsar, 1971) and the *Convention*

Fig. 1 Increase in area and number of protected sites in Sub-Saharan Africa 1885-1990



Five year period commencing....

Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972). The list of areas given such protection expands each year as the States Party add areas to the list. Areas currently given such protection are identified and described in later sections.

- 2.5 While not a convention, the Biosphere Reserve programme of Unesco also has considerable relevance to the region. As part of UNESCO's Man and the Biosphere Programme (MAB), a biosphere reserve is established to conserve representative natural areas throughout the world, and to use these areas to further understanding of the interaction between man and nature. Biosphere reserves ideally take an existing protected area as the core, then incorporating land around the core with varying degrees of human intervention are permitted. Biosphere reserves in Africa are also listed in later sections.
3. **Other critical habitats**
 - 3.1 While many countries in Africa have an impressive record on establishing protected areas, there are many gaps in coverage, with many ESAs of high priority for conservation yet to receive any effective management. The regional systems review carried out by IUCN (IUCN/UNEP, 1986) identifies a number of important sites, as does the action plan for protected areas in Africa (IUCN, 1987) and in the African Biodiversity Review prepared by IUCN (Stuart and Adams, 1990). Many of these unprotected ESAs may in fact deserve higher attention than the existing protected areas, because they are more liable to alteration to inappropriate uses, and a number are identified in the body of this report.
 - 3.2 Even if they are not yet protected, habitats can also be considered ecologically sensitive areas if they meet the criteria identified in Box 3. The identification of such ESAs outside of existing protected areas ideally requires considerable research and information, but the pace of development is such that it will inevitably prove necessary to take some relatively arbitrary decisions on the limited information available. In making such decisions, use should be made of all available information, including both national and international reviews.
 - 3.3 Threatened species are of particular concern to both governments and the general public. Many such species are protected under national legislation, and in addition many African countries are members of international conventions which provide protection to threatened species. It is widely accepted that the best way to conserve species is through protecting their habitats while simultaneously controlling exploitation. Critical habitats of threatened species are particularly important ESAs.
 - 3.4 Potential ESAs can also be identified from digitized data on the distribution of key species using a Geographic Information System (GIS). By overlaying such

distribution data onto habitat maps, sites of particular species richness can be identified. These should then be priority areas for ground surveys. The application of information technology in this way enables proactive conservation planning to maintain the ecological integrity of such areas before they are disturbed by unsustainable management practices.

3.5 Information on the status and distribution of both habitats and species is central to the study of biodiversity conservation within a country, and a key part of both protected area systems reviews and the development of the national biodiversity strategies necessary for implementation of the *Convention on Biological Diversity*. Information is often widely distributed, and effort is required to bring the information together, and to develop research and monitoring programs to support biodiversity conservation. A range of international organizations, including UNEP and WCMC are in a position to support such activities.

4. Areas to be rehabilitated

4.1 Many ESAs have already been over-exploited, with resulting degradation. These areas need to be rehabilitated so that they can once again make important contributions to sustainable development. Since tropical forests often grow on soils which are poor in cations or suffer from other deficiencies, attempts at agriculture are often followed rather quickly by abandoned fields and degraded vegetation. As a result, large areas of Africa are covered by devastated landscapes which are productive only for grazing at a very low stocking density. With proper economic incentives, such areas can be made productive again, either for agriculture, forestry, or conservation of biological diversity.

4.2 It may be more expensive in the short run to reconstitute damaged ecosystems than to conserve new lands (and is certainly more expensive to reconstitute damaged ecosystems than it is to exploit new ones), but it will often be as economically efficient in the long run to rebuild degraded local ecosystems rather than to exploit (and degrade, requiring rebuilding) other more remote land, which may itself be sensitive to degradation.

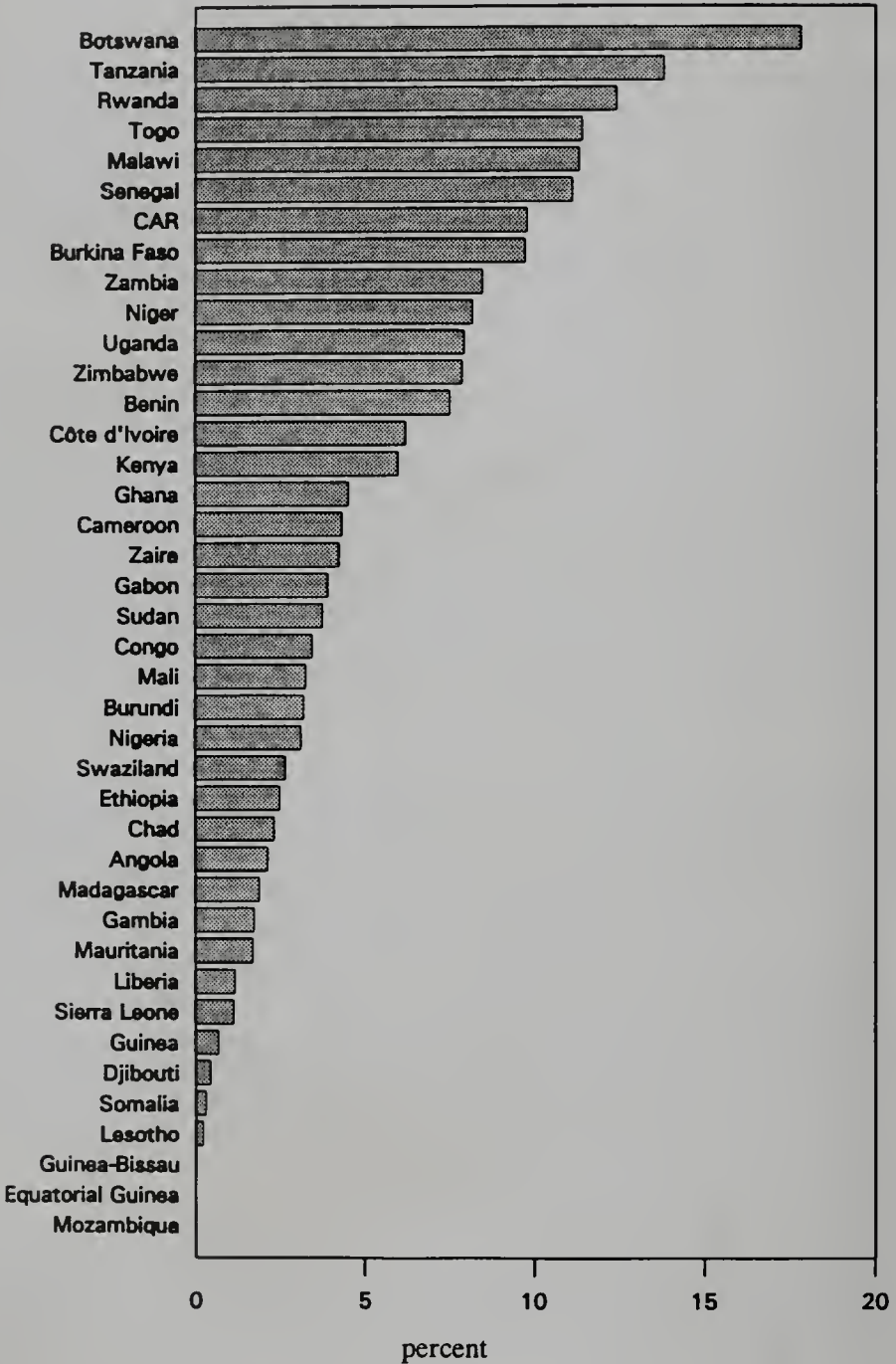
4.3 Given the right circumstances it is also possible to develop ecologically sensitive areas from lands which previously had no particular value, through careful development of new habitats. This may have economic as well as ecological benefits.

CONCEPTUAL FRAMEWORK FOR DESIGNATION AND CLASSIFICATION OF ENVIRONMENTALLY SENSITIVE AREAS

1. Introduction

- 1.1 Conservation of biological resources has become an important item on every country's development agenda. Conservation in the modern sense is part of development. As defined by the *World Conservation Strategy*, it means: "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. Thus conservation is positive, embracing preservation, maintenance, sustainable utilization, restoration, and enhancement of the natural environment" (IUCN, 1980).
- 1.2 Conservation of biological resources is not a new idea. Farmers have always had the sense to avoid eating the seeds for growing next year's crop, to select the seeds which have the most favourable characteristics, and to plant a wide variety of crops. Herders don't slaughter their breeding stock, and they select the individuals for breeding which are the easiest to manage, have the most meat, or display other desirable traits. For most of human history, the natural world has been protected from the most disruptive human influences by cultural/ecological factors such as taboos preventing over-exploitation, tribal warfare which kept wide areas as wilderness "buffer zones" between groups, land ownership by ancestors or lineages rather than individuals, relatively sparse human populations, and so on.
- 1.3 But during the last few generations, economic growth based on the conversion of fossil fuels has spurred such rapid expansion of human numbers that new approaches to conservation are required. One such approach has been the establishment within the past 100 years of explicit government policies aimed at ensuring that wild living resources are conserved, usually through the designation of particular ecologically sensitive areas as national parks or other sorts of protected areas. Today, all but a small handful of countries have national parks and national legislation promoting conservation (see Fig. 2). Most governments have established wildlife management agencies, joined international conservation conventions, and built environmental considerations into the national education system. Non-governmental organizations are active throughout the region in promoting public awareness of conservation issues, including those dealing with biological diversity.
- 1.4 The conservation movement has been led by naturalists. While their contributions have been fundamental, they are unable to address fully the basic problems of conservation because the limiting factors are not biological, but rather political, economic, and social. The decisions affecting the natural

**Fig.2 Percentage of each country within protected area system
(source: WCMC)**



environment are influenced by pressures and incentives that go far beyond the relatively straight-forward technical considerations of what might in theory be best for the ecologically sensitive areas, and consider in addition questions of social equity, political possibility, and technical feasibility.

- 1.5 Advice on delivering conservation action needs to be sought from development practitioners, engineers, politicians, rural sociologists, agronomists, and economists. In the last analysis, local resource users are the ones who make local-level decisions, and their decisions are affected above all by enlightened self-interest. Those seeking to conserve ESAs need to be able to identify legitimate self-interests of rural people, and design ways of ensuring that the interests of ESAs and community self-interest coincide. Development aid agencies, including the Bank, therefore have an important role to play.
- 1.6 It has become apparent that a sectoral approach to managing ESAs is unlikely to be successful, even in the short run. While government institutions responsible for wildlife and protected areas need strengthening, even the most successful conservation programs will fail unless they are supported by appropriate developments in other sectors. Progress in sustainable approaches to forestry, agriculture, rural development, international trade, energy, population, national security, and other areas are so essential to the success of efforts to conserve ESAs that they deserve as much attention as the traditional conservation-related sectors.
- 1.7 The need for a broad based multi-sectoral approach to conservation is clearly identified in both the *Global Biodiversity Strategy* (IUCN/UNEP/WRI, 1992) and the *Convention on Biological Diversity*. Under the convention, countries will be required to prepare national biodiversity strategies and action plans, and to report on their implementation. These plans will need to focus on biodiversity outside the confines of protected areas, and address the fundamental requirements of reconciling the pressures of human development with conservation of ESAs in the wider landscape.

2. Criteria for designating and managing Environmentally Sensitive Areas

- 2.1 In planning a system to protect ESAs for supporting national development goals, criteria for selection and management are essential. Criteria will enable a relatively systematic comparison of different sites; help communicate to decision-makers why certain areas or policy initiatives are important; help focus research on the most important questions; promote the drawing of boundaries for the ESA by specifying the features which need special management; and facilitate public information programs.
- 2.2 In seeking to identify which sorts of protective regimes are most appropriate for each major ESA (including, but not limited to, designation as a protected area),

local social, political, and economic factors need to be considered along with the ecological ones. The following set of criteria are presented in rough descending order of importance, though modifications will be required for adapting to each particular situation. Each criterion is presented as an ideal against which each site can be considered. No site can be expected to meet the ideal, but the criteria can provide a basis for comparing sites against each other. In some cases, it may be appropriate for planning purposes to assign numerical scores to the various criteria, with relatively higher scores being assigned to the first four criteria.

a) Criteria which determine the importance of the site to human society

Economic benefit. The site provides obvious long-term economic benefits, such as watershed protection or tourism (even though their initial establishment might involve short-term economic disruptions).

Diversity. The site has a great variety of species and ecosystems, and is sufficiently large to contain viable populations of most species; it contains a variety of geomorphological features, soils, water regimes, and microhabitats.

Critical habitat, international. The site is essential to the survival of one or more threatened species which occurs in no other country, contains the only example of certain types of ecosystems, or contains landscapes of outstanding universal value.

Critical habitat, national. The site is essential to the survival of one or more species which are threatened nationally or internationally, or contains the nation's only example of certain types of ecosystems. The ecological functioning of the area is vital to the healthy maintenance of a natural system beyond its boundaries (such as habitat for migratory species, an important catchment area for lowland irrigation systems, protection of the coast against typhoons, etc.).

Cultural diversity. The site supports populations of indigenous people who have developed mechanisms for living in a sustainable balance with the natural ecosystems, and whose continued presence in the ESA would help ensure that the diversity of the area is maintained.

Urgency. Action is required quickly at the site in order to avert an immediate threat (though it should be realized that this is often a "damage control" action; it is usually best to protect far in advance of threat).

b) Criteria to determine additional elements which enhance the value of the site

Demonstration. The site demonstrates the benefits, values, or methods of protection, and can show how to resolve conflicts between natural resource values and human activities.

Representativeness. The site is representative of a habitat type, ecological process, biological community, physiographic feature, or other natural characteristic.

Tourism. The site lends itself to forms of tourism compatible with the aims of conservation; this criterion is often related to those of economic benefit and social acceptance.

Landscape. The site has features of outstanding natural beauty; these are usually also unique, easily destroyed, and attractive to tourists and any alteration would significantly reduce the area's amenity value.

Recreation. The site provides local communities with opportunities to use, enjoy, and learn about their natural environment.

Inventory and Monitoring. The site can serve as a non-manipulated area against which to measure changes occurring elsewhere; it can form the basis for assessing any ecological change. It can also serve as the site for detailed inventory of biodiversity to provide a baseline for long-term monitoring. Research has been carried out over a long period in the site, and major field studies have been carried out to provide a strong foundation on which new research can build. The site represents ecological characteristics of regional value so research can yield arguments that can have impacts far beyond the protected area.

Awareness. Education and training within the site can contribute knowledge and appreciation of regional values. The site can serve to exemplify techniques or scientific methods, making it particularly important for education purposes.

c) Criteria to help determine the management feasibility of a site

Social acceptance. The site is already protected by local people; or official protection by the government (particularly against outside exploitation) would be welcomed.

Opportunism. Existing conditions or actions at the site lend themselves to further action (such as the extension of an existing protected area or establishment of a buffer zone around an existing park).

Availability. The site can be acquired easily, through inter-departmental

transfer, easements, or other legal forms of control.

Convenience. The site is accessible to researchers or students for scientific and educational uses.

3. An expanded approach to protecting ecologically sensitive areas

- 3.1 The best-known method of managing ESAs is through national parks, but many other types of reserves can also make contributions to both conservation and development, providing a range of management "tools" (Box 2). Ten years ago, the leading professionals in the field of national parks management, meeting in Bali, Indonesia, asserted that while national parks must be as carefully protected as ever, they must be supplemented by a range of other categories of protected areas in order to fully meet the social and economic development needs of modern society.
- 3.2 In the Bali Declaration (in McNeely and Miller, 1984), these authorities pointed out that protected areas are an indispensable element of conservation because they maintain those essential ecological processes that depend on natural ecosystems; they preserve the diversity of species and the generic variation within them, thereby preventing irreversible damage to our natural heritage; they maintain the productive capacities of ecosystems and safeguard habitats critical for the sustainable use of species; they provide opportunities for scientific research, education, training, recreation, and tourism; and they provide opportunities for the sustainable use of their natural resources for the benefit of local communities.
- 3.3 Since 1970, the world's networks of protected areas have expanded in extent by more than 80 per cent, around two-thirds of which are in the Third World (IUCN, 1990). The IUCN review of the protected areas of Africa suggested that the total expanse of protected areas in Africa needs to be increased at least three times, if the protected areas are to be effective in delivering nature's benefits to people. But given the pressures on the land today, these additional protected areas will need to be of a new type, far more flexible in their management than the traditional national parks. They may in fact merit a new term such as "Sustainably Managed Areas", or "Managed Resource Protected Areas".
- 3.4 New approaches to linking protected areas to surrounding lands are required if the appropriate benefits are to flow to society. While the specifics will vary from case to case, the major generalization is that local support for protected areas must be increased through such measures as education, revenue sharing, participation in decisions, complementary development schemes adjacent to the protected area, and, where compatible with the protected area's objectives, access to resources. In short, economic incentives should be used to encourage people to behave according to their own enlightened interest, and sound

Box 2: Categories and management objectives of protected areas

While all protected areas control human occupancy or use of resources to some extent, there is wide variation in the degree of such control. Different protected areas are established for different purposes, and therefore have different management objectives. The following categories, which were first defined by IUCN in 1978, are currently under review. As a result of this review, it is likely that categories VI-VIII will be removed, and replaced with a new category VI - "Sustainably Managed Area" or "Managed Resource Protected Area".

- I Scientific reserve/strict nature reserve. To protect nature and maintain natural processes in an undisturbed state in order to have ecologically representative examples of the natural environment available for scientific study, environmental monitoring and education, and for the maintenance of genetic resources in a dynamic and evolutionary state.
- II National park. To protect relatively large natural and scenic areas of national or international significance for scientific, educational, and recreational use, under management by the highest competent authority of a nation.
- III Natural monument/natural landmark. To protect and preserve nationally significant natural features because of their special interest or unique characteristics.
- IV Managed nature reserve/wildlife sanctuary. To ensure the natural conditions necessary to protect nationally significant species, groups of species, biotic communities, or physical features of the environment when these require specific human manipulation for their perpetuation.
- V Protected landscapes. To maintain nationally significant natural landscapes characteristic of the harmonious interaction of man and land while providing opportunities for public enjoyment through recreation and tourism within the normal life-style and economic activity of these areas.
- VI Resource reserve. To protect the natural resources of the area for future use and prevent or contain development activities that could affect the resource pending the establishment of objectives based on appropriate knowledge and planning.
- VII Natural biotic area/anthropological reserve. To allow the way of life of societies living in harmony with the environment to continue undisturbed by modern technology.
- VIII Multiple-use management area/managed resource area. To provide for the sustained production of water, timber, wildlife, pasture, and outdoor recreation, with the conservation of nature primarily oriented to the support of the economic activities (although specific zones can also be designed within these areas to achieve specific conservation objectives).

Adapted from: IUCN (1990)

government policies should be designed to ensure that conservation is indeed in their self-interest. Such approaches were extensively discussed at the IV World Congress on National Parks and Protected Areas, held in Caracas, Venezuela,

in 1992, and the Caracas Action Plan (IUCN, 1992) calls for new and innovative programs of integrated planning and cooperative management.

- 3.5 Another theme of the World Parks Congress held in Caracas, 1992, was the contribution made by other sectors. Strictly protected areas are unlikely to ever cover more than about five percent of Africa. Since permanent agriculture seldom covers more than a quarter of a nation's land area, ample land exists for forestry, shifting cultivation, grazing, and other uses which may, with proper management, contribute to conservation of biological diversity.
- 3.6 By themselves protected areas will never be able to conserve all, or even most, of the species, genetic resources, and ecological processes they were established to protect; these areas are just too small to support viable populations of wildlife if the areas are isolated from the surrounding lands. Far greater expanses are required for conservation than modern societies can afford to remove from direct production. The best answer to this dilemma is to select and manage protected areas to support the overall fabric of social and economic development, not as islands of anti-development, but rather as critical elements of regionally envisioned harmonious landscapes. Through a planned mix of national parks and other categories of ESAs, amidst productive forests, agriculture, and grazing, conservation can serve human communities and safeguard the well-being of future generations of people living in balance with their local ecosystems.
- 3.7 Improvements in conservation over the coming decades will be of three main types:
- ▶ the establishment and improved management of categories of protected areas where some kinds of human use are tolerated or even encouraged
 - ▶ the establishment of new types of protected areas in degraded landscapes which have been restored to productive use for conservation
 - ▶ management regimes in non-protected areas which bring sustainable benefits from harvesting biological resources to local communities

and will be founded on a rapidly improving information base to support management decisions.

DEVELOPING GUIDELINES ON THE RELATIONSHIP BETWEEN VARIOUS TYPES OF BANK PROJECTS AND ECOLOGICALLY SENSITIVE AREAS

While many development projects have led to the abuse of ESAs, in fact a positive relationship between development projects and ESAs would be of benefit to both the project and the ESA. A series of guidelines can be developed for each major type of development project which would illustrate how the project can contribute to the viability of the ESA. The following examples indicate the sorts of guidelines which might be appropriate.

1. Water resources development projects

- 1.1 Natural vegetation cover on water catchments regulates and stabilizes water run-off. Deep penetration by tree roots or other vegetation makes the soil more permeable to rainwater so that run-off is slower and more uniform than on cleared land. As a consequence, streams in forested regions continue to flow in dry weather and floods are minimized in rainy weather. Water resources development projects -- dams, irrigation systems, urban water supply, and others -- depend on watershed protection to such an extent that many valuable reserves in these ESAs have been established by drawing support from the development projects involved; irrigation and energy agencies can therefore make powerful potential allies for protected areas which protect watersheds.
- 1.2 In many cases, the total costs of establishing and managing reserves which protect catchment areas can be met and justified as part of the hydrological investment. Guidelines should be developed to specify how the potential positive relationship between watershed protection and water resources development projects can be converted into reality.
- 1.3 One of the objectives of water resources development projects should be improved integration in the management of such resources. Guiding principles of integrated river basin management (Dugan, 1990) include:
 - a) The hydrological balance of the basin should be quantified, including measures of both water quantity and quality, and incorporating surface, underground and coastal waters.
 - b) The values of all the major ecosystems in the basin should be identified, as well as the full range of biophysical processes upon which they depend.
 - c) The products and services taken from each part of the system should be inventoried and the minimum requirements for the sustenance of these

features determined.

- d) The short and long term impact on the environment of planned changes to the system should be determined, and appropriate compensatory measures should be implemented as required.

1.4 The establishment and management of protected areas in coastal and marine ESAs is still in its infancy, with most such areas being merely an extension seaward of existing terrestrial protected areas. Many critical habitats in the coastal zone need protection so that they can provide services to mankind on a continuous basis; these services include support for fish breeding, shoreline protection, and sustainable harvesting of construction materials.

1.5 Virtually all wetland habitats are important for fisheries, but of particular relevance are inland floodplains which are often affected by development projects. Dams, irrigation systems, and other measures affect both inland and coastal wetlands important for fisheries, and alternative means of managing these systems need to be developed, along with guidelines to assessment of potential impacts on both environmental and socio-economic grounds.

2. Tourism development projects

2.1 Natural areas -- mountains, rivers, wetlands, forests, savannas, coral reefs, deserts, beaches -- are major attractions for tourists. Tourism can bring numerous socio-economic benefits to a country, in terms of creating local employment, stimulating local economies, generating foreign exchange, stimulating improvements to local transportation infrastructure, and creating recreational facilities. Positive effects on the environment often derive from these socio-economic benefits. Such positive effects may include:

- ▶ encouraging productive use for conservation objectives of lands which are marginal for agriculture, thereby enabling large tracts of land to remain covered in natural vegetation
- ▶ promoting conservation action by convincing government officials and the general public of the importance of natural areas for generating income from tourism
- ▶ increasing awareness amongst local communities of the benefits from conservation, including the economic opportunities it can generate
- ▶ stimulating investments in infrastructure and effective management of natural areas

- 2.2 These benefits can provide incentives for effective management of the natural areas which are tourist destinations, which in turn enhances the quality of the natural resources that attract tourists. Properly planned and managed tourism in natural areas is both non-polluting and renewable, and numerous examples exist where tourism has provided powerful incentives for conserving biological resources.
- 2.3 However, biological resources can also be damaged by inappropriate tourism developments. McNeely and Thorsell (1987) have outlined the positive and negative impacts that tourism can have on such resources and recommend that the guiding principle for tourism development in natural areas should be to manage the natural and human resources so as to maximize visitor enjoyment while minimizing negative impacts of tourism development.
- 2.4 Four general principles are relevant for linking investments in tourism with conservation of ESAs:
- ▶ Planning for tourism development must be integrated with other planning initiatives, particularly in national parks and other natural areas which are potential tourist destinations.
 - ▶ Tourism authorities working with protected area managers should determine the level of visitor use an area can accommodate with high levels of satisfaction for visitors and few negative impacts on the environment (the carrying capacity), and ensure that this level is not exceeded.
 - ▶ For each major tourist destination based on the attractions of biological diversity, a management plan should be developed to specify objectives for both tourism and resource management and to determine how sufficient income from tourism can be provided to the natural area to provide an incentive for improved management.
 - ▶ National policy should require environmental impact assessments (EIA) for all tourism development projects or programs, and specify the ways and means that the tourism development can provide economic benefits to both the local people and the natural areas which are the primary tourist destinations.
- 2.5 In short, tourism and conservation of ESAs can be natural partners, and each can benefit from the other if both are properly managed. Sufficient resources must be devoted to managing the natural areas, but it is often difficult to convince the governments who are responsible for budgets to allocate sufficient funds for this purpose. It is in the interest of both tourism and conservation that governments be so convinced.

3. Agricultural development projects

- 3.1 In addition to the water resource management benefits of ESAs, other positive linkages can also be formed. For example, good soil protection by natural vegetation cover and leaf litter can preserve the productive capacity of the reserve itself, prevent dangerous landslides, safeguard coastlines and riverbanks, and prevent the destruction of coral reefs and freshwater and coastal fisheries by siltation.
- 3.2 Linkages between conservation and agriculture are also important in industrialized countries. Under regulations adopted by the European Community, EC Governments may define certain areas of the farmed countryside as "Ecologically Sensitive Areas." Such areas are important in environmental terms, and their continued environmental protection depends upon the survival of the traditional forms of farming which give rise to their environmental qualities. Within ESAs, farmers are paid grants to encourage them to continue to farm in a traditional way; ESA payments, therefore, can involve limitations on the amount of fertilizer which can be used, restrictions on changes of agricultural land use and controls over the dates at which meadows are cut for hay; they may also include positive payments to encourage practical conservation, such as woodland management or the restoration of archaeological features.
- 3.3 A group of US-based NGOs called the "Committee on Agricultural Sustainability for Developing Countries" (CASDC) has suggested a series of criteria for developing sustainable farming systems. Such systems are required if pressures on marginal agricultural lands are to be reduced, thereby enabling such lands (which are often ESAs) to be devoted to conserving natural ecosystems and the benefits they provide. Sustainable farming systems:
 - a) Maintain and improve soil productivity, quality, and tilth.
 - b) Augment the potential for achieving the highest possible efficiency in the use and conservation of basic farm resources (soil, water, sunlight, energy, and farmers' time).
 - c) Incorporate as much biological interaction as possible, including such processes as mulching, the use of nitrogen-fixing plants, the use of agroforestry techniques, and the use of inter-cropping and crop rotations to control pests and weeds.
 - d) Minimize the use of external inputs which damage the environment and endanger human health (some chemical fertilizers; non-selective pesticides and herbicides; and some forms of energy), maximizing instead the use of available, affordable, renewable, and environmentally benign inputs.

- e) Avoid the contamination of groundwater by using only those fertilizers, pesticides and herbicides that do not penetrate below the plants' growing zone and then only in controlled doses.
- f) Meet the needs of farm families for energy to work their land, cook, and heat from readily available and affordable energy sources.
- g) Meet the needs of farm families for cash income, including from off-farm sources.
- h) Are adaptive, so that even as society evolves and communities change, they will strengthen communal cooperation, protect rural survival systems, through community support and sharing allow farm families to keep going in difficult times (famine, drought, and natural or political disasters), and make possible effective local management of community-controlled common property resources (ponds, woodlots, grazing lands, irrigation systems) in ways that permit equitable sharing of benefits.

3.4 Many of the conventional agricultural, water resources development, and forestry projects of the Bank can contribute to the conservation of ESAs by focusing attention on linkages between the ESA and the surrounding lands. To reduce inappropriate pressures on ESAs, the basic criteria of sustainability must be developed and applied to all kinds of farming systems, from the intensive mono-cropping systems to animal husbandry to agroforestry to the vast numbers of mixed systems used by small farmers throughout the region. Therefore, Bank projects in agriculture need to support work on the continuing evolution of the concepts and practices of sustainability, provide encouragement and incentives for the adoption of sustainable agricultural systems (many of which are discussed in McNeely, 1988), and ensure that farmers receive their fair share of the benefits from conserving ESAs.

4. Linkages with other sectors

4.1 Other types of projects for which such considerations can be developed include livestock development, cottage industries, aqua-culture, land classification and titling, reforestation, rangeland management, and mangrove management. While some guidelines will be common to all types of project, others will be specific to certain sectors (such as aqua-culture, forestry, or livestock development). For each type of project, guidelines should be developed for application in the design and implementation of the project. Such guidelines should not focus simply on mitigation, but be far more positive in linking development with conservation by showing the mutual benefits that can follow from enhanced consideration of how conservation can support development.

MINIMUM QUALITY STANDARDS FOR ECOLOGICALLY SENSITIVE AREAS

1. General considerations

- 1.1 Protected ESAs will succeed in realizing their conservation objectives only to the extent that the areas themselves are effectively managed, and to the extent that the management of the land surrounding them is compatible with the objectives of the protected areas. IUCN has conducted considerable work in this field (see for example Kelleher and Kenchington, 1990; MacKinnon *et al.*, 1985; Oldfield, 1988; Poore, 1992; Poore and Sayer, 1987), which can provide the basis for developing such quality standards. General considerations which need to be incorporated in development projects include:
- a) The acceptance of protection depends on putting a sufficient economic value on natural resources and biological diversity and, often, on demonstrating that such areas bring a positive benefit to the local communities around them. Examples may be provided by the role of ESAs as sources of water and products, their maintenance of regional climatic conditions, and their support for tourism.
 - b) Each ESA, or regional set of ESAs, should have a management plan which establishes the objectives of management, the obstacles to achieving the objectives, the steps required to overcome the obstacles, the resources required, and the costs and benefits of achieving the objectives.
 - c) Management of an ESA and that of the adjacent land must be planned together, since few protected areas are self-contained entities. The establishment of "buffer zones" (better referred to as "zones of influence") in which human activities including uses of natural resources in adjacent land are compatible with the conservation of natural ecosystems within protected areas, are often vital to the integrity of the latter.
 - d) The management context and likely ecological resilience of the area in the face of climatic trends and human pressures need critical review, taking into account the likely trend in human numbers in the area in question.
 - e) Certain "keystone" and critical species will be used as diagnostic indicators of the adequacy of the protected area system, it being assumed that if habitats capable of assuring the survival of viable populations of these are protected, the lesser known species will also be safeguarded.

- f) A conscious relationship needs to be established between *in situ* and *ex situ* approaches to conservation and these methods need to be integrated into over-all regional development; the potential contribution of the general managed landscape to conserving biological diversity should not be under-estimated.
- g) The national infrastructure needs to be so designed as to ensure that the protected area system designed to manage ESAs is properly evaluated as a national asset and that adequate resources are deployed in its management.
- h) The project must gather baseline data on key ecological, economic and social parameters, so that its long-term effects can be monitored.
- i) A major effort is needed to raise public consciousness, enlist the aid of professionals in the field (e.g. in universities, museums and professional networks), and educate local communities about the value of the ESA to the region.

2. Economic factors

- 2.1 Decisions about the identification and management of ESAs, including consideration of alternative land uses, must be based on analysis of costs and benefits, and their distribution. Realizing that change is a constant factor in land use, these economic factors require continual review. It is apparent, then, that economics must be an important foundation of all programs for enhancing the contributions of ESAs to society.
- 2.2 As a basis for applying economic incentives and calculating benefits and costs of various management options for ESAs, governments need to estimate the economic contribution that ESAs make to the national economy. This requires:
 - ▶ ensuring that national accounting systems make explicit the trade-offs and value judgements regarding impacts on biological resources that may not be measured in monetary terms
 - ▶ conducting research on methodologies for assessing the cross-sectoral impacts -- positive and negative -- of resource utilization
 - ▶ collecting information on the physical properties of resources in specific environments and for specific uses
 - ▶ developing methodologies for assigning values to non-marketed biological resources, appropriate to the needs of the country

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- ▶ estimating the economic productivity of various ecosystems, with various types of inputs
- 2.3 The sustainable levels of production of economic benefits from ESAs -- including goods such as fish, timber, wildlife, and medicinal plants, and services such as supply of clean water, tourism, and recreation -- should be estimated, and demands upon benefits planned within those limits. This should be reflected in the prices of forest products and other biological resources.
- 2.4 The review and formulation of all national policies which have a direct or indirect bearing upon ESAs and the biological resources they contain must therefore:
- ▶ estimate the relevant benefits which ESAs can produce
 - ▶ treat ESAs as reservoirs of capital resources and invest accordingly in preventing the depletion of their productivity
 - ▶ ensure that the objectives of sustainable utilization are met
 - ▶ address the basic needs of the local people who depend on the ESAs for their continued prosperity

3. National policies for managing ESAs

- 3.1 The incentives which are required to bring the benefits of ESAs to the community require commensurate policies at the national level. A national or regional conservation strategy can be an effective means of reviewing such policies, and determining what shifts are required to achieve national objectives for conserving the productivity of biological resources. Major policy components of the required integrated action might include the following considerations:
- a) Sufficient data needs to be compiled from a wide range of sources to enable ESAs to be identified objectively, and to help define the most appropriate management regimes for these areas.
 - b) The many economic and financial benefits of integrated rural development linked with conservation of ESAs and the biological resources they contain need to be quantified and brought to the attention of policy makers.
 - c) Both conflicts and potential for cooperation between the various activities of agriculture, fisheries, forestry, conservation and rehabilitation need to be identified in integrated plans and programs.

- d) Institutional reform and improvement is often a prerequisite to good design and implementation of integrated sectoral development plans and programs.
- e) Legislation consonant with the socio-economic patterns of the target group and the natural resource needs to be formulated, both to institute disincentives and to ensure that incentives carry the power of law.
- f) Policies and legislation in other sectors need to be reviewed for possible application to conservation of biological resources and community involvement in such work.
- g) Effective incentives need to be devised to accelerate integrated development in and around ESAs, aimed at narrowing any gap between what the individual sees as an investment benefit and what the government considers to be in the national interest.
- h) The rural population needs to be involved in the design and follow-up of plans and projects regarding ESAs, not simply their implementation.

3.2 Systems of incentives for improving the contribution of ESAs to rural development can be designed in a large number of ways, and numerous options exist for coordinating these incentives with other national policy objectives. In designing systems of incentives, governments should compare several options, with estimated costs and benefits, for each of the various national objectives being addressed. Systems of incentives need to be supported by suitable machinery for implementing the system, including regulation, enforcement, monitoring, and feedback.

3.3 All government sectors which depend on the productivity of ESAs should design policies to encourage the sustainable use of these resource systems, possibly as part of the process of preparing a national conservation strategy. In addition, other sectors which have major impacts on ESAs, such as transport, highways, and the military, should ensure that their policies do not unnecessarily deplete biological diversity.

3.4 Coordination and control of natural resource use in and around ESAs, in particular to introduce systems of incentives which involve several sectors, may require the creation of new agencies with wide-ranging authority over certain aspects of the operations of implementing ministries within a particular region.

3.5 Based on the best available information, governments should establish national objectives for the management of ESAs. Drawing on the latest advances in conservation biology, governments need to state, as a matter of public record, what proportion of the current land and water area is intended to be legally

protected for conserving biological resources. Such policy objectives can often be incorporated as part of a national protected area system plan or a national conservation strategy; on the basis of such national objectives, governments can measure the costs and benefits of implementing conservation programs effectively.

4. Data needs

4.1 In order to identify ESAs and to develop informed policies on their management, governments should build the capacity to assess the status, trends, and utility of their biological resources. This capacity should include:

- a) National compilations of the flora and fauna (at least higher plants and vertebrates) contained within the nation, in addition to the more usual assessment of stocks of timber, fish, and minerals.
- b) Where these compilations do not yet exist, development projects might require that rapid appraisal methods be employed -- perhaps through the use of indicator species which can provide the optimal return on investment of field time -- to ensure that biological resources are being given an appropriate level of priority.
- c) Institutionalized biological surveys, perhaps carried out by university departments of biology, to determine what species occur where and in what numbers, and how these parameters change over time.
- d) A national program for monitoring the status and trends of biological resources, linked to international systems such as UNEP's Global Environmental Monitoring System and the World Conservation Monitoring Centre.
- e) Regular publication of the available information on status and trends of biological resources, and the various forces which are affecting these trends.

4.2 These efforts will help governments to recognize the consequences of their development activities on the biological resources of the nation, and help identify external effects of development projects on biological resources. However, in-depth assessments are time-consuming, and action should not be delayed until "all" the information is available; instead, some rapid initial assessments need to be done. Development assistance agencies may be willing to assist in such efforts.

5. Policies on mitigating measures

- 5.1 ESAs, by definition, make their most important contributions to sustaining society by remaining relatively unaltered by human action; the goods and services they provide depend on natural ecological processes, so any forms of development should be aimed at enhancing rather than reducing their natural productivity.
- 5.2 In cases where objective and competent analysis dictates that public works are required in or near an ESA, environmental impact assessments should be conducted to ensure that the intrusion is made with the minimum detrimental impact on the natural systems in the ESA, and that appropriate mitigating measures are incorporated in the project. An independent decision-making process which has the confidence of the public may be required to ensure that all factors have been given sufficient consideration.
- 5.3 Since public works in or near an ESA can significantly increase the value of the ESA (for example, through maintaining low sedimentation rates in reservoirs), sufficient investments should be made in improving the management of the ESA so that it can make the most productive contribution. This may require measures to share the costs of improved management on a sustained basis.
- 5.4 In some cases, where a development project must intrude on an ESA, equivalent areas may be added to other parts of the ESA, or the value of the ESA lost to the project can be invested in other parts of the national ESA system. In this regard, full consideration should be given toward enhancing investments in ESAs which have been degraded through inappropriate uses.
- 5.5 Any mitigating measures which are proposed should be incorporated in the management plan for the ESA, and contribute to regional land-use objectives.

CONCLUSIONS

The governments of many of the countries of Africa have recognized the importance of Ecologically Sensitive Areas to their development programs, even if they have not used this exact term. However, few nations have been able to invest sufficiently in a systematic approach to designating and managing their ESAs, nor in conducting the economic analysis which would demonstrate the value of such areas to national development.

ESAs are important for social, economic, political, and ethical reasons, and they can make important contributions to sectors ranging from forestry to tourism to rural development. However, many ESAs are being abused rather than nurtured, and a number of general policy changes are required to enable ESAs to be identified, and for the most appropriate management regimes to be implemented.

Each country will have its own particular opportunities and constraints and no set of guidelines or criteria will automatically provide the right answers. Each country will need to design its own approaches to ESAs, and the Bank should stand prepared to provide whatever assistance might be requested.

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OPERATIONAL POLICY NOTE NO. 11.02

**WILDLANDS: THEIR PROTECTION AND MANAGEMENT
IN ECONOMIC DEVELOPMENT**

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1. INTRODUCTION

1. The maintenance of specific natural land and water areas in a state virtually unmodified by human activity, hereafter termed wildland management, is an important subset of the broad environmental concerns addressed in OMS 2.36, "Environmental Aspects of Bank Work". The conversion of wildlands to more intensive land and water uses (through land clearing, inundation, plantations, or other means)¹ continues to meet important development objectives, and is an element of certain World Bank-supported projects. At the same time, wildlands are rapidly diminishing in many Bank member countries. The remaining wildlands can often contribute significantly to economic development, particularly in the longer term, when maintained in their natural state. The Bank's policy therefore is to seek a balance between preserving the environmental values of the world's more important remaining wildlands, and converting some of them to more intensive, shorter term human uses.

2. The Bank already has considerable experience of wildland management in Bank-supported projects. This OPN codifies existing practices and provides operational guidance concerning conservation of wildlands.² For a more detailed discussion of wildland management, see the Bank's Technical Paper: *Wildlands: Their Protection and Management in Economic Development*³ which amplifies each section of this OPN. The Office of Environmental and Scientific Affairs in the Projects Policy Department (PPDES) is available to advise and assist staff on issues of wildland management.

2. JUSTIFICATION

3. There are two principal justifications for wildland management. First, wildlands serve to maintain biological diversity (i.e., the full range of the world's biota).

¹ Conversion here applies to permanent fundamental alteration of the natural ecosystem. Temporary modification by such means as highly selective, long rotation logging usually creates fewer relevant effects.

² Other conservation activities (designed to protect the environment, but not necessarily to preserve biological diversity) are discussed elsewhere, e.g., in the 1978 Forestry Sector Policy Paper.

³ Available from the Office of Environmental and Scientific Affairs.

Second, wildlands provide environmental services important to society. In addition, certain wildlands are essential for maintaining the livelihood of tribal peoples, discussed in OMS 2.34.

2.1 Biological Diversity

4. Wildland management is necessary to prevent the untimely and often irreversible loss of a large proportion of the world's remaining biota, including the more visible plant and animal species. Because their wildland habitats are today rapidly disappearing, a large and growing number of biotic forms face extinction. Appropriate, low-cost wildland management measures can greatly reduce current extinction rates to much lower (perhaps almost "natural") levels, without slowing the pace of economic progress. By preserving the integrity of the biotic community and its plant and animal species, wildlands are important for the replenishment of surrounding degraded or abandoned areas.

5. Preserving biological diversity is important to development because of the economic potential of species that are currently undiscovered, undervalued, or underutilized. Many previously unknown or obscure, and often threatened, species have turned out to have major economic benefits. But less than 20 per cent of the world's plant and animal (largely invertebrate) species have ever been inventoried, and even fewer screened for possible human uses. They therefore present valuable development opportunities if they are not irreversibly destroyed. In addition, there are important scientific, aesthetic, ethical, and practical reasons to avoid or minimize the extinction of the remaining biotic stock. While some species can be conserved *ex situ* (such as in zoos or seed banks), wildland management is the only technically and economically feasible means of preserving most of the world's existing biological diversity.

2.2 Environmental Services

6. In addition to maintaining biological diversity, many wildlands also perform important "environmental services", such as improving water availability for irrigated agriculture, industry, or human consumption; reducing sedimentation of reservoirs, harbors, and irrigation works; minimizing floods, landslides, and coastal erosion (and possibly droughts in some regions); improving water quality; and providing essential habitat for economically important fishery species. Despite their economic value and importance in meeting human needs, such environmental services are not always accorded adequate attention because they are usually public goods that tend to be poorly understood, undervalued, or even overlooked. When environmental services are lost due to wildland elimination, remedial measures are almost always far more expensive than prior maintenance. While many environmental services can also be maintained by establishing more intensive water and/or land use systems (e.g., bio-oxidation sewage treatment, tree plantations), wildland management is frequently more cost-effective.

2.3 Wildlands of Special Concern

7. Wildlands of special concern are areas that are recognized to be exceptionally important in conserving biological diversity or perpetuating environmental services. They can be classified into two types. First are wildlands officially designated as protected areas by governments, sometimes in collaboration with the United Nations or the international scientific community. These are National Parks, Biosphere Reserves, World Heritage Natural Sites, Wetlands of International Importance, areas designated for protected status in national conservation strategies or master plans, and similar "wildland management areas" (WMAs), i.e., areas where wildlands are protected and managed to retain a relatively unmodified state (Annex 1).

8. Second are wildlands as yet unprotected by legislation, but recognized by the national and/or international scientific and conservation communities, often in collaboration with the United Nations, as exceptionally endangered ecosystems, known sites of rare or endangered species, or important wildlife breeding, feeding, or staging areas. These include certain types of wildlands that are threatened throughout much of the world, yet are biologically unique, ecologically fragile, or of special importance for local people and environmental services. Wildlands of special concern often occur in tropical forests, Mediterranean-type brushlands, mangrove swamps, coastal marshes, estuaries, sea grass beds, coral reefs, small oceanic islands, and certain tropical freshwater lakes and riverine areas. Within the spectrum of tropical forests, lowland moist or wet forests are the most species-rich and often the most vulnerable. Wildlands of special concern also occur in certain geographical regions (Annex 2) that have been reduced to comparatively small patches and continue to undergo rapid attrition. As a result, these regions harbor some of the most threatened species in the world.

3. THE BANK'S INVOLVEMENT TO DATE

3.1 Existing Record

9. During the last 15 years, the World Bank Group⁴ has assisted with financing of upwards of 40 projects with significant wildland management components. Most of them have involved establishment or strengthening of WMAs. Bank-supported

⁴ Includes the International Development Association (IDA) and the International Finance Corporation (IFC)

WMAs include national parks, nature reserves, wildlife sanctuaries, and those forest reserves managed primarily for their watershed or biological values, rather than for wood harvest. Other wildland management components of Bank projects have involved management of wildlife and the humans that utilize it, including anti-poaching measures, management of water flows from reservoirs to maintain wildlife habitat, and relocation of certain species. In still other cases, the location of projects has been changed to avoid important wildland areas.

10. Wildland management components have two principal objectives: first, to prevent, minimize, or partially compensate for wildland elimination, thereby conserving biological diversity; second, to preserve or improve the environmental services provided by wildlands, thereby enhancing the project's economic or social benefits. Most Bank-supported projects emphasize one or the other objective, however some Bank projects have wildland components seeking both objectives.⁵

11. Costs of wildland management components in Bank projects have typically been low. They have normally accounted for less than three per cent of total project costs, and in half of the cases for less than one per cent. In many instances, it is difficult to separate out the cost of the wildland component because of its integration with other components.

12. In one case, wildland management was the sole objective, so accounts for 100 per cent of project costs. At the other extreme, a large number of Bank projects have achieved significant wildland management objectives at zero additional cost. For example, manipulation of a hydroelectric project's water release schedule costs little or nothing, even though it provides major downstream benefits for wildlife, as well as for people and cattle.

⁵ For example, the establishment of the Dumoga-Bone National Park in the Indonesia Irrigation XV project helps ensure a more reliable water supply while reducing sedimentation of valuable irrigation works; at the same time, it helps ensure that a significant portion of the project area remains in its natural state, despite surrounding developments.

13. Wildland management components require additional Bank staff time and can increase project complexity, but they have rarely caused significant delays at any stage of the project cycle. Moreover, the failure to incorporate adequate wildland components can result in much greater delays and complexity later on. Furthermore, the failure to incorporate adequate wildland components can substantially reduce project benefits and might result in project failure. As wildland management components within Bank-supported projects become more routine, the additional staff effort required to manage them successfully is expected to decrease further.

14. The Bank's track record in implementing wildland management components is encouraging. According to project completion reports or environmental post-audits, implementation of only three out of 43 wildland components has been markedly slower than for most other project components. In at least four cases, the wildland component has been implemented with less difficulty than other project components.

3.2 Lessons Learned

15. A number of important lessons have emerged from the Bank's experience with wildland management to date. First, wildland management components should be routinely and systematically incorporated into certain types of Bank projects (outlined in Section 4.1). Up to now, this has not always been done, and some projects which would have benefitted from wildland components have not included them.

16. Second, wildland components should be incorporated as early as possible within the project cycle (Annex 3) to minimize costs and facilitate implementation. While inclusion of wildland components in later stages of the project cycle may at times be necessary because of unforeseen circumstances, it is more effective and less costly to incorporate them as early as possible in the project cycle.

17. Third, meeting wildland management goals requires effective management "on the ground", not simply on paper. Colonists and resource extractive companies have rapidly moved into such "paper parks" (parks existing only on a legal document or map, rather than on the ground) unless they were inaccessible for other reasons. The wildland management objectives have to be translated into specific measures with a budget for their implementation. These measures include hiring and training of personnel, provision of necessary infrastructure and equipment, development of a scientifically sound management plan for each particular wildland, and a policy environment - legal, economic and institutional - which supports the wildland preservation objective. The mere declaration of intent to protect wildlands or wildlife, or even the designation of WMAs on a map, does not ensure effective management unless specific supporting measures are implemented.

18. Fourth, the multiple objectives of wildland management are most successfully attained if the WMA is carefully designed. For example, a WMA cannot preserve biological and genetic diversity, evolutionary processes, and environmental services

if it is too small. While some Bank-supported WMAs clearly appear sufficiently large to accomplish most or all of their objectives, others are so small that their ability to conserve biological diversity or provide environmental services or other benefits is questionable. Besides size, the specific location and shape of a WMA can be important factors in determining its success. Appropriate WMA design features are best determined for each case by a conservation specialist.

19. Finally, the success of a WMA, as of other project components, is contingent upon government commitment. This, in turn, often depends upon the degree of financial support provided by the Bank. Most of the Bank-supported wildland components have provided some direct support to establishing or strengthening WMAs. However, in some cases, the costs of the WMA establishment were assumed entirely by the Government, and the Bank took no specific measures to ensure the continued availability of such financing. By taking measures to ensure counterpart financing, or by providing the financing itself, the Bank can help ensure the availability of the relatively modest sums necessary for WMA establishment and continuation.

20. Financial support is usually not sufficient, however. It is often also necessary to maintain dialogue with governments, affected local people, and environmental advocates about the importance of conservation and the benefits of WMAs (tourism, watershed protection, etc.) and to include local people in the planning and benefits. Government commitment to the WMA is fostered by such dialogue, by supervision, by monitoring of national legal provisions, and by loan conditionality. In addition, two complementary and parallel activities contribute to WMA success: (1) rural development investments that provide farmers and villagers in the vicinity of the WMA an alternative to further encroachment, and (2) coherent national and sectoral planning and policies that promote wildland conservation.

4. POLICY GUIDANCE

21. The Bank's general policy regarding wildlands is to seek to avoid their elimination and rather to assist in their preservation. Specifically, (1) the Bank normally declines to finance projects involving conversion of wildlands of special concern (as defined in Section 2.3), even if this conversion occurred prior to the Bank being invited to consider financing. (2) When wildlands other than those of special concern may become involved, the Bank prefers to site projects on lands already converted (e.g., logged over, abandoned, degraded, or already cultivated areas) sometime in the past, rather than in anticipation of a Bank project. Deviations from this policy must be explicitly justified. (3) Where development of wildlands is justified, then less valuable wildlands should be converted rather than more valuable ones. (4) When significant conversion (e.g., 100 sq. kms., or a significant proportion of the remaining wildland area of a specific ecosystem, if smaller) of wildlands is justified, the loss should be compensated by inclusion of wildland management

components (see Section 4.2 below) in the project concerned, rather than in some future project. This component should directly support preservation of an ecologically similar area.⁶ This policy pertains to any project in which the Bank is involved, irrespective of whether the Bank is financing the project component that affects wildlands.

22. The success of projects that do not eliminate any wildland often depends on the environmental services provided by wildlands. In such cases, the Bank's policy is to include a project component to conserve the relevant wildland in a WMA, rather than leaving its preservation to chance. In areas without remaining wildlands, alternative conservation measures may be needed to provide similar project benefits. In other cases, where the wildlands do not directly benefit or serve the objectives of the project, the project may be improved by supporting management of wildlands to provide socio-economic benefits in the general project area (see paragraph 6). Projects with wildland management as the sole objective should also be encouraged.

4.1 Types of Projects Needing Wildland Management Components

23. Based upon these criteria, projects with the following aspects should normally contain wildland components:

- a. **Agriculture and livestock projects** involving: wildland clearing, wetland elimination,⁷ wildland inundation for irrigation storage reservoirs; watershed protection for irrigation; displacement of wildlife by fences or domestic livestock; **fishery projects** involving: elimination of important fish nursery, breeding, or feeding sites; overfishing or introduction of ecologically risky

⁶ The policy in the 1978 Forestry Sector Policy Paper states "... in countries where there are no adequate natural resource conservation programs, the Bank will not support projects that might result in disintegration of a habitat not elsewhere represented in the country and not under suitable protection (as in national parks and wildlife reserves)."

⁷ Wetlands (such as ponds, marshes, swamps, flood plain forests, estuaries, mangroves) can be eliminated inadvertently through water diversions upstream or deliberately through drainage, diking, or filling.

exotic species within aquatic wildlands; **forestry projects** involving: access roads, clear-felling or other intensive logging of wildlands, wildland elimination.⁸

- b. **Transportation projects** involving: construction of highways, rural roads, railways, or canals which penetrate wildlands, thus easing access and facilitating spontaneous settlement; channelization of rivers for fluvial navigation; dredging and filling of coastal wetlands for ports projects.
- c. **Hydro projects** involving: large-scale water development, including reservoir, power, and water diversion schemes; inundation or other major transformation of aquatic or terrestrial wildlands; watershed protection for enhanced power output; construction of power transmission corridors.⁹
- d. **Industry projects** involving: chemical and thermal pollution which may damage wildlands¹⁰; wildland loss from large-scale mining; wildland conversion for industrial fuels or feedstocks.

4.2 Types of Wildland Management Components

24. The most effective type of wildland management component is support for the conservation of ecologically similar wildlands in one or more WMAs.¹¹ In cases where a WMA already exists in the same type of ecosystem that is to be converted by a Bank-supported project, it may be preferable, for administrative or biological conservation¹² reasons, to enlarge the existing WMA, rather than to establish a new one. The government's wildland agencies, local university wildlife departments, and various international organizations can often advise in such judgements.

⁸ Plantations of fast-growing tree species are often an important complement to more direct wildland management activities by reducing the economic pressures for cutting the remaining forest wildland. They should be sited preferentially on already deforested land. Reforestation and land rehabilitation are covered in the 1978 Forestry Sector Policy Paper.

⁹ & ¹⁰ Industrial pollution control is discussed in the Bank's Environmental Guidelines available from PPDES.

¹¹ See Section 5 for technical guidance on establishing a WMA.

¹² Biological conservation is usually more effective in one large WMA than in several small ones comprising the same total size and encompassing the same types of natural habitats.

25. A wildland management component could also involve the creation of wildlife habitat, in addition to or rather than preservation of already existing habitat. For example, marginal land on the fringes of irrigation projects could be converted to wildlife reserves by taking advantage of the water supply created by the projects. Natural depressions or seasonal swamps could be exploited by diverting water from the canal systems (probably a very small part of the total supply). Such reserves attract significant numbers of migratory and residential waterfowl with minimal additional project costs and land.¹³

26. A useful option is to improve the quality of management of existing WMAs. Many WMAs in Bank member countries receive insufficient on-the-ground management, due to lack of adequately paid staff, training, staff housing, other infrastructure, equipment, spare parts, fuel, or a well-developed management plan through which efficient resource allocation decisions can be made. Small components can often help correct these deficiencies. In countries where effective management is clearly lacking, it is generally preferable to improve the management of existing WMAs than to create new units "on paper", thereby further over-extending the limited capabilities of the responsible agencies. Whenever a new WMA is established as a project component, provisions are needed to ensure effective management. Since many wildland agencies (e.g., departments of national parks or wildlife) are not as operationally effective as necessary, institutional strengthening (particularly support for training) should be an important element of Bank-supported wildland management components.

27. The establishment or strengthening of WMAs is particularly effective when the Government includes these wildland areas in a national conservation or land use plan. A growing number of Bank member governments have undertaken some type of systematic land use planning for wildland management. Such planning can take various forms, ranging from "master plans" for a system of national parks and other WMAs, to "National Conservation Strategies" which address wildland management as only one component of a broad range of natural resource planning concerns, and in which policy intervention such as economic incentives are used to influence resource utilization. Bank assistance with such planning efforts greatly strengthens wildland management at the national level. When member governments agree to develop appropriate land use plans, it is important for the Bank to refrain from supporting projects which involve eliminating wildlands and run counter to these plans.

¹³ The Wildfowl Trust, Slimbridge, England, has set up such reserves on 5-8 sq. km.

28. In those relatively few Borrower countries in which wildland elimination pressures are still minor,¹⁴ the requirement of a compensatory wildland component can be interpreted more flexibly to involve measures other than the establishment or strengthening of one or more WMAs. Such alternative options include careful project siting to avoid converting the more environmentally sensitive wildlands, support for research on and management of particularly sensitive species, support for land use planning efforts, or institutional strengthening of the government's wildland management agency, and training in ecology, biological conservation, and wildland management.

5. DESIGN OF WILDLAND MANAGEMENT AREAS

5.1 Design Considerations

29. WMA design features include size, shape and siting. Because an optimal design may vary greatly in different ecosystems, it is best determined in each case by a conservation specialist.

30. The size of a compensatory WMA should be sufficient to maintain the biological diversity or other important values present in the area to be converted. A WMA which is large enough to encompass a viable population of the largest local predator (e.g., eagle, tiger), or the seasonal territories and migration routes of the largest local herbivore, will most likely preserve all other pertinent ecological values. These objectives would most likely be achieved in a WMA larger than 1,000 sq. kms. Many values are conserved in moist forest WMAs of 500 sq. kms, although possibly not all in perpetuity. Interim WMAs of less than 100 sq. kms can be useful short-term expedients for subsequent expansion into surrounding degraded areas. In general, the larger the WMA, the greater the number of ecological interdependencies and gene pools that will be preserved. Both are necessary to a healthy and self-perpetuating ecosystem. It is recognized that conflicting pressures for more intensive land use often make the establishment of large WMAs difficult. In any case, compensatory WMAs should be no smaller than the wildland area converted by the project.

¹⁴ Wildland elimination pressure may still be minor because of low human population densities and growth rates, little economic demand for agricultural land, timber, or other resources, or because a substantial proportion of each remaining wildland ecosystem in a country has been set aside in WMAs which receive good on-the-ground protection and have strong policy support from the Government.

31. The optimal shape of a WMA will depend upon its objectives. A more circular shape may preserve more biological diversity than other shapes of the same area. Shape is also determined by the location of centres of endemism and other wildlife resources. Boundaries are more effective when they coincide with natural surficial features, such as a river or watershed.

32. To ensure that the compensatory WMA is ecologically similar to the area to be converted, it is obviously necessary to site the WMA in the same ecosystem as the area to be converted. Moreover, siting the WMA some distance away from the converted area (separated by a managed buffer zone for example) helps reduce pressures for encroachment upon the WMA from people living in the converted area.

5.2 Management Categories

33. A variety of different use related categories can be used in establishing WMAs. The choice of category depends upon the particular objectives being accorded priority for management. The categories listed in Annex 1 indicate the variety of WMAs appropriate under different circumstances.

5.3 Personnel and Training Needs

34. The need for well-trained personnel in the proper management of WMAs cannot be overemphasized. Without adequate numbers of such trained people, WMAs cannot effectively serve their intended national or societal functions. Bank-supported wildland project components should therefore provide for staffing levels and training activities that ensure competent management of WMAs. The appropriate number and types of WMA personnel depend upon the category of WMA, its size, and its intensity of management. The minimum adequate permanent staff size for a "modest to average" WMA is usually about eight.

5.4 Equipment, Infrastructure, and Budgetary Needs

35. Designation of WMAs on a map in no way ensures that they will be managed to provide their greatest possible benefits to society. Effective on-the-ground management requires a variety of physical inputs. In Bank-supported WMAs, efforts should be made to ensure that these inputs are provided as a project component in adequate supply and on a timely basis. Annex 4 contains a basic checklist of the physical inputs that are typically needed for effective WMA management. Some types of WMAs will require a variety of additional inputs, according to specific management objectives.

36. The budgetary requirements for establishing and operating WMAs will vary according to size and the amounts of needed infrastructure, equipment, and personnel. The comparatively large (3,200 sq. kms.) Dumoga-Bone National Park, financed by the Indonesia Irrigation XV Project, cost roughly US\$ 1 million for establishment and

initial operating costs; most smaller WMAs can be expected to cost considerably less.

37. In some instances, establishment or enlargement of WMAs may require additional funds for purchasing land from private or tribal owners. It may at times also be necessary to resettle and compensate people living within the boundaries of a newly-established WMA.¹⁵ Usually, however, WMAs are established on wholly government-owned properties on which people have not settled.

38. The largest recurrent cost of WMAs is usually staff salaries. It is important to maintain salaries at levels that encourage high productivity and a degree of permanence, and discourage corruption.¹⁶ Spare parts for machinery, while usually a relatively small budget item, are also a vital recurrent expenditure. Without a reliable supply of spare parts for often remote WMA areas, necessary equipment will often lie idle or may become cannibalized to provide spare parts. In some cases, salaries, spare parts, fuel, and other recurrent costs can be fully or partly met by fees collected from tourists, persons engaged in some form of harvesting, or scientific researchers.¹⁷ Otherwise, small annual outlays from the national or other government budget will be needed.

¹⁵ See OMS 2.33 for guidelines regarding involuntary resettlement and OMS 2.34 for guidelines regarding tribal people in Bank-financed projects. In many cases, indigenous hunter-gatherer societies are as much a part of the "natural" environment as the wildlife, and can safely remain in the park as caretakers as long as traditional ways of life are continued.

¹⁶ High productivity also depends upon these important components: 1) environmental education for an understanding of the importance of the WMA; 2) pride in the WMA and the role of those who protect and support it; and 3) self-interest through some direct accrual of benefits of the WMA (aesthetic, recreational, moral, etc., as well as economic).

¹⁷ The proportion of recurrent costs that can be recovered in this manner varies greatly in different WMAs, from 0 to 100 per cent.

5.5 Management Plans

39. Wildland management areas typically need well-developed management plans to ensure efficient allocation of the scarce financial and skilled human resources devoted to their management. A management plan is a written document which guides and controls the use of the resources of a WMA and directs the design of subsequent programs of management and development. A thorough management plan will:

- (a) Describe the physical, biological, social, and cultural features of the WMA within a national, regional, and local context;
- (b) Identify those items of particular concern from which the objectives for managing specific areas of the WMA are derived;
- (c) Describe appropriate uses of the entire WMA through zoning; and
- (d) List in chronological order the activities to be carried out to realize the proposed management programmes.

40. Preparation and implementation of management plans are carried out by the government wildland agency. Project staff should ensure that Bank-supported WMAs either have adequate management plans or will develop them early in the project. Some parts of a management plan can be completed in a few days, while others may take years to refine. While a longer-term management plan is being developed as soon as possible after loan signing, an "interim management plan" or "operational plan" may be used. PPDES can be of assistance in these matters.

5.6 Legal Considerations

41. The success of a WMA may depend upon how its design fits into an overall national legal framework concerning natural resources management in general and wildland management in particular. To maintain their legitimacy in the eyes of policy-makers and local populations, WMAs must have a firm legal foundation. National legislation, sometimes accompanied by a specific Presidential designation, is often needed to establish a WMA. Depending upon the particular situation, such legislation needs to establish precise WMA boundaries; specific management zones within the WMA, including buffer zones; a central management authority (at the national or sub-national level) with unambiguous responsibilities; and a mechanism to channel local participation in WMA management decisions. Bank staff should ensure that Bank-supported WMAs are established and managed within a compatible legal and policy context.

June 2, 1986

ANNEX I

Categories of Wildland Management¹⁸

1 **Scientific or Strict Nature Reserves** represent the most restrictive WMA category, intended to maintain representative samples of natural ecosystems in an undisturbed state for scientific research, environmental monitoring, education, and preservation of biological diversity. Tourism, recreation, and most other human uses are usually not permitted.

2 **National Parks** are usually relatively large areas where native plant and animal species (and often outstanding geological or other scenic features) are of special interest. Controlled tourism and scientific research are permitted; more intensive human uses usually are not.

3 **Natural Monuments** are often smaller WMAs intended to protect highly localized species, ecosystems, or geological formations. Tourism and scientific research are permitted to the extent that they are compatible with preservation of the unique natural features.

4 **Managed Nature Reserves or Wildlife Sanctuaries** protect rare plant or animal species, or large concentrations of resident or migratory wildlife. Manipulation of vegetation and other intensive management may be done to improve the habitat for species of special concern. Tourism, research, and occasionally limited livestock grazing or fuelwood collection are permitted, when these activities are compatible with wildlife management objectives.

5 **Tribal Peoples Reserves** are relatively unmodified natural areas in which indigenous tribal peoples or vulnerable ethnic minorities (see OMS 2.34) continue to practice traditional, low-intensity forms of land use such as hunting and gathering or nomadic pastoralism. Settlement or potentially disruptive resource utilization by outsiders is not permitted.

6 **Protected Landscapes** are areas which have often been significantly modified by people, but which still contain important wildland resources. Traditional land uses, including fishing, grazing, and some agriculture, are often permitted to accommodate the needs and interests of local populations. Land use control is often at the local government level.

¹⁸ Recognizing that different countries use different names for various types of WMAs, the standardized system of WMA nomenclature developed by the International Union for Conservation of Nature and Natural Resources (IUCN) is used here to facilitate comparisons and reduce confusion.

7 **Resource Reserves** are "interim" WMAs. They are typically fairly extensive areas which are not yet heavily settled, but which may be under relatively recent pressure for colonization, timber or mineral extraction, or other intensive uses. This WMA category is designed to restrict such uses until a land use plan or other management guide is issued to channel further development in an environmentally suitable manner.

8 **Multiple Use Management Areas** are intended to allow sustainable production of such economic goods as water for downstream uses; timber (obtained through low-intensity logging); fuelwood; wild fruits, herbs, gums, or other plant products; wildlife; fish; grazing; and outdoor recreation. Included in this category are most "forest reserves" and "protection forests," including those established largely for watershed catchment protection. Within these WMAs, management is primarily oriented to the sustaining of these economic activities, although special zones may also be designated within these areas to achieve more specific conservation objectives, such as preservation of biological diversity. These WMAs are generally large and capable of sustaining these types of economic activities without degradation or elimination of the wildland resource. Generally, these wildland areas do not possess nationally unique or exceptional natural features.

ANNEX II

Some Tropical Wildlands of Special Concern¹⁹

Eastern Africa

- 1 Madagascar: significant proportions of the northern and eastern moist forests.
- 2 Ethiopia: much of the remaining highland forest.
- 3 Tanzania: Usambara, Pare, and Uluguru Mountains.
- 4 Rwanda: mountain forests along the Zaïre and Uganda borders.
- 5 Kenya: Kakamega, Nandi, and Arabuko-Sokoke forests.

Western Africa

- 6 Cameroon: particularly Cameroon Mountain and the moist forested area extending into Gabon, and to the vicinity of the Cross River in southeastern Nigeria, including the Oban Hills.
- 7 Ivory Coast: southwestern forests (including the Taï forest), and adjacent parts of Liberia and Sierra Leone.

East Asia and Pacific

- 8 The Malay Peninsular (including parts of Thailand): Lowland forests, especially along the northwestern and eastern coasts.
- 9 Indonesia: much of the remaining lowland forests of Kalimantan, Sumatra, Sulawesi (especially the two southern peninsulas), and many smaller islands (e.g., Siberut).
- 10 Philippines: much lowland forest on all larger islands.

South Asia

- 11 Sri Lanka: the coastal hills of the southwest and the Sinharaja forest of the "wet zone."
- 12 India: most of the forests remaining on the Western Ghats.
- 13 Burma: the untouched teak forests in the northern regions.

Latin America and Caribbean

- 14 Ecuador: lowland coastal forest
- 15 Mexico: Lacandon forest in Chiapas.
- 16 Honduras-Nicaragua border: Mosquitia forest.
- 17 Panama: Darien province.
- 18 Colombia: the Choco region adjacent to Darien province.
- 19 Brazil: coastal forests of the "Cocoa Region" in the southeastern extension of Bahia between the coast and 41°30'W longitude, and between 13° and 18°15'S latitude, and an outlier near Linhares, Espiritu Santo.
- 20 Brazil: parts of the eastern and southern Amazon region.

¹⁹ This list is by no means to be interpreted as comprehensive.

Tropical Aquatic Areas

- 1 Amazon River and associated wetlands (including varzea forests) (Brazil, Peru, Colombia, Ecuador, and Bolivia.)
- 2 Orinoco River and Delta (Venezuela and Colombia).
- 3 Purari River (Papua New Guinea).
- 4 Musi River (Sumatra, Indonesia).
- 5 Lake Malawi (Malawi), and other Rift Valley Lakes.
- 6 Lake Toba (Sumatra, Indonesia).
- 7 Sudd Swamp (Sudan).
- 8 Pantanal Swamp (Mato Grosso, Brazil).
- 9 Lake Atitlan (Guatemala).

ANNEX III

The Project Cycle

Responsibility for implementing wildland management projects or components rests primarily with regional operations staff, with advice and operational support provided by PPDES, as detailed for all environmental work in OMS 2.36. At *identification*, projects being considered are reviewed by regional staff in conjunction with PPDES to identify, as early as possible, the need to avoid converting a wildland tract or to preserve such a tract as part of the project. To determine whether a proposed project will develop or be in close proximity to environmentally important wildlands, Bank staff can consult those government agencies with jurisdiction over wildland management authority. PPDES maintains contacts with such agencies and will assist upon request. Additional sources of information on ecologically important wildlands are computerized data bases maintained by some non-governmental organizations (NGOs) and several published directories, available from PPDES. In this manner, it will often be possible to learn quickly whether a proposed project site contains existing or proposed WMAs; known endangered species; major wildlife or fish breeding, feeding, or staging areas; important watershed catchments; or living resources of major importance to local people. If none of these mechanisms reveal the existence of ecologically important wildlands in the project area, a brief pre-project field survey is necessary since many important wildlands are not yet identified. This field survey should be undertaken by relevant specialists from the government's environmental ministry, wildlife agency, national university, or similar institution. This brief survey indicates the nature and extent of impacts on critical wildlands that would result from the implementation of the project and puts the information in a national context. The results should be recorded on the form provided in Annex 5.

During *preparation*, project staff (or their consultants) may assist the Borrower or project sponsor in carrying out the necessary environmental studies, including those pertaining to wildlands. PPDES can recommend consultants or other experts who can identify important wildland areas, carry out necessary field surveys, or help design appropriate wildland management project components. At the completion of any necessary studies, the Project Brief (see OMS 2.13) should highlight whether the project involves the conversion or disintegration of a relatively unmodified ecosystem and include alternative suggestions for achieving the goals of the government. If conversion is justified, the Brief should outline why, together with the wildland management components needed.

As part of *appraisal*, project staff assess the planned wildland management and other environmental measures, as specified by OMS 2.20. The Staff Appraisal Report specifically describes any planned wildland management measures, including budgets and agency responsibilities. While PPDES is available for consultation and assistance at any stage of the project cycle, it is also responsible for reviewing projects at the Yellow Cover stage (see OMS 2.00). In addition to the Staff Appraisal Report, the

Ecologically Sensitive Sites in Africa

President's Report (see OMS 3.02) also notes any significant environmental -- including wildland management -- issues and mitigatory measures. Once wildland measures are identified as necessary, timely action should be ensured by conditionality such as loan effectiveness of disbursement. Since wildland management must be done in perpetuity to be effective, the loan agreement should specify long-term measures which the Borrower has agreed to implement.

Supervision missions should routinely review implementation of the wildland component with the Borrower. Such aspects are handled as for environmental issues in general (see OMS 2.36). Implementation of important wildland components should, as a general principle, be well underway before a project's major land clearing or construction works are allowed to proceed.

ANNEX IV

Physical Inputs Required in Most Wildland Management Areas

- a. Headquarters building and guard posts at entry points.
- b. Staff housing
- c. Visitor information center, including educational and interpretive exhibits where appropriate.
- d. Research facilities, including laboratory and housing for scientists.
- e. Roads and trails (amount will vary according to intensity of management desired).
- f. Fencing and signs, adequate to ensure proper demarcation and to control access.
- g. Communications, internal and external to the WMA: radio, walkie-talkies, mail, and telephone (where appropriate).
- h. Electricity, gas, or other energy systems.
- i. Sewage and waste systems.
- j. Four-wheel drive, motor bikes, or other vehicles.
- k. Boats, outboard motors, and docking facilities, where needed.
- l. Appropriate tools, maintenance equipment, and *spare parts*.
- m. Fuel.
- n. Management-oriented publications: maps, species lists, pamphlets for visitors, etc.

ANNEX V

Wildland Survey and Management Form²⁰
(Sample only)

Name of Project:

Expected Appraisal (or other) Date:

Date of this Survey:

Surveyor:

Affiliation:

Methodology(ies) (circle one):

Site inspection/Library research/Both/Other(specify)

- 1 Specific subcategory(ies) of ecosystem that proposed project will affect: (e.g., tropical semi-evergreen moist forest, salt-marsh, wet savanna)
- 2 Important environmental and biological features of ecosystem(s): (e.g., water catchment area for large agricultural valley and habitat for the endangered mountain gorilla)
- 3 Projected general impact type on ecosystem(s) of proposed project: (e.g., deforestation, flooding, draining)
- 4 Proportion (%) of the region's remaining ecosystem(s) (as in #1 above) to be converted (and/or impacted, if different): (e.g., this project will flood about 10% of this country's remaining lowland riparian swamp forest.)
- 5 Estimated annual rates of attrition of affected ecosystem(s) in this country and historical trend of this rate: e.g., The current annual rate of attrition of (semi-montane forest) is 3% a year. This rate was 0.5% in 1975 and 1% in 1980.)

Maps and more complete reports used or available can be appended or cited.

²⁰ This type of information is expected as part of identification, and can be used for the project brief. This form can be completed by the government's environmental ministry or wildlife agency, or by the project pre-feasibility team's wildlands specialist.

SECTION II

WEST AFRICA

Ghana, Guinea-Bissau, Liberia, Nigeria, São Tomé and Príncipe,
Sierra Leone

ANNOTATED LIST OF SITES

Within each country, sites are divided into four subsections, according to the degree of protection they appear to enjoy.

INTERNATIONALLY DESIGNATED PROTECTED AREAS These are the World Heritage sites, Biosphere Reserves and Ramsar sites within each country.

NATIONALLY PROTECTED AREAS Excluding those in the above section, these include all nationally designated protected areas having objectives which qualify them for IUCN Management Categories I-VII (see below).

OTHER MANAGED AREAS In this section are other designated sites which have a nature conservation function (including forest reserves and other IUCN Management Category VIII sites), as well as some well managed private reserves.

UNPROTECTED SITES This section includes sites where there is no officially recognised protection status. Three types of site are included: proposed protected areas, where implementation is either being studied or is under way; recommended sites, where protection has been recommended by an individual or group but where implementation is yet to be initiated; and other sensitive sites which have been recognised as valuable wildlands.

In some countries, the political situation may have caused management to lapse, and in these and other cases information on the current status of the site can be hard to obtain. The annotated list is based on the information available.

The protected areas information shown on the maps for each chapter have been classified by management authority; i.e the forestry sector, wildlife sector or additional sector (e.g. Presidential reserve). Information concerning the location of all numbered sites was not available. Hence some sites numbered on the lists do not appear on the maps.

This list has been prepared as a desk study, and is based on available information. It should be taken as a guide rather than a definitive study.

Information Sources

The World Conservation Monitoring Centre gathers, analyzes and disseminates information on the status, security and management of the Earth's biological diversity as a service to the international community. The information presented in this publication has been drawn from WCMC's databases and geographical files which have been developed in collaboration with numerous national and international sources. These data, which have been gathered over a number of years, are held within tabular databases, paper files and geographic information systems (GIS) at the Centre. WCMC relies on its own and its sponsors' worldwide network of contacts, as well as published and unpublished literature, to provide accurate information and an efficient service to its users.

The protected areas listings in the country chapters have been downloaded from the WCMC Protected Areas Database which contains over 32,000 records. The WCMC maintains these data in collaboration with the IUCN Commission on National Parks and Protected Areas, the UNESCO Man and the Biosphere Programme, the World Heritage Convention and others. This desk study has concentrated heavily on these data and on the extensive conservation library held at WCMC.

Much of the information WCMC holds has a spatial element and since 1989 WCMC has been operating a GIS. A substantial amount of data on threatened habitats, protected and unprotected sites and other related subjects have now been assembled. The digital spatial data run in parallel with the supporting structured data, and the locational or boundary information shown on the maps within the country chapters are updated as new data are acquired. The spatial data are maintained within the Centre's GIS in ARC/INFO format and are available to all parties concerned with environmental conservation, via the WCMC *Biodiversity Map Library* (BML). The BML has been designed and implemented to enhance the Centre's information service providing a method for maintaining the environmental data in a structured and easily accessible manner. The information shown on the maps in this book are stored in the BML.

The following text was originally drafted in December 1991 by James Culverwell and Hilary Tye, and updated in 1993 by James Culverwell and Harriet Gillett. Maps were prepared by Mary Edwards. Final copy was prepared by Harriet Gillett with assistance from Mark Lewis. Secretarial support was provided by Veronica Greenwood, with assistance from Deborah Rothera. Clare Billington and Jerry Harrison were responsible for overall coordination.

GHANA

INTERNATIONALLY DESIGNATED PROTECTED AREAS

Anlo-Keta Lagoon Complex

5°55'N, 0°50'E Designated a Ramsar Wetland Site in 1992.

Bia National Park

IUCN Categories II and IX

This national park and biosphere reserve covers 7770ha, with a core area of 300ha; it is contiguous to **Bia Game Production Reserve** (22,810ha). Bia has an undulating topography, and the vegetation is generally little disturbed. One of the two remaining areas in Ghana where virgin rain forest still exists, covering less than one percent of the former forest area. Interesting for being at the transition between moist evergreen and moist semi-deciduous tropical forest. All the mammals typical of undisturbed Guinean rain forest are found in Bia, including eight primate species and elephant. Illegal hunting continues, however, and has considerably reduced the fauna. There is a diverse avifauna, including the threatened white-breasted guineafowl *Agelastes meleagrides*. This reserve is one of the best studied forest areas in Ghana. Some evidence of timber exploitation and plantations of trees can still be seen. Tourism has also had some impact (IUCN/UNEP, 1987; MacKinnon and MacKinnon, 1986).

Densu Delta

5°33'N, 0°18'E Designated a Ramsar Wetland Site in 1992.

Muni Lagoon

5°22'N, 0°40'E Designated a Ramsar Wetland Site in 1992.

Owabi Wildlife Sanctuary

IUCN Category IV

6°44'N, 1°42'W Initially covering an area of 1450ha, this sanctuary is included in a Ramsar site (7258ha), established in 1988. It was originally established to protect a catchment area for the Owabi waterworks, and is centred on a reservoir on the Owabi stream. Water, containing aquatic plants (particularly water lettuce *Pistia nymphia*), reeds and other marsh flora, comprises one-third of the area. This is surrounded by secondary forest and some plantations. The area supports several primate species, a number of small antelopes and a variety of aquatic birds, including large numbers of Palearctic migrants during drought years. The water is no longer kept clear of vegetation, and the area of open water area is shrinking. The lower part of the sanctuary includes a water treatment plant, now used for training staff and as a standby supply for Kumasi. The sanctuary is ideally located for educational and recreational use, being within 10km of Kumasi (IUCN/UNEP, 1987; Ramsar Convention Bureau, 1990).

Sakumo Lagoon

5°40'N, 0°10'E Designated a Ramsar Wetland Site in 1992.

Songor Lagoon

5°45'N, 0°30'E Designated a Ramsar Wetland Site in 1992.

NATIONALLY PROTECTED AREAS

Boabeng-Fiema Monkey Sanctuary IUCN Category IV
Established in 1974; 260ha Protected by both legislation and traditional belief. A stream, the surrounding forest and two monkey species, black and white colobus *Colobus polykomos* and mona *Cercopithecus mona* are considered sacred (Sayer *et al.*, 1992).

Bomfobiri Wildlife Sanctuary IUCN Category IV
6°57'N, 1°10'W Covering 5184ha, this area of dry semi-deciduous forest is situated between the savanna and forest zones within Bomfoum Forest. Vegetation is secondary, with some cultivation (WCMC, 1988a).

Bui National Park IUCN Category II
This park of 207,360ha includes the catchment of the Black Volta River, and is covered in Guinea savanna woodland, with gallery forest along river courses. It supports a variety of primates and antelopes, and there is a varied avifauna. There are still some human settlements within the park, which put pressure on its natural resources (IUCN/UNEP, 1987).

Digya National Park IUCN Category II
This park covers 312,595ha of undulating terrain, and is bounded to the north and east by Lake Volta, which has flooded two river valleys. Guinea savanna woodland predominates, with gallery forest along major drainage lines. The park supports at least six primate species, elephant and a variety of antelopes. About 1000 people live within the park (IUCN/UNEP, 1987).

Kogyae Strict Nature Reserve IUCN Category I
7°15'N, 1°07'W Established in 1976 and covering an area of 32,400ha, this reserve is of importance for its antelope populations (Stuart *et al.*, 1990).

Mole National Park IUCN Category II
This park covers 491,440ha and is generally undulating, with steep scarps in the central part. Guinea woodland savanna predominates, with gallery forest along rivers. The park supports at least five mammal species, and the threatened fauna includes African wild dog, leopard, elephant and two crocodile species. There is no information on the status of the park's animal populations (IUCN/UNEP, 1987).

Nini-Suhien National Park IUCN Category II
5°19'N, 2°34'W Established in 1976, this park is situated in the extreme south-west of the country, within **Ankasa Game Production Reserve**. Covering 10,630ha, the area is in a wet evergreen forest zone of great richness. Endemic trees include *Monocyclanthus* sp. and *Cola umbratilis*. A full complement of forest fauna occurs, including 10 species of primate, three species of duiker, and bongo, bushbuck, forest elephant and white-breasted guineafowl (Stuart *et al.*, 1990; WCMC, 1988a).

OTHER MANAGED AREAS

- Abasumba Forest Reserve** IUCN Category VIII
5°38'N, 0°31'W Established in 1927; 104ha of southern marginal forest.
- Aboben Hill Forest Reserve** IUCN Category VIII
6°17'N, 0°00'W Established in 1962; 725ha of southern marginal forest.
- Abutia Hills Forest Reserve** IUCN Category VIII
Established in 1939; 899ha of forest.
- Ahirasu (Blocks I and II) Forest Reserve** IUCN Category VIII
7°37'N, 0°32'W Established in 1927; 104 ha of southern marginal forest.
- Akrobong Forest Reserve** IUCN Category VIII
5°38'N, 0°33'W Established in 1930; 260ha of southern marginal forest.
- Anhwiaso North Forest Reserve** IUCN Category VIII
6°19'N, 2°16'W Established in 1926; 363ha of moist semi-deciduous south-east forest.
- Ankasa Game Production Reserve** IUCN Category VIII
5°15'N, 2°36'W This 20,736ha area is adjacent to **Nini-Suhien National Park**, within **Ankasa Game Production Reserve**, with a similar fauna and flora to those areas. Controlled hunting and logging are allowed, and poaching occurs. Surveys are required (WCMC, 1988a).
- Apepesu River (plantation) Forest Reserve** IUCN Category VIII
7°50'N, 0°35'E Established in 1954; 6060ha of dry, semi-deciduous fire zone forest.
- Asebilika (plantation) Forest Reserve** IUCN Category VIII
3885ha
- Asonari (plantation) Forest Reserve** IUCN Category VIII
6°51'N, 1°19'W Established in 1928; 155ha of dry, semi-deciduous inner zone forest.
- Asuokoko River (plantation) Forest Reserve** IUCN Category VIII
7°47'N, 0°25'E Established in 1939; 11,603ha of dry, semi-deciduous fire zone forest.
- Bazua Bridge (proposed plantation) Forest Reserve** IUCN Category VIII
Established in 1958, covering an area of 218ha

Bediako Forest Reserve

6°10'N, 0°58'W This reserve covers 700ha of moist semi-deciduous south-east forest.

Bia Game Protection Area

IUCN Category VIII

Covering 22,810ha, this GPA comprises three-quarters of the original national park of the same name, to which it is contiguous. Selective logging takes place in this section, although many of the economically valuable trees are important food species for forest primates. There are unconfirmed reports that large sections of forest, important for encompassing dry season water supplies for elephant, have been felled. If true, this would have serious consequences. Some exploitation of fauna is allowed, but this is strictly controlled. Although many hunting licences have been issued, the authorities have tightened control on firearm licences (IUCN/UNEP, 1987).

Bombi Forest Reserve

IUCN Category VIII

Established in 1963; 148ha

Bopona (plantation) Forest Reserve

IUCN Category VIII

Established in 1948; 6175ha

Buligu (plantation) Forest Reserve

IUCN Category VIII

Established in 1955; 5672ha

Bumbugu Extension Block I (plantation) Forest Reserve

IUCN Category VIII

Established in 1958; 41ha

Bambugu Plantation (plantation) Forest Reserve

IUCN Category VIII

Established in 1954; 414ha

Chai River Forest Reserve

8°02'N, 0°26'E Established in 1962, covering 18,236ha of dry, semi-deciduous fire zone forest.

Chasi (plantation) Forest Reserve

IUCN Category VIII

Established in 1940; 7252ha

Chiana Hills (plantation) Forest Reserve

IUCN Category VIII

Established in 1945; 4359ha

Daka Headwaters Forest Reserve

IUCN Category VIII

Established in 1952; 14,566ha

Damango Scarp (plantation) Forest Reserve

IUCN Category VIII

Established in 1963; 3937ha

- Damango Teak Plantation Block I Forest Reserve**
Established in 1963; 38ha IUCN Category VIII
- Damango Teak Plantation Blocks II and III Forest Reserve**
Established in 1963; 5ha
- Dede Forest Reserve** IUCN Category VIII
6°34'N, 0°16'W Established in 1955; covers 5110ha of dry, semi-deciduous fire zone forest.
- Dedoro (plantation) Forest Reserve** IUCN Category VIII
Established in 1947; 311ha
- Education Plantation (plantation) Forest Reserve** IUCN Category VIII
Established in 1960; 259ha
- Gambaga East Forest Reserve** IUCN Category VIII
Established in 1948; 12,753ha
- Gambaga West I Forest Reserve** IUCN Category VIII
Established in 1954; 11,500ha
- Gambaga West II Forest Reserve** IUCN Category VIII
Established in 1968; 22,222ha
- Gbele Game Production Reserve** IUCN Category VIII
Established in 1975; 54,691ha (Stuart *et al.*, 1990)
- Giah (plantation) Forest Reserve** IUCN Category VIII
Established in 1948; 2169ha
- Ho Hill Station (plantation) Forest Reserve** IUCN Category VIII
Established in 1946; 23ha
- Kabakaba Hills Forest Reserve** IUCN Category VIII
6°39'N, 0°29'E Established in 1947; covers 1386ha of dry, semi-deciduous fire zone forest.
- Kabo River (plantation) Forest Reserve** IUCN Category VIII
7°37'N, 0°26'E Established in 1931; covers 13,598ha of dry, semi-deciduous fire zone forest.
- Kalakpa Game Production Reserve** IUCN Category VIII
Established 1975, this 32,400ha area contains some important forests (Stuart *et al.*, 1990).

Kamba Tributaries (plantation) Forest Reserve Established in 1959; 3756ha	IUCN Category VIII
Kandembeli (plantation) Forest Reserve	IUCN Category VIII
Kanjarga Fumbisi (plantation) Forest Reserve Established in 1948; 1293ha	IUCN Category VIII
Karaga (plantation) Forest Reserve	IUCN Category VIII
Kenikeni (plantation) Forest Reserve	IUCN Category VIII
Klemu Headwaters (plantation) Forest Reserve 6°46'N, 0°31'E Established in 1947; covers 1088ha of dry, semi-deciduous fire zone forest.	IUCN Category VIII
Kologu-Naga (plantation) Forest Reserve Established in 1945; 4533ha	IUCN Category VIII
Kpandu Plantation (plantation) Forest Reserve Established in 1947; 44ha	IUCN Category VIII
Kpandu Range Dayi Block (plantation) Forest Reserve 5°45'N, 0°17'E Established in 1951; covers 3030ha of dry, semi-deciduous fire zone forest.	IUCN Category VIII
Kpandu Range West (plantation) Forest Reserve 6°50'N, 0°14'E Established in 1947; covers 3548ha of dry, semi-deciduous fire zone forest.	IUCN Category VIII
Krowam (plantation) Forest Reserve 6°55'N, 1°19'W Established in 1928; covers 570ha of dry, semi-deciduous inner zone forest.	IUCN Category VIII
Kulupene (plantation) Forest Reserve Established in 1951; 218ha	IUCN Category VIII
Kumawu Waterworks Supply (plantation) Forest Reserve Established in 1945; 96ha	IUCN Category VIII
Kumbo Forest Reserve Established in 1956; 16,449ha	IUCN Category VIII
Marago River Forest Reserve Established in 1954; 8806ha	IUCN Category VIII

Morago West (plantation) Forest Reserve Established in 1951; 3976ha	IUCN Category VIII
Nandom/Lambussie (plantation) Forest Reserve Established in 1956; 188ha	IUCN Category VIII
Nasia Tributaries Forest Reserve Established in 1956; 31,469ha	IUCN Category VIII
Nuale (proposed) Forest Reserve Established in 1954; 5180ha	IUCN Category VIII
Nyembong (plantation) Forest Reserve Established in 1954; 466ha	IUCN Category VIII
Nyokoko (plantation) Forest Reserve Established in 1951; 40ha	IUCN Category VIII
Obotumfo Hills Forest Reserve 5°36'N, 0°34'W Established in 1930; covers 155ha of southern marginal forest.	IUCN Category VIII
Oboyow Forest Reserve 5°46'N, 0°55'W Established in 1927; covers 6370ha of moist semi-deciduous south-east forest.	
Odomi River (plantation) Forest Reserve 7°19'N, 0°29'E Established in 1931; covers 1606ha of dry, semi-deciduous fire zone forest.	
Pogi (plantation) Forest Reserve Established in 1951; 2606ha	IUCN Category VIII
Red Volta East (plantation) Forest Reserve Established in 1953; 21,760ha	IUCN Category VIII
Red Volta West (plantation) Forest Reserve Established in 1962; 26,159ha	IUCN Category VIII
Saboro (plantation) Forest Reserve Established in 1934; 37ha	IUCN Category VIII
Sapawsu Forest Reserve 6°16'N, 0°01'E Established in 1957; covers 1531ha of southern marginal forest.	IUCN Category VIII

- Sekondi Waterworks (II and III) Forest Reserve** IUCN Category VIII
5°01'N, 1°45'W Established in 1938; covers 1010ha of moist semi-deciduous south-east forest.
- Shai Hills Game Production Reserve** IUCN Category VIII
5°54'N, 0°04'E 5443ha The only southern outlier forest of the coastal zone that is protected. Three endemic tree species occur, as do kob, baboons and green monkeys. Illegal collection of firewood is a problem (WCMC, 1988a).
- Sinsaa Bogiwini (plantation) Forest Reserve** IUCN Category VIII
Established in 1956; 7252ha
- Sissili Central (plantation) Forest Reserve** IUCN Category VIII
Established in 1947; 15,509ha
- Sissili North (plantation) Forest Reserve** IUCN Category VIII
Established in 1940; 8288ha
- Sumtwitwi (plantation) Forest Reserve**
6°20'N, 2°10'W Established in 1939; 363ha of moist semi-deciduous forest.
- Tamale Waterworks (plantation) Forest Reserve** IUCN Category VIII
Established in 1954; 140ha
- Tankara (plantation) Forest Reserve** IUCN Category VIII
Established in 1951; 482ha
- Tankwiddi East (plantation) Forest Reserve** IUCN Category VIII
Established in 1951; 19,321ha
- Tankwiddi West (plantation) Forest Reserve** IUCN Category VIII
Established in 1941; 11,914ha
- Togo Plateau (plantation) Forest Reserve** IUCN Category VIII
7°14'N, 0°25'E Established in 1929; covers 14,763ha of dry semi-deciduous fire-zone forest (WCMC, 1988a).
- Upper Tamne Blocks I-V (plantation) Forest Reserve** IUCN Category VIII
Established in 1958; 1725ha
- Volta River Forest Reserve** IUCN Category VIII
6°11'N, 0°01'E Established in 1940; covers 5050ha of dry semi-deciduous and southern marginal forest.
- Wa Plantation (plantation) Forest Reserve** IUCN Category VIII
Established in 1957; 248ha

Wiaga (plantation) Forest Reserve Established in 1950; 948ha	IUCN Category VIII
Wiaga Kandema (plantation) Forest Reserve Established in 1941; 5180ha	IUCN Category VIII
Yakombo (plantation) Forest Reserve Established in 1974; 121,095ha	IUCN Category VIII
Yendi Town Plantation (plantation) Forest Reserve Established in 1954; 75ha	IUCN Category VIII
Yerada (plantation) Forest Reserve Established in 1972; 42,481ha	IUCN Category VIII
Yogaga (plantation) Forest Reserve 80ha	IUCN Category VIII
Yongwa (plantation) Forest Reserve 6°13'N, 0°03'W Established in 1957; covers 777ha of south-east outlier forest.	IUCN Category VIII
Zawse Hill Blocks I and II (plantation) Forest Reserve Established in 1954; 1012ha	IUCN Category VIII
Zawse Plantation UR (plantation) Forest Reserve Established in 1954; 229ha	IUCN Category VIII
UNPROTECTED SITES	
Agumatsa Wildlife Sanctuary 1200ha	Proposed
Ambalara (plantation) Forest Reserve 9995ha	Proposed
Assin-Attandanso Game Production Reserve 5°34'N, 1°20'W Established in 1937; covers 15,359ha of moist evergreen forest, which could be incorporated into Kakum National Park (Stuart <i>et al.</i> , 1990).	Proposed
Bagwon Bawo (plantation) Forest Reserve 6475ha	Proposed
Bambulo (plantation) Forest Reserve 20,409ha	Proposed

Chira Headwaters (plantation) Forest Reserve Proposed
4144ha

Greenbelt Forest Reserve Proposed
1471ha

Kakum National Park Proposed
5°26'N, 1°19'W Covering 21,264ha, this park will be created by the amalgamation of **Kakum Forest Reserve** and **Assin Attandanso Game Production Reserve**, in the southern moist semi-deciduous forest zone. Elephant still occur (Stuart *et al.*, 1990).

Kulpawn Headwaters (plantation) Forest Reserve Proposed
15,540ha

Mawbia (plantation) Forest Reserve Proposed

Polli (plantation) Forest Reserve Proposed
3561ha

Pudu Hills (plantation) Forest Reserve Proposed
5413ha

Pulubajala (plantation) Forest Reserve Proposed
3921ha

Tapania (plantation) Forest Reserve Proposed
4662ha

Tumu (plantation) Forest Reserve Proposed
5439ha

Turtle Beaches

Five species of marine turtle occur in Ghanaian coastal waters, *viz.* the loggerhead, hawksbill, green, olive ridley and leatherback, of which the last four nest on the coast (Stuart *et al.*, 1990).

Volta River Delta

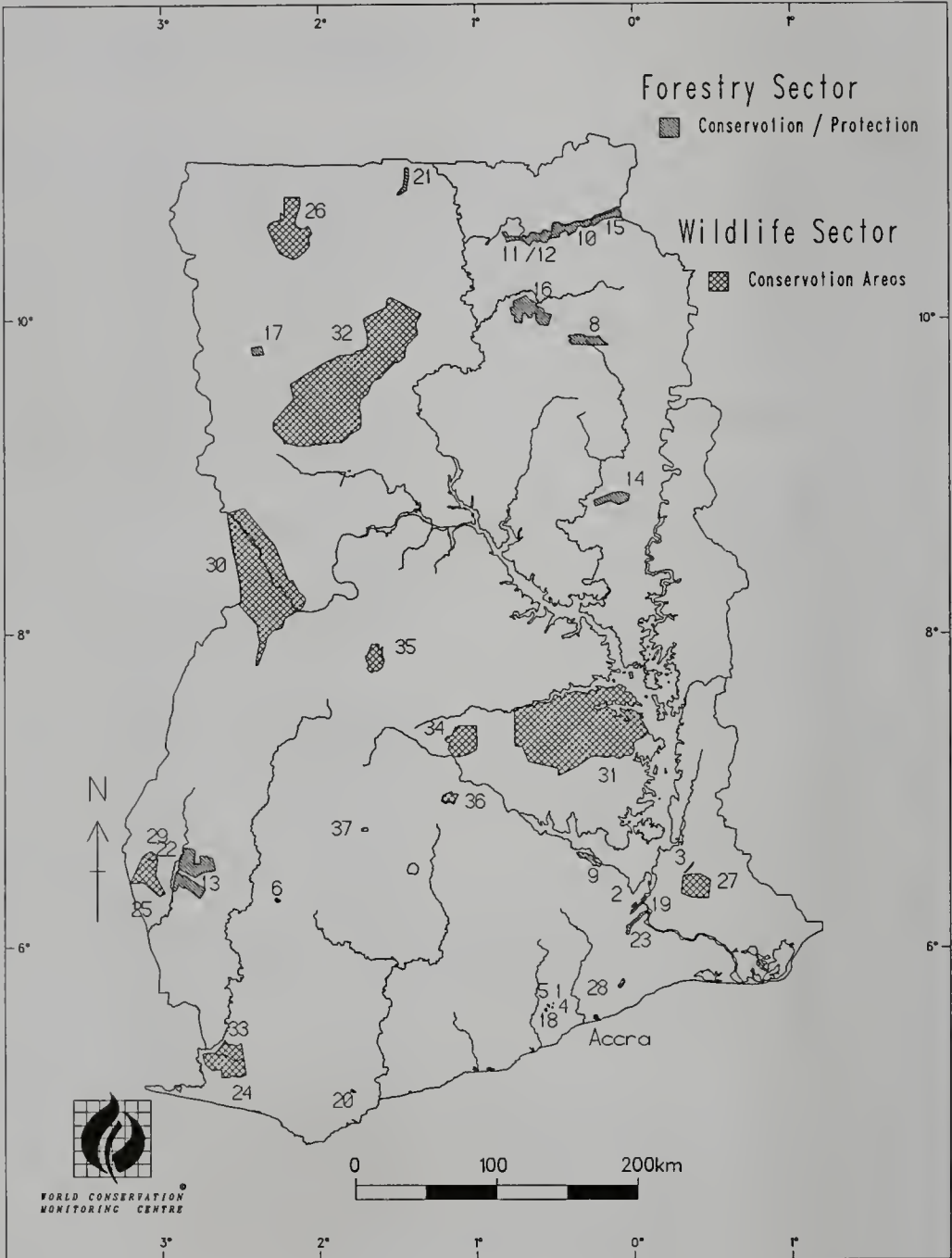
5°46'-6°01'N, 0°15'-1°12'E This is a large delta with a complex lagoon system, including Songaw and Keta lagoons. These lagoons are surrounded by coastal mangroves and extensive freshwater lagoons, with small mudflat areas in the estuary. The area is of very great importance to wintering Palaearctic and resident waterfowl and waders. Possible threats to the integrity of the area include overfishing, pollution and the hunting of terns (Altenburg, 1987; Stuart *et al.*, 1990).

GHANA - PROTECTED SITES

National/international designations

Name of area and map reference (see Fig. 1.1)	Management area (ha)	Year notified
Forest Reserves		
1 Abasumba	104	1927
2 Aboben Hill	725	1962
3 Abutia Hills	899	1939
4 Ahirasu (Blocks I & II)	104	1927
5 Akrobong	260	1930
6 Anhwiaso North	363	1926
7 Bombi	148	1963
8 Daka Headwaters	14,566	1952
9 Dede	5,110	1955
10 Gambaga East	12,753	1948
11 Gambaga West II	1,500	1954
12 Gambaga West II	22,222	1968
13 Krokosua Hills	48,170	1935
14 Kumbo	16,449	1956
15 Marago River	8,806	1954
Morago West (plantation)		
16 Nasia Tributaries	31,469	1956
17 Nuale	5,180	1954
18 Obotumfo Hills	155	1930
19 Sapawsu	1,531	1957
20 Sekondi Waterworks (Blocks II & III)	1,010	1938
21 Sissili North	8,288	1940
22 Sucusuku	14,760	1972
23 Volta River	5,051	1940
Game Production Reserves		
24 Ankasa	20,736	1976
25 Bia	22,810	1974
26 Gbele	54,691	1975
27 Kalakpa	32,400	1975
28 Shai Hills	5,443	1976
National Parks		
29 Bia	7,770	1974
30 Bui	207,360	1971
31 Digya	312,595	1971
32 Mole	491,440	1971

Fig 1.1 Ghana: protected ecologically sensitive sites



GHANA - PROTECTED SITES (cont.)

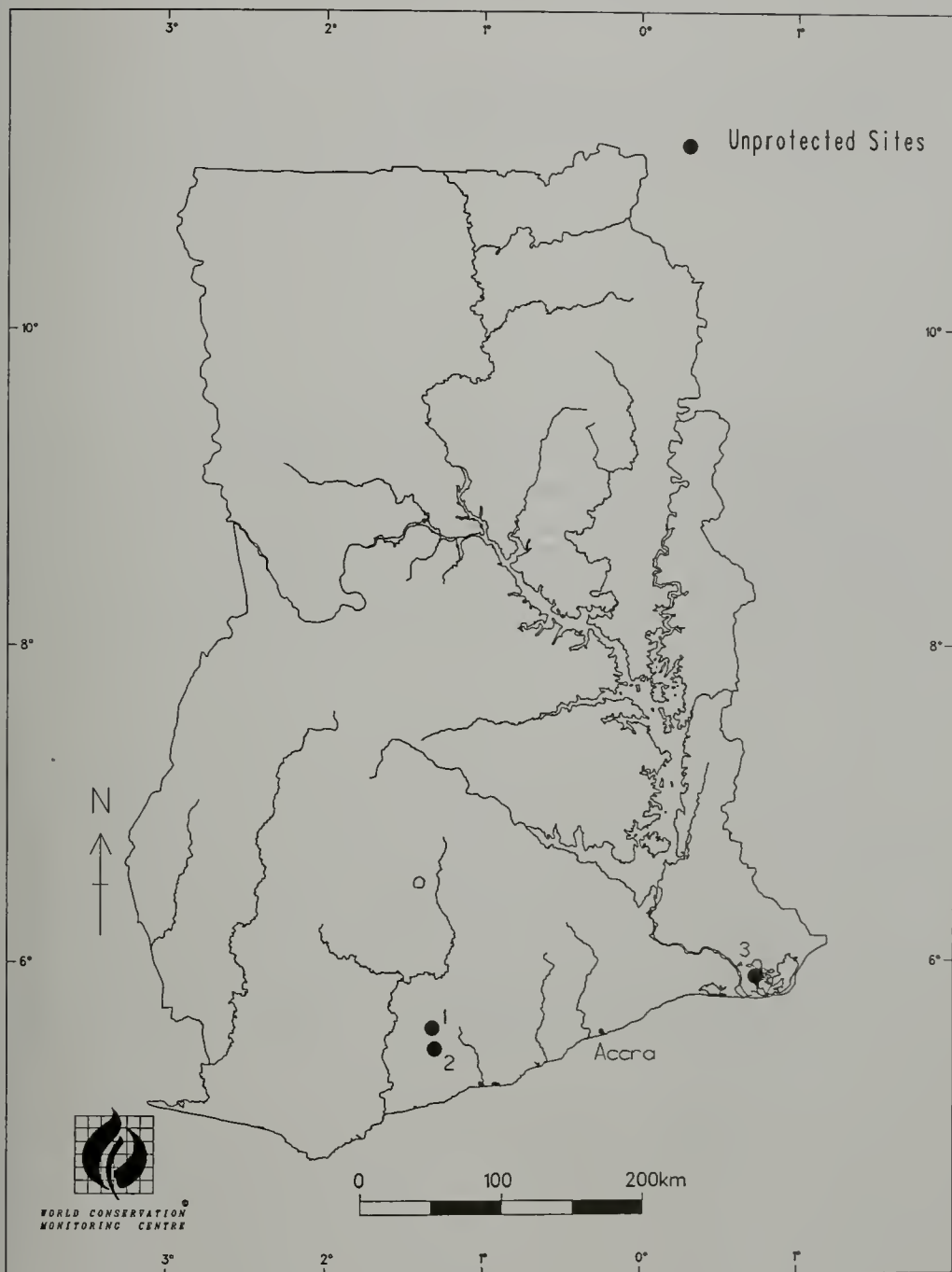
National/international designations

Name of area and map reference (see Fig. 1.1)	Management area (ha)	Year notified
Strict Nature Reserve		
33 Nini-Suhien	10,630	1976
34 Kogyae	32,400	1976
Wildlife Sanctuaries		
35 Boabeng-Fiema	260	1974
36 Bomfobiri	5,184	1975
37 Owabi	7,258	1971
Biosphere Reserve		
Bia National Park	7,770	1983
Ramsar Sites		
Anlo-Keta Lagoon Complex		
Densu Delta		1992
Muni Lagoon		1992
Owabi	7,260	1988
Sakumo Lagoon		1992
Songor Lagoon		1992
World Heritage Sites		
Ashante Traditional Buildings		1980
Forts and castles, Accra		1979

GHANA - UNPROTECTED SITES

Name of area and map reference (see Fig. 1.2)	Management area (ha)
Agumatsa Wildlife Sanctuary	1,200
Ambalara (plantation) Forest Reserve	9,995
1 Assin-Attandanso Game Production Reserve	15,359
Bagwon Bawo (plantation) Forest Reserve	6,475
Bambulo (plantation) Forest Reserve	20,409
Chira Headwaters (plantation) Forest Reserve	4,144
Greenbelt Forest Reserve	1,471
2 Kakum National Park	21,264
Kulpawn Headwaters (plantation) Forest Reserve	15,540
Mawbia (plantation) Forest Reserve	12,950
Polli (plantation) Forest Reserve	3,561
Pudu Hills (plantation) Forest Reserve	5,413
Pulubajala (plantation) Forest Reserve	3,921
Tapania (plantation) Forest Reserve	4,662
Tumu (plantation) Forest Reserve	5,439
Turtle Beaches	
3 Volta River Delta	

Fig 1.2 Ghana: unprotected ecologically sensitive sites



GUINEA-BISSAU

INTERNATIONALLY DESIGNATED PROTECTED AREAS

Lagoa de Cufada Ramsar Wetland

11°41'N, 14°47'W (approx. centre) Established as a Ramsar Wetland site of 39,098ha in 1990. Includes **Lagoa de Cufada Hunting Reserve**. Situated largely between the Quebo-Fulacunda road and the Rio Corubal to the north, this area is noteworthy for its wealth of birdlife (Miranda, 1989).

NATIONALLY PROTECTED AREAS

None

UNPROTECTED SITES

Arquipelago dos Bijagos Biosphere Reserve

Proposed

11°10'N, 16°00'W (centre) Incorporates **Arquipelago dos Bijagos Hunting Reserve**. Consists of some 40 islands off the coast of Guinea-Bissau, 20 of which are sparsely inhabited. Oil palms cover the higher areas, whilst 35,000ha of mangroves and 76,000ha of inter-tidal mudflats are of major importance for migratory birds and wintering waders. Marine hippopotami occur. Includes Ilhau do Poilau, possibly the most important nesting site for Green Turtle *Chelonia mydas* in West Africa (Stuart *et al.*, 1990; WCMC, 1991).

Boe Protected Area

Proposed

Ilha de Cofra Hunting Reserve

Established 1980.

Lagoa de Cufada Hunting Reserve

Proposed

see Lagoa de Cufada Ramsar Wetland

Mata de Cantanhez Protected Area

Proposed

11°22'-11°37'N, 14°56'-15°09'W This incorporates moist forests in the south of the country, immediately to the south of the **Lagoa de Cufada** area, north of the Bedanda-Guilege road. The rare tree *Guibourtia copallifers* occurs (Miranda, 1989).

Olon Forest

Interesting forest; a potential site for protection (Stuart *et al.*, 1990).

Rio Cacene and Rio Cumbija Basin

Rio Cacheu

Proposed

12°02'-12°20'N, 15°13'-16°42'W An area extending up to Ilha de Jeta, incorporating 9500ha of inter-tidal mudflats, 52,000ha of estuarine mangroves, and 24,000ha of swamp and marsh along the river, up to 150km inland. The area is of great importance to Palaearctic waders and other waterfowl, and for birds of prey. Threats include possible droughts, and cutting of mangroves (Altenburg, 1987; WCMC, 1991).

Rio Gêba Estuary

Proposed

11°43'N, 15°14'W (centre) Comprising 17,500ha of mudflats, 3000ha of mangrove and 13,000ha of marshes, including Bolama Island, this estuary is of importance to waterbirds, particularly certain herons (Altenburg, 1987; WCMC, 1991).

Rio Gêba/Rio Mansoa Hunting Reserve

Established in 1980.

Rio Grande de Buba Basin

Proposed

11°25'N, 15°23'W (centre) Comprising 13,000ha of rocks and mudflats, and 17,000ha of mangroves, this is an important area for resident and Palaearctic waders; marabou stork and pink-backed pelican breed here (Altenburg, 1987; WCMC, 1991).

Rio Mansoa Basin

Proposed

11°54'N, 16°00'W (centre) Incorporates **Rio Mansoa Hunting Reserve** established in 1980, the islands of Ilha de Jeta and Ilha de Pecixe, and Rio Nhacete. The river banks and islands are lined by 11,000ha of inter-tidal mudflats, whilst 50,500ha mangroves occur up to 50km inland; the central and upper areas of mangrove have been destroyed by rice cultivation. An important breeding area for African darter and great white egret, it is of international importance for western European populations of black-tailed godwit *Limosa limosa*, amongst others (Altenburg, 1987; WCMC, 1991).

Rio Tombali

Proposed

11°11'N, 15°05'W (centre) Includes the estuaries of the Rio Cumbija and Rio Cacine, comprising 32,500ha of inter-tidal coastal mudflats, and 78,500ha of mangroves, especially in the Cumbija and Cacine estuaries. Biologically, this is the richest area in the country. African darter, wood stork, great white egret, sacred ibis, African spoonbill and pink-backed pelican breed in the Cumbija estuary, and the area as a whole is important for resident and Palaearctic waders. Cutting of mangroves is probably a threat (WCMC, 1991).

Sector Administrativa de Boé Hunting Reserve

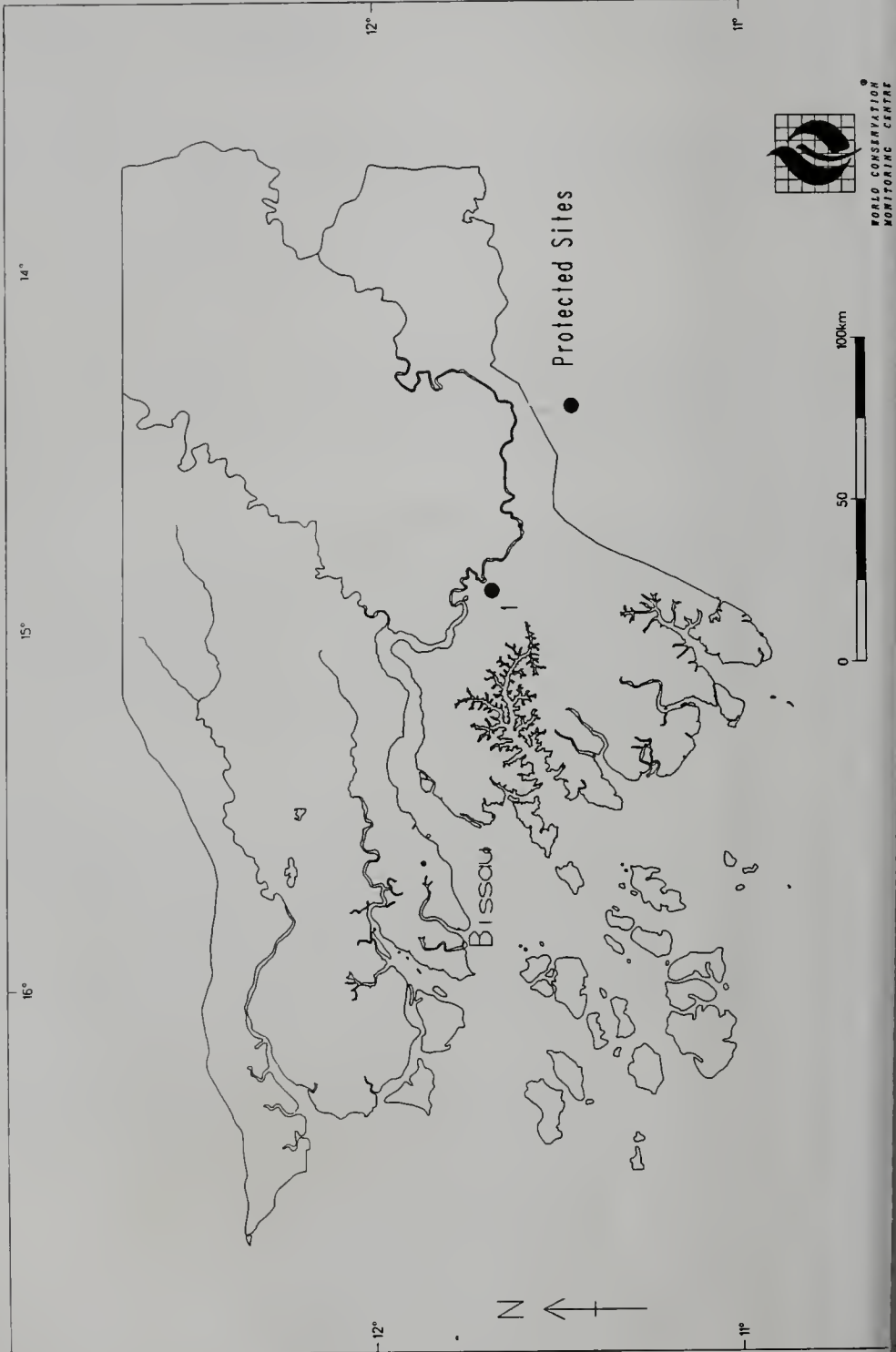
Established in 1980; mangroves, both coastal and estuarine occur, and the reserve supports manatees (IUCN 1987).

GUINEA-BISSAU - PROTECTED SITES

National/international designations

Name of area and map reference (see Fig. 2.1)	Management area (ha)	Year notified
Ramsar Wetland Site 1 Lagoa de Cufada	39,098	1990

Fig 2.1 Guinea-Bissau: protected ecologically sensitive sites



GUINEA-BISSAU - UNPROTECTED SITES

Name of area and map reference (see Fig. 2.2)	Management area (ha)
1 Arquipelago dos Bijagos Biosphere Reserve Boe Protected Area Ilha de Cofra Hunting Reserve	
2 Lagoa de Cufada Hunting Reserve	
3 Mata de Cantanhez Protected Area Olon Forest	
4 Rio Cacene and Rio Cumbija Basin	
5 Rio Cacheu	85,500
6 Rio Gêba Estuary Rio Gêba/Rio Mansoa Hunting Reserve	
7 Rio Grande de Buba Basin	30,000
8 Rio Mansoa Basin	61,500
9 Rio Tombali Sector Administrativa de Boé Hunting Reserve	111,000

Fig 2.2 Guinea-Bissau: unprotected ecologically sensitive sites



LIBERIA

INTERNATIONALLY DESIGNATED PROTECTED AREAS

None

NATIONALLY PROTECTED AREAS

Sapo National Park

IUCN Category II

This park covers 130,747ha of gently undulating hills and higher steep ridges. Sapo Forest is one of the last remaining blocks of tropical lowland rain forest in Liberia; about 20% of the park area consists of swamp, and 63% is primary and mature secondary forest of which 13% is seasonally inundated. The forest is one of the richest in West Africa for wildlife, and contains most of the mammal species recorded in Liberia. Threatened species include forest elephant, pygmy hippopotamus *Choeropsis liberiensis*, Jentink's duiker *Cephalophus jentinki*, leopard, chimpanzee and three rare bird species. It is thirteenth on the list of forests identified as important for threatened birds in Africa (Collar and Stuart, 1988). The park is facing tremendous pressure from timber concessions, subsistence farming and hunting. A road was constructed in the north-east corner in 1981 and some illegal logging and hunting has occurred here, although generally the lack of access has prevented much disturbance. Staff levels are far below that required to control the park adequately. The Putu mountain range to the north is one of the richest game areas in Liberia, but villages and mining projects here prevent its inclusion (IUCN/UNEP, 1987).

OTHER MANAGED AREAS

East Nimba National Forest - see Mount Nimba Nature Reserve

28,700ha

IUCN Category VIII

Gbi National Forest

IUCN Category VIII

Established in 1960, this 60,970ha area has been recommended for upgrading to a nature reserve (IUCN, 1987).

Gio National Forest

IUCN Category VIII

Established in 1960 and covering 32,900ha, this area has been recommended for upgrading to a nature reserve. North Gio is no longer protected (Stuart *et al.*, 1990).

Gola National Forest

IUCN Category VIII

Covering 207,100ha, this area has been recommended for upgrading to a nature reserve.

Grebo National Forest

IUCN Category VIII

5°45'N, 7°35'W Covering 260,400ha, the topography and forest types within this national forest are presumably similar to the almost adjacent **Tai National Park**. Mammalian fauna includes elephant, buffalo, leopard, Jentink's and yellow-backed duikers, and bongo. It is one of the few known localities of the extremely rare

Liberian mongoose *Liberiictis kuhni*, considered to be in danger of extinction. Several vulnerable bird species occur, including the endemic spot-winged greenbul *Phyllastrephus leucolepis*. The area is considered to be of international biological importance. The forest is logged commercially, and forests in the eastern-most regions have been almost eliminated. It has been recommended for upgrading to a nature reserve (Collar and Stuart, 1988; Stuart *et al.*, 1990).

Kpelle National Forest
174,828ha

IUCN Category VIII

Krahn-Bassa National Forest
Established in 1960 and covering 514,200ha, this is recommended for upgrading to a nature reserve; it will be contiguous to the ungazetted **Cestos-Sankwen National Park** (IUCN/UNEP, 1987).

IUCN Category VIII

Lorma National Forest
43,500ha (Stuart *et al.*, 1990)

IUCN Category VIII

North Lorma National Forest - see **Wologizi Area Nature Conservation Unit**
100,000ha

IUCN Category VIII

West Nimba National Forest - see **Mount Nimba Nature Reserve**
IUCN Category VIII

UNPROTECTED SITES

Belle National Forest This forest is reported to be a priority for conservation (Stuart *et al.*, 1990).

Cape Mount National Park Proposed
6°45'N, 11°21'W Covering 22,400ha between the Sierra Leone border and the southern edge of Lake Piso (at 20,000ha the largest lagoon in Liberia), this proposed national park will include the 300m high Cape Mount. Its northern slopes support secondary forest, but rain forest in good condition occur on the southern side. Between the mouth of the Lofa river and Cape Mount there are unique habitats including savanna, swamp forest, freshwater lakes and lagoons. The area supports 95% of the Liberian population of white-faced tree duck and it is of great importance for overwintering herons and waders. The beach is a significant turtle nesting site, where turtle eggs are sometimes dug up by humans. The Lofa mouth and the mangroves to the east are an important roosting place for many waders and waterfowl. The area is largely uninhabited; the Lofa is the only large estuary in Liberia with no villages (Gatter, 1988; Stuart *et al.*, 1990).

Cavally Forest Nature Reserve
5°20'N, 7°26'W This is a frontier reserve, situated in an enclave between **Grebo National Forest** and the border with Côte d'Ivoire.

Cestos-Senkwen National Park

5°20'N, 9°25'W (centre) Situated along the coast between the Sehnkwehn and Cestos rivers, this proposed national park extends upstream along these rivers for 20km and 60km, respectively. The proposed area of 145,000ha would be a westward extension of **Krahn-Bassa National Forest**, to include the spectacular Cestos River and Senkwen River estuary with 1200ha of mangroves. The area is low-lying, with occasional hills. Situated at the transition between inland and littoral forests, the area reportedly contains a wide variety of typical Liberian fauna; pygmy hippo occur in riverine gallery forest. Shifting cultivation is spreading rapidly along the Cestos River, although at present in an area still outside the proposed park, and human pressure on the mangroves is great. Some forestry and mining concessions exist within the park's boundaries, but less so than in **Sapo National Park**. However, a logging road which is being constructed from the Sinoe-Zwendru road will increase access and enable farmers access (Gatter, 1988; Hughes and Hughes, 1992; IUCN/UNEP, 1987).

Lofa-Mano National Park

This covers an area of 230,000ha in the same forest block as the **Gola Forest Reserves** in Sierra Leone. The whole region is undulating and includes part of the Wonegizi mountain range, drained by the Mano and Lofa rivers which have considerable seasonal variations in their water levels. The dominant vegetation is evergreen rain forest, becoming more deciduous in the north with large patches of low bush, marshes and savanna. About 90% of the vegetation can be considered as near-primary. All remaining forest has now been allocated for timber concessions. It is joint thirteenth on the list of forests identified as important for threatened birds in Africa. The area contains one-third of the Liberian forest elephant population, and other threatened species such as pygmy hippopotamus, Jentink's duiker and red colobus also occur. Hunting is widespread, although much of the area has been safeguarded by its inaccessibility. A pipeline from proposed iron ore mines outside the park to a new harbour would, if constructed, run through the park. Construction of a hydroelectric power scheme on the Mano River is already in progress and will flood large areas which will have to be excluded from the park; the dam will jeopardise one of the most scenic and scientifically valuable areas in Liberia (Collar and Stuart, 1988; IUCN/UNEP, 1987).

Loma Conservation Area

Proposed

Mount Nimba Nature Reserve

Proposed

7°32'N, 8°32'W Contiguous to **Mount Nimba World Heritage Site** (18,00ha) in Côte d'Ivoire and Guinea, the Guinea part of the reserve is also a biosphere reserve. Mount Nimba is part of the 'Guinean Backbone', rising some 1000m above the surrounding terrain. It is a frontier reserve with a very high priority, and is home to a high number of plant species (over 2000), of which 16 species are endemic. It displays a very high degree of faunistic endemism, with over 500 new species having been described from the area. It is also the home of rare fruit bats, birds including the Nimba flycatcher and white-winged picathartes, the endemic otter shrew *Micropotamogale lamottei*, the endemic frog *Nectophrynoides liberiensis*, and the rare

African giant swallowtail butterfly. Parts have been severely degraded by iron ore mining. **East Nimba National Forest** was established in 1977 and covers 28,700ha; it has been recommended for upgrading to a nature reserve. **West Nimba National Forest** covers 13,112ha (IUCN/UNEP, 1987; Stuart *et al.*, 1990).

Tienpo Natural Forest
12,800ha

Proposed

Wologizi Area Nature Conservation Unit
Covering 20,234ha, this Unit together with **North Lorma National Forest** (100,000ha) and **Wonegizi Area Nature Conservation Unit** (26,130ha) will form a combined protected area which should comprise two fully protected core areas, with an adjacent utilisation area. **North Lorma National Forest** is an IUCN Category VIII area; it has been recommended for upgrading to a nature reserve (Stuart *et al.*, 1990).

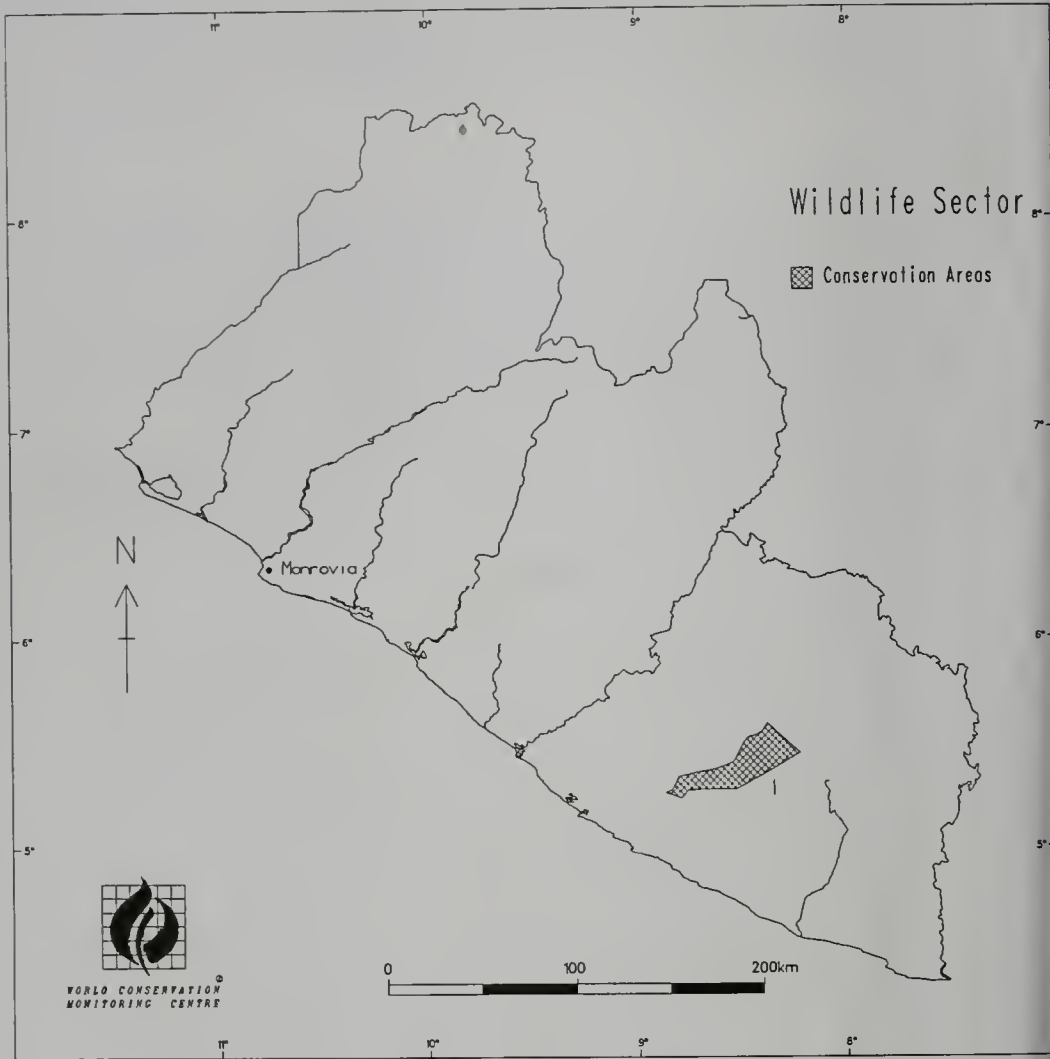
Proposed

Wonegizi Area Nature Conservation Unit - see **Wologizi Area Nature Conservation Unit**
26,130ha

LIBERIA - PROTECTED SITES*National/international designations*

Name of area and map reference (see Fig. 3.1)	Management area (ha)	Year notified
National Forests		
Kpelle	174,828	
Gbi	60,970	1960
Gola	207,100	
Grebo	260,400	
Krahn-Bassa	514,200	1960
Lorma	43,500	
North Lorma	100,000	
National Park		
1 Sapo	129,230	1983

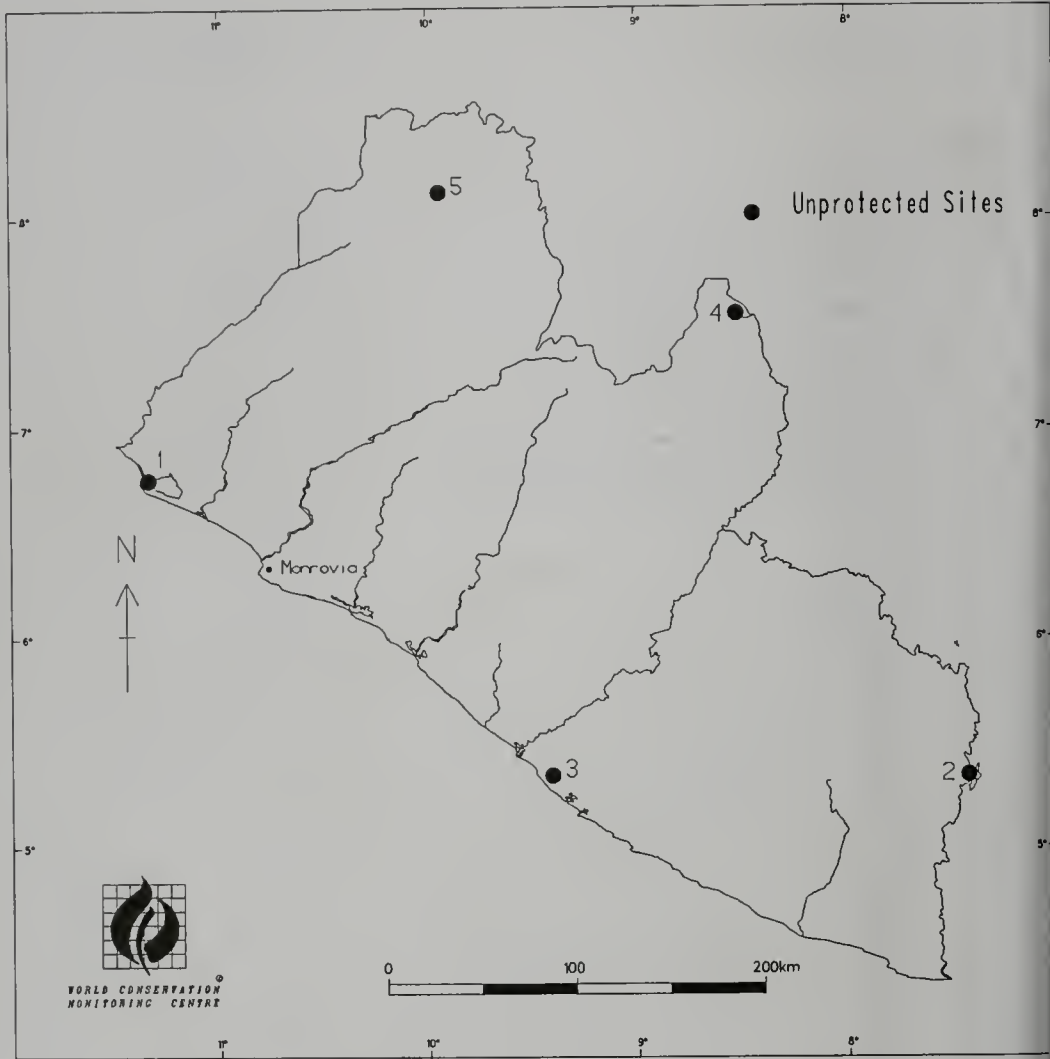
Fig 3.1 Liberia: protected ecologically sensitive sites



LIBERIA - UNPROTECTED SITES

Name of area and map reference (see Fig. 3.2)	Management area (ha)
Belle National Park	65,600
1 Cape Mount National Park	55,400
2 Cavally Forest Nature Reserve	
3 Cestos-Sankwen National Park	145,000
Loffa-Mano National Park	230,000
Loma Conservation Area	
4 Mount Nimba Nature Reserve	
Tienpo Natural Forest	12,800
5 Wologizi Area Nature Conservation Unit	20,234
Wonegizi Area Nature Conservation Unit	26,130

Fig 3.2 Liberia: unprotected ecologically sensitive sites



NIGERIA

INTERNATIONALLY DESIGNATED PROTECTED AREAS

Omo Strict Nature Reserve

IUCN Categories I and IX

The strict nature reserve, covering 460ha was created a Biosphere Reserve in 1977. It is a fairly flat area in the moist lowland evergreen forest zone. Common mammals include threatened species such as elephant and red-bellied monkey *Cercopithecus erythrogaster* and a number of antelope species. The core area is still largely undisturbed but some hunting occurs in the buffer zone. The new main road from Shagamu to Benin passes through the forest abutting onto the reserve and here rain forest is being replaced by *Gmelina* spp. plantations which threaten the integrity of the strict natural reserve (IUCN, 1986; IUCN/UNEP, 1987).

NATIONALLY PROTECTED AREAS

Akure Strict Nature Reserve

IUCN Category I

The reserve of 32ha has been proposed as a biosphere reserve. Terrain is gently undulating, with occasional granitic inselbergs and high forest vegetation of variable structure and density. One area is modified to some extent by shifting cultivation. The reserve supports a wide diversity of forest species, including threatened species such as chimpanzee and red colobus. It has been a research centre for a long time, and a pilot sawmill, staff quarters and experimental plots have been established and cover about 10% of the total area. There are fire and forest protection patrols (IUCN/UNEP, 1987).

Bam Ngelzarma Strict Nature Reserve

IUCN Category I

142ha

Baturiya Wetlands Game Reserve

IUCN Category IV

The reserve comprises 29,700ha of floodplain with dry season waterholes and ponds; two-thirds is terrestrial habitat and includes one of the few remaining areas of Sahelian woodland in the Sahel. The reserve is an important wintering ground for palaeartic migrants and also supports a variety of native mammals. Grazing and fishing are allowed on a limited basis but uncontrolled grazing by cattle and lopping of branches by Fulani herdsmen for their livestock to browse are a threat. Another major problem is the lack of inundation of the floodplain which began in the early 1980s, partly through droughts but also owing to offtake of water upstream reducing river flows. However, an international project to promote sustainable use in the area began its second three-year phase in 1991 (IUCN/UNEP, 1987).

Bonu Strict Nature Reserve

IUCN Category I

145ha

Chad Basin National Park

IUCN Category II

Established in 1991; 58,636ha

Cross River National Park (Oban Division) IUCN Category II
5°35'N, 8°44'E A forested area, adjacent to Cameroon's **Korup National Park**, with red-eared guenon, drill, chimpanzee, angwantibo, buffalo and elephant all present. It is part of a coordinated conservation programme aiming to meet the demands of human populations living in the vicinity (project area covers 4424km²), without compromising conservation values (Stuart *et al.*, 1990; WWF/ODNRI, 1989).

Cross River National Park (Okwangwo Division) IUCN Category II
6°15'N, 9°09'E The area is the focus of a coordinated conservation programme which will take the needs of local human populations into account. Adjacent to Takamanda Forest Reserve in Cameroon. Comprises 92,000ha of moist forests providing significant watershed protection and which support the only population of gorillas in West Africa. There are 16 other species of primate, including chimpanzee, drill, potto, Preuss's guenon and three galago species. Of the bird species found here 60 are recorded nowhere else within Nigeria, including white-throated mountain babbler *Lioptilus gilberti*, endangered grey-necked rock fowl *Picathartes oreas* and green ibis *Bostrychia olivacea*. Elephant and buffalo also occur. It is planned to include the **Afi River** area (6°23'N, 8°54'E), which is increasingly degraded and hunted in, and the **Mbe Mountains**. The entire park covers 422,672ha (Stuart *et al.*, 1990; WWF, 1990).

Dagida Game Reserve IUCN Category IV
9°24'N, 5°35'E Covers 29,422ha of *Isoberlinia* woodland in Niger State (Ola-Adams, 1987).

Falgore (Kogin Kano) Game Reserve IUCN Category IV
A small part of the northern sector of this 92,000ha reserve has been flooded as a result of the Tiga dam. The Kano River crosses it and there are a few inselbergs. Open savanna woodland predominates and it supports a variety of large mammals including lion, leopard and a number of ungulate species. The reserve is important in protecting much of the catchment area of Tiga dam which supplies water to Kano and a major irrigation project. Some poaching and illegal grazing by nomadic Fulani herdsman and uncontrolled fire occurs, but the reserve is otherwise well protected. The vegetation was in good condition in 1985 despite recent droughts (IUCN/UNEP, 1987).

Gashaka/Gumti National Park IUCN Category II
Recently established and covering 636,300ha; most of the Gashaka sector (435,200ha) is mountainous and includes Chappal Waddi with Gangirwal (2419m), the highest mountain in Nigeria. The Gumti sector (201,100ha) is flat with rolling hills. Savanna woodland covers much of the lowland areas and montane grassland is present on the Falinga and Sabere plateaux and the higher mountains. Gallery forest is well-developed along all rivers and streams and supports over 330 bird species. Large mammals, particularly antelopes, are much less abundant than in the 1970s because of illegal hunting but at least five primates occur, although threatened species such as chimpanzee *Pan troglodytes* are rare and elephant is now only present in the Gumti

sector. This reserve was established to protect the Gotel Mountains and Chappal Hendu; people were allowed to remain in enclaves but other villages have since become illegally established elsewhere (some by Cameroonians) and cattle raising and subsistence agriculture have extended well beyond the enclaves. Poaching is widespread, the military camp at Serti being a particular problem as soldiers hunt with modern rifles (Green, 1990; IUCN/UNEP, 1987).

Gilli-Gilli Game Reserve

IUCN Category IV

6°00'N, 5°15'E Established in 1916, this area of 36,300ha includes seasonal swamp forest (Ola-Adams, 1987).

Kainji Lake National Park

IUCN Category II

This park of 534,082ha includes part of the artificial Lake Kainji on the Niger River and two terrestrial sections: Zugurma (138,500ha) and Borgu (397,002ha). There are permanent waterholes throughout the dry season. Vegetation is notable for being transitional between Sudan and northern Guinea savanna. The fauna is typical of Sudano-Guinean savanna woodland with 65 mammals and 350 bird species recorded, including at least seven threatened species. Kainji Lake also has a diverse fish fauna. Illegal grazing with burning and tree lopping by Fulani herdsmen to feed livestock is the major problem in the Zugurma section; here there are also permanent cattle routes which suffer from trampling and erosion. Fruit, baobab bark, thatching grass and raffia poles are harvested, and extensive farming is practised, by locals whose villages are encroaching on the park. Grazing is less prevalent in the Borgu sector but will increase as more Fulani become settled. Borgu also has less severe hunting problems than Zugurma where it is out of control. There are temporary fishing villages on the lakeshore with nearly 5000 fishermen and reports of over-fishing. DDT is used to kill blackfly *Simulium* sp. in the Oli River and has had adverse effects on fish and possibly some unguulates (IUCN/UNEP, 1987).

Kambari Game Reserve

IUCN Category IV

This lies adjacent to **Pai River Game Reserve**, and covers 41,400ha. Mammals present include warthog, red-flanked duiker, kob, bushbuck, reedbuck, oribi, waterbuck, hartebeest, roan antelope and hippo; evidence of lion, elephant, giraffe and leopard has also been found. The reserve is unsuitable for tourism development due to difficult access (Hall, n.d.).

Kashimbila Game Reserve

IUCN Category IV

Established in 1977, this covers 139,600ha in Gongola State.

Kwale Game Reserve

IUCN Category IV

Established in 1981, this 1340ha reserve supports Deltaic swamp complex vegetation (Ola-Adams, 1987).

Lame/Burra Game Reserve

IUCN Category IV

10°30'-11°00'N, 8°45'-9°35'E Combines the two former reserves of Lame and Burra, and covers some 205,767ha adjacent to **Falgore (Kogin Kano) Game Reserve**

in Kano State. The reserve is largely open savanna woodland, supporting several species including lion, spotted hyena, caracal, roan antelope, red-flanked duiker, defassa waterbuck and klipspringer amongst others. This is one of the most important areas in the country for wildlife (Hall, n.d.; Stuart *et al.*, 1990).

Lekki Strict Nature Reserve
7800ha

IUCN Category I

Margadu-Kabak Wetlands Game Reserve

IUCN Category IV

This area of 10,000ha consists of marsh and ox-bow lakes, and is intensively used by the local population for fishing, grazing and farming. It is of significance to Palearctic and Afrotropical waterbirds (Dugan, 1985).

Nguru/Adiani Wetlands Game Reserve
7500ha

IUCN Category IV

Old Oyo National Park

IUCN Category II

8°44'N, 3°44'E Established in 1991 and covering 251,200ha. The park is notable for the numbers of ruined towns and villages, deserted after the fall of the Old Oyo empire (Babayemi, n.d.).

Ologbo Game Reserve

IUCN Category IV

Established in 1981, this 19,440ha reserve supports moist semi-deciduous forest (Ola-Adams, 1987).

Orle River Game Reserve

IUCN Category IV

Established in 1916 and covering 110,000ha, the reserve includes some important forests, north of the main forest zone. A large part of the reserve is now reported to be under wheat (J. Caldecott *in litt.*, 1991; Stuart *et al.*, 1990).

Pandam Game Reserve

IUCN Category IV

This reserve covers 22,400ha and is contiguous with Ibi, Wase Rock and Pai River Game Reserves and to Wase Rock Bird Game Reserve and includes Pan lake (200m by 3km). Vegetation is predominantly grassland interspersed with patches of high forest. The fauna is similar to that of Yankari and Falgore (Kogin Kano) Game Reserves and the lake contains manatee *Trichechus senegalensis* and Nile crocodile *Crocodylus niloticus*, both threatened species, and a variety of fish. The reserve is managed for game viewing, river-based recreation and the protection of aquatic birds. Poaching is a major problem with ineffectual punishment of offenders. The tracks are impassable by vehicle during the wet season (IUCN/UNEP, 1987).

Ribako Strict Nature Reserve
170ha

IUCN Category I

Udi/Nsukka Game Reserve

IUCN Category IV

6°52'N, 7°13'E Covering 5600ha, this area is reported as being no longer in a natural condition (J. Caldecott *in litt.*, 1991).

Urhonigbe Strict Nature Reserve

IUCN Category I

64ha

Yankari National Park

IUCN Category II

This covers 224,400ha of rolling hilly terrain drained by the Gaji River, the only water source during the dry season, due to the regions sandy soils. Sudanian savanna woodland predominates, with some grassland and evergreen swamp forest. A variety of typical West African savanna mammals are present, including threatened species such as elephant and Nile crocodile *Crocodylus niloticus* plus a variety of antelopes. Management policy includes early burning to improve visibility along game-viewing tracks but this has led to erosion where stabilising perennial grasses have been replaced by annual species. Construction of waterholes in the savanna area would reduce habitat degradation along the river. Habitat destruction, competition from domestic stock and severe poaching with modern weapons is reducing animal populations and there is forest clearance for human settlement. A plan to develop a water factory at the warm Wikki spring would seriously affect the only perennial river in the reserve. Funds and personnel are insufficient for proper management. There is a proposal to upgrade it to a national park (IUCN/UNEP, 1987).

OTHER MANAGED AREAS

Alawa Game Reserve

10°12'N, 9°35'E (centre) Established in 1971, this covers 29,620ha of *Isoberlinia* woodland.

Bakono Game Reserve

8°28'N, 7°55'E Established in 1972, this covers approximately 190,000ha in Plateau State but has never been properly surveyed (J. Caldecott *in litt.*, 1991).

Ibi Game Reserve

IUCN Category VIII

Covers 156,000ha in Plateau State (Ola-Adams, 1987). Contiguous to **Pandam Game Reserve** (22,400ha).

Ifon Game Reserve

The reserve covers 28,230ha at the transition between forest and savanna. There are 15,000ha of high forest and trees include *Borassus* palm but there is little commercially valuable timber. Wildlife is relatively abundant; threatened mammals include elephant, seven species of monkey and possibly chimpanzee but at low population densities. Considerable effort is being made to control poaching, illegal burning and tree felling but more staff, equipment and access tracks are needed (IUCN/UNEP, 1987).

Kwiambana Game Reserve

IUCN Category VIII

The highest area in this 261,400ha reserve (contiguous to **Kamuku Game Reserve**: (proposed - 120,000ha) is the Madaba Hills (850m). During the dry season the major rivers dry up and only pools remain. The reserve has northern Guinea savanna woodland and riverine vegetation. It supports a variety of mammals, including threatened species such as elephant, leopard *Panthera pardus* and Nile crocodile *Crocodylus niloticus* plus a number of antelopes. The area, which is managed partly to attract visitors, is burnt too frequently. Grassland has been degraded, with perennial species being replaced by annuals. Uncontrolled cattle grazing also causes 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. There are insufficient personnel and equipment for effective management (IUCN/UNEP, 1987).

Milliken Hill Strict Nature Reserve

A predominantly rocky area with typical savanna species on more exposed steeper and drier slopes, and forest species on the lower slopes. The rich and interesting forest flora has been little disturbed due to the area's status as a protected forest reserve and to its predominantly rocky topography which makes it unattractive for farming.

Okomu Game Reserve

The reserve of 11,200ha with rugged forested terrain, is the largest and least disturbed example of typical south-western Nigerian rain forest. It is floristically rich, with a high degree of endemism. The reserve supports a viable population of the endemic red-bellied monkey *Cercopithecus erythrogaster* and a high diversity of lowland rain forest mammals. Carefully controlled selective logging has occurred in some sectors although this may be restarted. Hunting is controlled to some degree through local associations and Forestry Office permits but there is also professional hunting. An area of 15,600ha has been allocated for an oil palm plantation and there are enclaves of habitation and cultivation on the periphery (IUCN/UNEP, 1987).

Opara Game Reserve

Covering 110,000ha, this reserve is reported to be no longer in a natural condition but is now a *Gmelina* plantation. It supported *Azelia africana* woodland (Stuart *et al.*, 1990).

Pai River Game Reserve

IUCN Category VIII

This 248,600ha reserve occupies the north-east corner of Benue-Plateau State; contiguous to **Pandam Game Reserve** (22,400ha). The reserve supports a Sudanian savanna, and mammals include lion, giraffe, reedbuck and possibly elephant. It has been reported to be "mostly" degazetted (J. Caldecott *in litt.*, 1991; Sikes, 1974).

Sambisa Game Reserve

This covers 68,600ha and lies in the northern Guinea, Sudanian savanna vegetation zone. It supports a number of mammals including roan antelope, topi, baboon, elephant and ostrich. The reserve is managed primarily for the preservation of the dry

season elephant range. However, there is grazing, poaching and illegal fishing and there are inadequate personnel and equipment to control these (IUCN/UNEP, 1987).

Wase Game Reserve

This 186,500ha reserve includes **Wase Rock Bird Game Reserve**, an ancient volcanic plug rising approximately 300m out of the surrounding plain; contiguous to **Pandam Game Reserve** (22,400ha). A colony of pelicans used to breed on top of the rock, but these were disturbed in 1971 and have not since returned. Baboon, bats and reptiles inhabit the 180,000ha rock (Sikes, 1974).

Wase Rock Bird Game Reserve

93ha and established in 1971, it includes a large breeding colony of white pelican and is included in **Wase Game Reserve** (Stuart *et al.*, 1990).

UNPROTECTED SITES

Akpaka Game Reserve

6°25'N, 7°18'E (approx) Covering 19,400ha, this area supports some important forest patches, north of the main forest zone (Stuart *et al.*, 1990). Proposed

Anambra Game Reserve

6°38'N, 6°55'E Covering 35,400ha, the area supports important forest patches north of the main forest zone. It is reported that half of the reserve is now under exotic plantations (Stuart *et al.*, 1990). Proposed

Ankwe River Game Reserve

Situated in Plateau State

Proposed

Baturiya Wetlands National Park - see **Baturiya Wetlands Game Reserve**

Benin River Mangroves

Calabar Estuary

4°32'-5°05'N, 7°59'-8°32'E A large estuary with 80,000ha of mangrove and 4000ha of mudflats. Of importance to waterbirds and waders (Altenburg, 1987).

Chingurmi/Duguma Game Reserve

This covers 35,400ha of predominantly northern Guinea savanna, Sudanian zone vegetation. It supports a variety of species including elephant and giraffe. However, the area is little developed and not gazetted. Local people are allowed to grow guinea corn as long as it is left after the harvest for wildlife to feed on. Extensive illegal livestock grazing and burning occur and poaching is well organised (IUCN/UNEP, 1987).

Damper Sanctuary Game Reserve

7°53'N, 8°17'E

Proposed

Ebba/Kampe Game Reserve
11,730ha

Proposed

Forcados Estuary Mangroves

Gambari Forest

In the west of the country and of importance for the endemic Ibadan, malimbe *Malimbus ibadanensis* (Stuart *et al.*, 1990).

Idanre Hills

7°00'N, 5°05'E In Ondo State, these are the only known home of the toad *Bufo perneti*.

Ile-Ife Campus Forest

7°29'N, 4°34'E Situated on the campus of the University of Ile-Ife, this forest is small, but shelters a bat *Eidolon helvum* colony of over one million (Frame, 1987).

Iri-Ada-Obi Game Reserve

Proposed

This contains some important moist semi-deciduous forests, north of the main forest zone (Ola-Adams, 1987; Stuart *et al.*, 1990).

Kamuku Game Reserve

Proposed

This reserve covers 120,000ha and is contiguous to **Kwiambana Game Reserve** (261,400ha). It supports a variety of mammals including elephant and Nile crocodile *Crocodylus niloticus* (both threatened), several primates and a number of antelope species. Waterholes have been constructed for wildlife but 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 and there are villages along the Kwimbiana River. Extensive grass burning is carried out to provide new grazing for animals but at present this is degrading the habitat as perennial species are being replaced by annuals. There are insufficient personnel and equipment for effective management (IUCN/UNEP, 1987).

Kano Wetlands

11°45'N, 8°21'E These have been identified as being of importance to conservation (WCMC, 1988b).

Komadugu Yobe

13°07'N, 12°30'E (approx) Situated west of Lake Chad on the border with Niger, this riverine area has been identified as important for conservation (WCMC, 1988b).

Lagos Lagoon

6°35'N, 3°43'E Pollution and urbanisation around Lagos is a threat (Altenburg, 1987).

Mbe Mountains

Extensions to **Cross River National Park** may include these mountains.

Meko Game Reserve

Proposed

96,610ha

Ngadda/Yedseram and El Beid Rivers

12°00'-12°27'N, 13°07'-14°38'E The area between Maiduguri and Lake Chad have been identified as being of importance to conservation (WCMC, 1988b).

Niger Delta

4°16'-4°40'N, 5°30'-7°35'E (approx.) There are large mangrove areas, especially at Taylor's Creek and Stubb's Creek (both proposed game reserves, wildlife sanctuaries). Olive colobus are found, and the endemic Sclater's guenon occurs west of Oguta in Imo State. A distinct subspecies of pygmy hippo *Choeropsis liberiensis heslopi* may still survive. The endemic Anambra waxbill occurs in non-forest habitats (Caldecott, pers. comm.; Stuart *et al.*, 1990).

Niger/Benue River System

This area has been identified a being of importance to conservation (WCMC, 1988b).

Num River Game Reserve

Proposed

9720ha

Obudu Plateau

6°30'N, 9°15'E In south-eastern Nigeria, north of the Cross River, close to the border with Cameroon, at elevations between 1500m and almost 2000m. The southern end is partly within **Cross River National Park (Okwango Division)**. The plateau is deeply dissected, and forests are now confined to steep slopes and scarps. These are largely lowland forests, enriched with species of Afromontane affinity. Three forest reserves covering 72,000ha were integrated to form this area. It is an important area for primate conservation (including chimpanzees), and several rare species of bird occur, as does the localised frog *Cardioglossa schioetzi*. Cattle movement, overgrazing and immigration have all contributed to the decline in the natural qualities of the area (Collar and Stuart, 1988; Frame, 1987).

Ohosu Game Reserve

Proposed

Situated in Bendel state, this area of 47,100ha supports moist semi-deciduous forest (Ola-Adams, 1987).

Okeleuse Game Reserve

Proposed

11,440ha

Okumbiri Mangroves - see **Niger Delta**

Opanda Game Reserve
10,520ha

Proposed

Stubbs Creek Game Reserve

Proposed

4°35'N, 8°08'E Covering 10,000ha, this is an important mangrove area which is fairly intact and is a uniquely valuable area for birds, amphibians, reptiles and primates (Stuart *et al.*, 1990).

NIGERIA - PROTECTED SITES

National/international designations

Name of area and map reference (see Fig. 4.1)	Management area (ha)	Year notified
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Game Reserves

1 Alawa	29,620	1971
2 Bakono	190,000	1972
3 Baturiya Wetlands	29,700	1976
4 Dagida	29,422	1971
5 Dagona	70	
6 Falgore (Kogin Kano)	92,000	1969
7 Gilli-Gilli	36,300	1916
8 Ibi	156,000	1972
9 Ifon	28,230	1990
10 Kambari	41,400	1969
11 Kashimbila	139,600	1977
12 Kwale	1,340	1916
13 Kwiambana	261,400	1971
14 Lame/Burra	205,767	1972
15 Margadu-Kabak Wetlands	10,000	
16 Nguru/Adiani Wetlands	7,500	
17 Okomu	11,200	1985
18 Ologbo	19,440	1981
19 Opara	110,000	1973
20 Orle River	110,000	1916
21 Pai River	248,600	1972
22 Pandam	22,400	1972
23 Sambisa	68,600	1978
24 Udi/Nsukka	5,600	1981
25 Wase	186,500	1972
26 Wase Rock Bird	93	1972

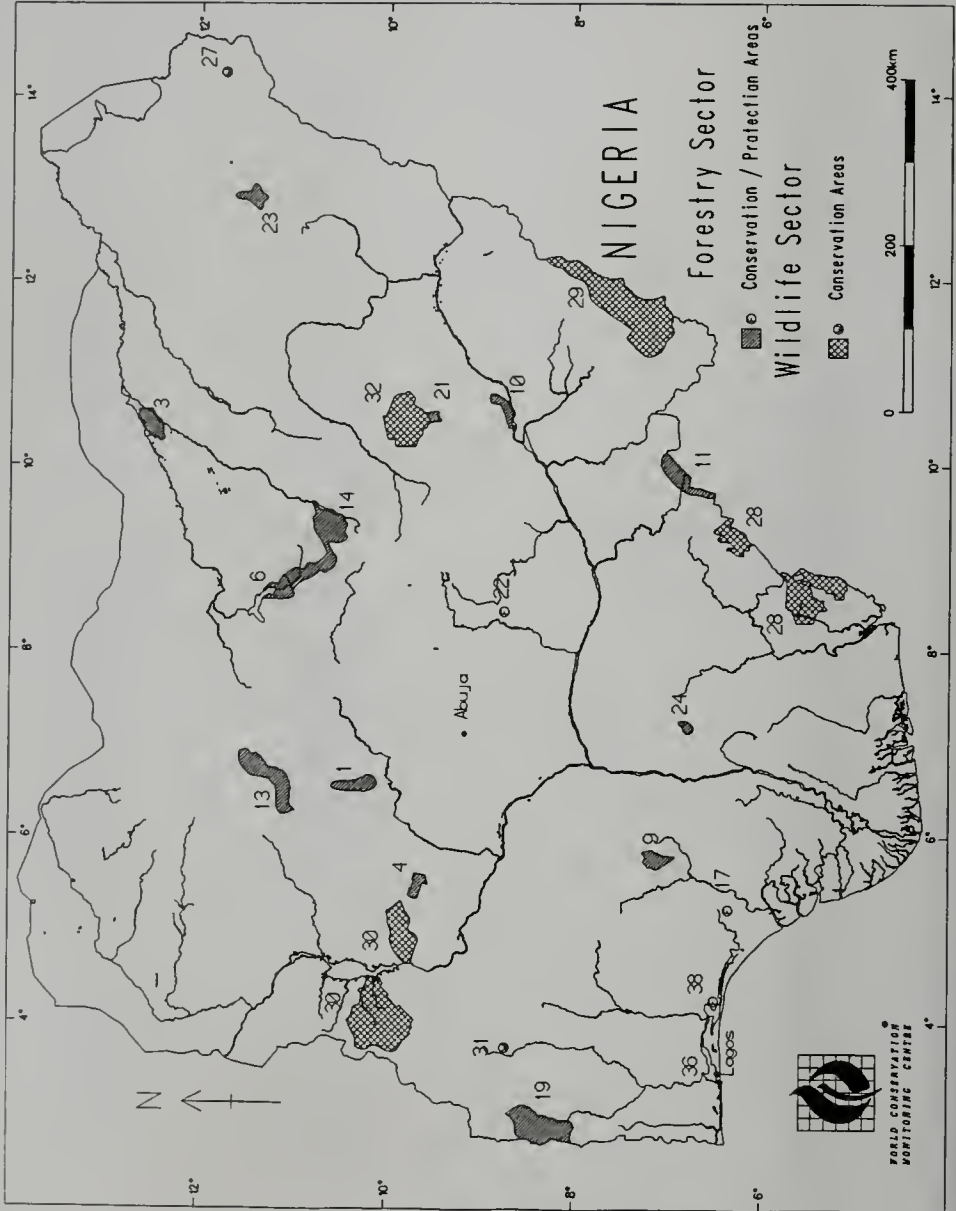
National Parks

27 Chad Basin	58,636	1991
28 Cross River	422,672	1991
29 Gashaka/Gumti	636,300	1991
30 Kainji Lake	534,082	1975
31 Old Oyo	251,230	1991
32 Yankari	224,400	1991

Strict Nature Reserves

33 Akure	32	
34 Bam Ngelzarma	142	
35 Bonu	145	

Fig 4.1 Nigeria: protected ecologically sensitive sites



NIGERIA - PROTECTED SITES (cont.)

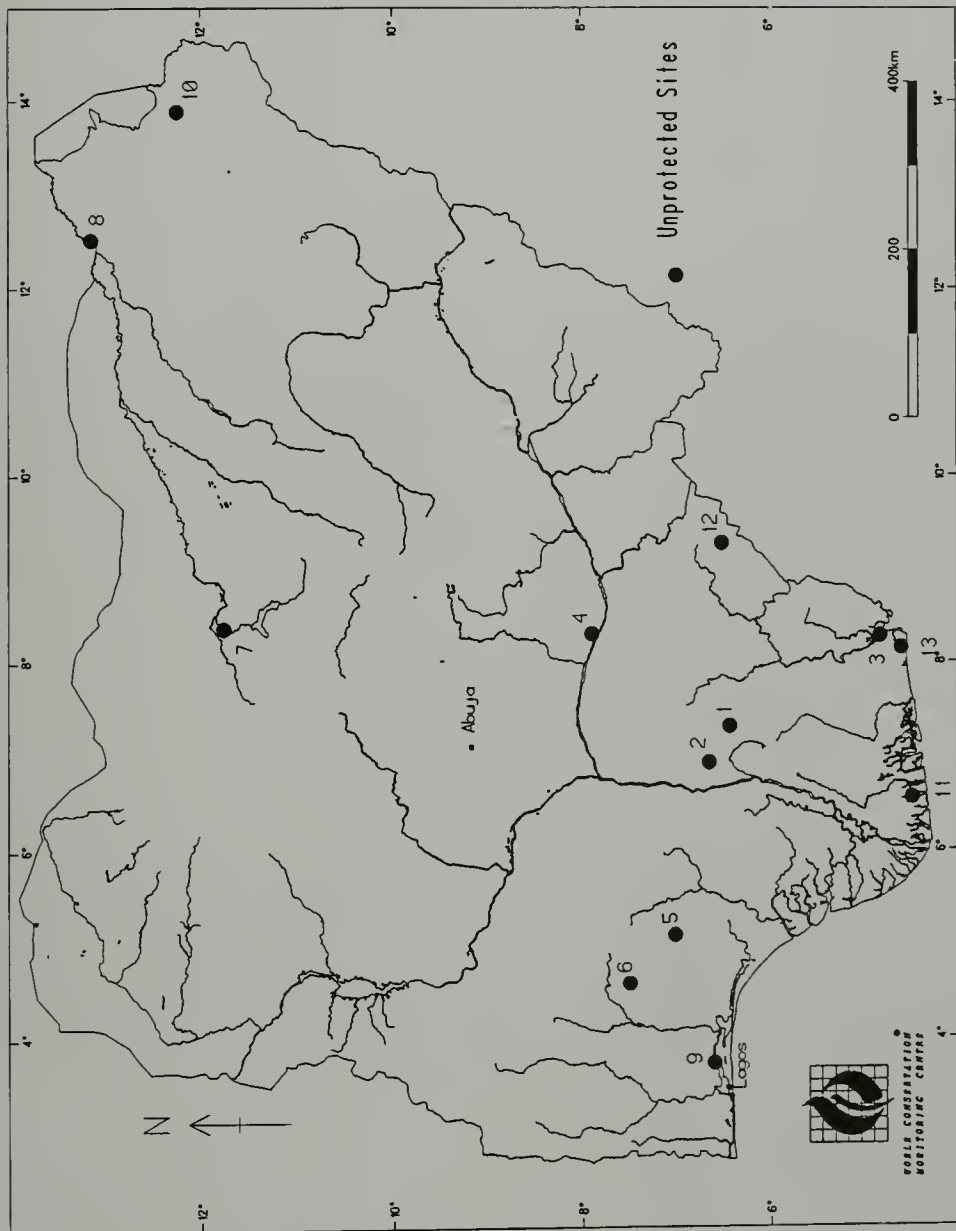
National/international designations

Name of area and map reference (see Fig. 4.1)	Management area (ha)	Year notified
36 Lekki	7,800	
37 Milliken Hill	49,200	1912
38 Omo	460	1949
39 Ribako	170	
40 Urhonigbe	64	
Biosphere Reserve		
Omo Strict Nature Reserve	460	1949

NIGERIA - UNPROTECTED SITES

Name of area and map reference (see Fig. 4.2)	Management area (ha)
1 Akpaka Game Reserve	19,400
2 Anambra Game Reserve	35,400
Ankwe River Game Reserve	
Baturiya Wetlands	29,700
Benin River Mangroves	
3 Calabar Estuary	84,000
Chingurmi, Duguma Game Reserve	35,400
4 Damper Sanctuary Game Reserve	
Ebba, Kampe Game Reserve	11,730
Forcados Estuary Mangroves	
Gambari Forest	
5 Idanre Hills	
6 Ile-Ife Campus Forest	
Iri-Ada-Obi Game Reserve	
Kamuku Game Reserve	120,000
7 Kano Wetlands	
8 Komadugu Yobe	
9 Lagos Lagoon	
Mbe Mountains	
Meko Game Reserve	96,610
10 Ngadda, Yedseram & El Beid Rivers	
11 Niger Delta	
Niger, Benue River System	
Num River Game Reserve	9,720
12 Obudu Plateau	72,000
Ohosu Game Reserve	47,100
Okeleuse Game Reserve	11,440
Opanda Game Reserve	10,520
13 Stubbs Creek Game Reserve	10,000

Fig 4.2 Nigeria: unprotected ecologically sensitive sites



SAO TOME E PRINCIPE

INTERNATIONALLY DESIGNATED PROTECTED AREAS

None

NATIONALLY PROTECTED AREAS

None

OTHER MANAGED AREAS

None

UNPROTECTED SITES

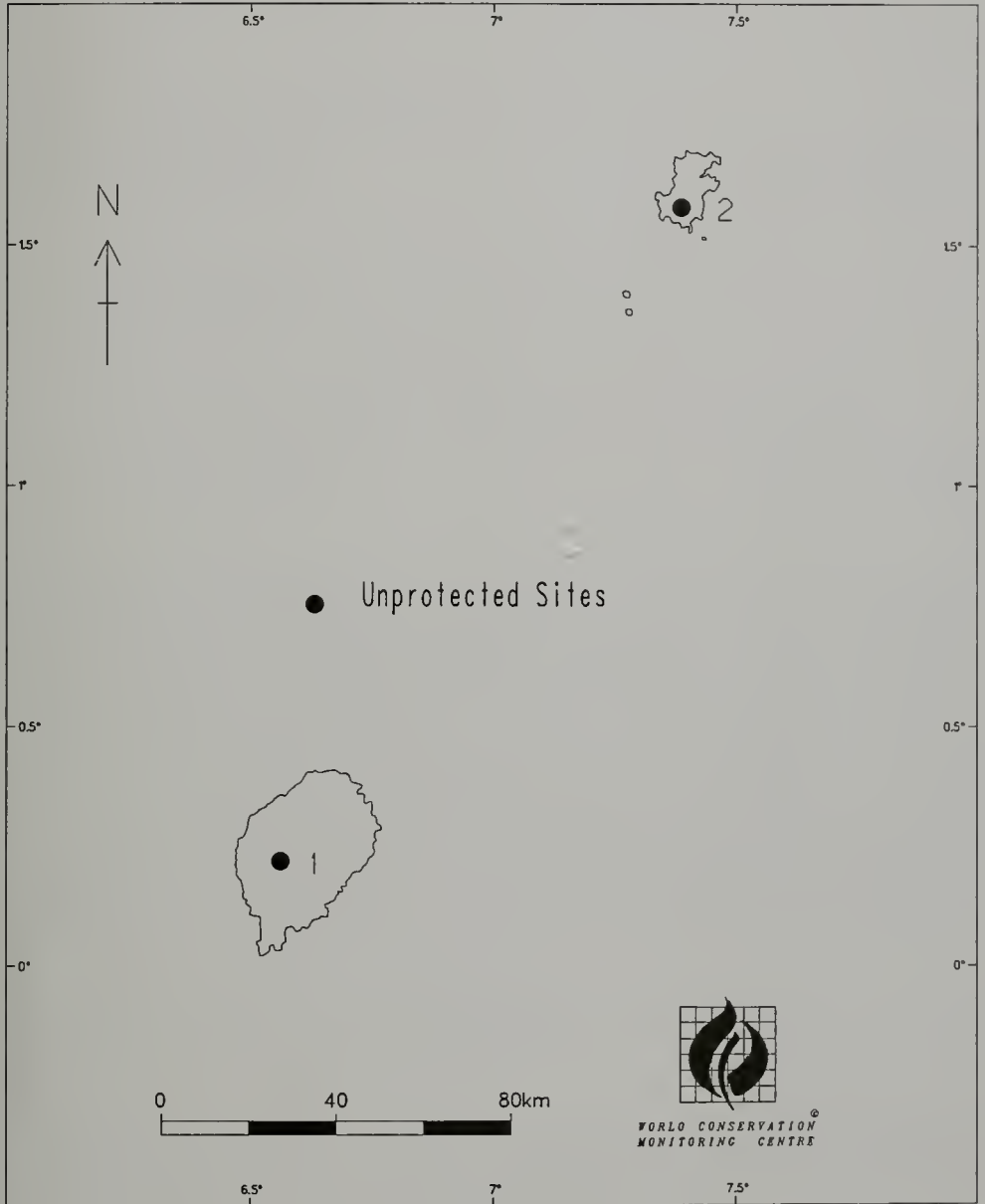
Zona Ecológica (São Tomé) Recommended
0°05'-0°21'N, 6°28'-6°39'E Covering 24,500ha, this area comprises all the remaining undisturbed lowland and montane rain forest in the catchments of the major rivers draining the central massif of São Tomé. It includes deeply dissected volcanic mountains, and spectacular plugs descending steeply in unstable slopes to the sea in the west. It also includes a sharp ridge (the Pic do São Tomé) running from 1403-2024m in elevation. There is no legal protection other than a prohibition on the cutting of trees. The forests are considered to have high biological and watershed values; they support over 550 species of vascular plants (including 108 single-island endemics), 49 species of breeding landbirds (including 14 single-island endemics plus six endemics shared with Príncipe), one endemic species and two subspecies of bat, and one endemic shrew. Hawksbill and green turtle nesting beaches exist. Pressure on the forests is still not great, although some hunting of feral pigs and monkeys occurs (Collar and Stuart, 1988; IUCN, 1987 and n.d.; Jones *et al.*, 1989; Stuart *et al.*, 1990).

Zona Ecológica (Príncipe) Recommended
1°32'-1°37'N, 7°20'-7°26'E Covering 4500ha of the mountainous area in the south of the island and including the Pic do Príncipe (948m), this area supports 35 species of endemic plant, an endemic subspecies of bat, and six endemic birds (out of a total of 35 land birds), some of which are very rare. The islands share a further six endemic bird species, as well as a further 14 endemic bird subspecies. Turtles nest on the beaches (IUCN, n.d.; Jones *et al.*, 1989; Stuart *et al.*, 1990).

SAO TOME E PRINCIPE - UNPROTECTED SITES

Name of area and map reference (see Fig. 5.1)	Management area (ha)
1 Zona Ecológica (São Tomé)	24,500
2 Zona Ecológica (Príncipe)	4,500

Fig 5.1 São Tomé e Príncipe: unprotected ecologically sensitive sites



SIERRA LEONE

INTERNATIONALLY DESIGNATED PROTECTED AREAS

None

NATIONALLY PROTECTED AREAS

Farangbai Forest Reserve IUCN Category VI
1260ha

Kangari Hills Forest Reserve - see **Kangari Hills Game Reserve**

Kuru Hills Forest Reserve - see **Kuru Hills National Park**

Loma Mountains Forest Reserve - see **Loma Mountains National Park**

Malal Hills Forest Reserve IUCN Category IV
339ha

Outamba-Kilimi National Park IUCN Category IV
This 80,813ha park comprises two non-contiguous sections, located on broad river plains with extensive seasonally flooded areas and isolated hills. It encloses the prime watershed of the Great and Little Scarcies rivers which water 20% of the country. Southern Guinea savanna predominates, with small forest remnants along streams and on several hilltops. These areas support at least eight primate species, a variety of ungulates and threatened species such as elephant, leopard *Panthera pardus* and Nile crocodile *Crocodylus niloticus*. Resettlement of 23 villages has not occurred and their inhabitants practise shifting cultivation within the park. There is also commercial exploitation of certain animal species for food and although export of many animals is prohibited this is not enforced. Hunters from Liberia with more sophisticated weapons are a problem (IUCN/UNEP, 1987).

Sankan Biriwa (Tingi Hills) Forest Reserve - see **Sankan Biriwa (Tingi Hills) Game Reserve and Tingi Hills Forest Reserve**

Tama Forest Reserve IUCN Category VI
8°40'N, 11°26'W Established 1926; 17,000ha adjacent to **Tonkoli Forest Reserve**. It has a relict forest fauna, including forest elephants and should receive fuller protected status (IUCN, 1987; Stuart *et al.*, 1990).

Tiwai Island Game Reserve IUCN Category IV
7°33'N, 11°21'W The sanctuary of 1200ha comprises the entire river island which is near the western boundary of **Gola West Forest Reserve**. The original vegetation of lowland rain forest and *Raphia*-palm swamp has been cleared for farming so that most vegetation, except by the river, is secondary, but is of substantial age and height. The island supports a typical forest fauna lacking in larger mammals like elephant but

there is a significant population of pygmy hippopotamus and 11 primate species including the threatened red colobus *Procolobus badius* and chimpanzee *Pan troglodytes*. The 115 bird species include the threatened white-breasted guineafowl *Agelastes meleagrides*. There is disturbance from shifting agriculture but this helps maintain habitat and faunal diversity. Tiwai is too small to support larger animals in isolation and it should be made contiguous with Gola West Forest Reserve (Allport *et al.*, 1989; IUCN/UNEP, 1987).

Tonkoli Forest Reserve IUCN Category VI
8°50'N, 11°28'W (centre) Established 1926 and covers 48,000ha. The forests are relatively isolated and contain a number of large rock outcrops; threatened bare-necked rockfowl *Picathartes gymnocephalus* breeds here (Stuart *et al.*, 1990; H. Tye pers. comm., 1991).

Wara Wara Hills Forest Reserve IUCN Category VI
1041ha

Western Area Forest Reserve - see Western Area National Park

OTHER MANAGED AREAS

Bojeni Forest Reserve
7°41'N, 11°31'W Situated in the interior plateau region, the Bojeni Hills are within Pujehin and Bo districts. The forest covers 738ha of closed montane rain forest and inland valley swamp, typical of humid wet tropical Africa. It is an important local water catchment, with economically important timber species. Trees include *Azelia africana*, *Chlorophia regia* and *Detarium senegalense*, all of which are threatened by clearance for shifting cultivation (Frame, 1987).

Dodo Hills Forest Reserve IUCN Category VIII
2180ha

Fabina Forest Reserve
382ha

Freetown Water Works Forest Reserve
1134ha

Gboi Hills Forest Reserve
207ha

Gola Forest Complex IUCN Category VIII
Covers a total area of 75,000ha, made up of three forest reserves: **Gola North Forest Reserve** (centre 7°40'N, 10°53'W; 45,800ha), **Gola East Forest Reserve** (centre 7°25'N, 11°11'E; 22,800ha), and **Gola West Forest Reserve** (centre 7°25'N, 11°19'W; 6200ha). National park status has been proposed for Gola West and East,

which are relatively flat except for the some hills in the north of Gola East, while Gola North is undulating. The area has also been proposed as a biosphere reserve, which would integrate **Tiwai Island Game Reserve** and other islands in the Moa River, a key area for the pygmy hippopotamus. It could be linked with **Lofa Mano Reserve** in Liberia. Gola is the last large remnant of near primary rain forest in Sierra Leone, which once covered 70% of the country. The original faunal diversity is still evident, including at least 78 species of mammal although many populations have been severely reduced, particularly primates. Conservation of forest elephant in Sierra Leone depends largely on the Gola forests. Gola is also one of the two most valuable of Upper Guinea rain forests for forest birds and supports eight threatened species. The forests are logged by concession and Gola west has been completely logged over while the other two have been disturbed in parts; this exploitation includes 78 species of tree. There are also plans to dam the Mano and Maro rivers for Hydro-electric power, with resettling of people around the reserves. All three sites are also affected by shifting cultivation, particularly on their peripheries, and poaching by professional hunters, many from Liberia (Allport *et al.*, 1989; Collar and Stuart, 1988; Davies, 1987; Frame, 1987; IUCN, 1987; IUCN/UNEP, 1987).

Gola East Forest - see **Gola Forest Complex**
7°27'N, 11°04'W Established 1926; 22,800ha

Gola North Forest - see **Gola Forest Complex**
7°39'N, 10°52'W Established 1930; 45,800ha

Gola West Forest - see **Gola Forest Complex**
7°28'N, 11°19'W Established 1926; 6200ha

John Obey Forest Reserve
207ha

Kambui Hills Forest Reserves North and South IUCN Category VIII
7°55'N, 11°13'W (North) and 7°37'N, 11°22'W (South) Situated in the north and south Kambui Hills, these forests are considered ecologically important and support several primate species including chimpanzee (Frame, 1987; H. Tye pers. comm., 1991).

Kandesuri Forest Reserve
5957ha

Kent Extension Forest Reserve
644ha

Lalay Forest Reserve
476ha

Leicester Peak Forest Reserve

52ha

Lhei Hills Forest Reserve

155ha

Matete Forest Reserve

850ha

Moku Hill Forest Reserve

146ha

Moyamba Hills Forest Reserve

189ha

Nimini South Forest Reserve

IUCN Category VIII

8°30'N, 11°10'W The threatened yellow-throated olive greenbul *Criniger olivaceus* occurs in these hills. Several forest reserves are located in the area: Nimini North and Dodo Hills Forest Reserves may be included (Clarke, 1969; Stuart *et al.*, 1990).

No. 2 River Extension Forest Reserve

699ha

Occra Hills Forest Reserve

248ha

Peninsula Forest Reserve

IUCN Category VIII

17,800ha

Port Loko Forest Reserve

216ha

Singamba Forest Reserve

IUCN Category VIII

299ha

Sipende Forest Reserve

829ha

Tingi Hills Forest Reserve

IUNC Category VIII

One of the four non-hunting forest reserves in which hunting without a licence is prohibited. Sankan Biriwa Game Reserve is the peak of the Tingi Hills

Tobi Forest Reserve

IUCN Category VIII

1671ha

Wara Wara Hills Forest Reserve
141ha

IUCN Category VIII

Waterloo Forest Reserve
85ha

Western Area Forest Reserve

IUNC Category VIII

One of the four non-hunting forest reserves in which hunting without a licence is prohibited.

UNPROTECTED SITES

Bagru-Moteva Creeks Game Reserve
5000ha

Proposed

Bo Plains Game Sanctuary

Proposed

7°58'N, 11°45'W (approx.) 2590ha of *Lophira* grasslands (Stuart *et al.*, 1990).

Bonthe Mangrove Swamp Strict Nature Reserve

Proposed

7°33'N, 12°40'W Covering 10,101ha, the greater area of the **Sherbro River Delta** (including Sherbro Island) contains some 120,000ha of mangroves, 10,500ha of mudflats and 65km of sandy beach. It is also of importance to wintering Palaearctic waders (Altenburg, 1987; IUCN, 1987; Stuart *et al.*, 1990).

Bumpe Mangrove Swamp Game Sanctuary

Proposed

8°07'N, 12°54'W These swamps contain 4921ha of mangroves. See also **Yawri Bay** (Stuart *et al.*, 1990).

Kagboro Creek (Yawri Bay) Game Reserve

Proposed

7°48'-8°27'N, 12°36'-13°05'W This area includes 60,000ha of mangroves and 7500ha of mudflats, of significance for wintering Palaearctic waders. Fishing from the beach occurs but the region is relatively undisturbed. An area of 5000ha is proposed for protection within the reserve (Altenburg, 1987).

Kangari Hills Game Reserve

Proposed

8°29'N, 11°39'W An area of 8573ha of relict forests. Area already existing as **Kangari Hills Forest Reserve**. Fauna includes forest elephants; should receive full conservation status (IUCN, 1987; Stuart *et al.*, 1990).

Kpaka-Pujehun Game Reserve - see Lakes Mape and Mabesi National Park

Kuru Hills National Park

Proposed

9°43'N, 12°18'W Forest reserve established in 1955; area of 6993ha, situated between the two sections of **Outamba-Kilimi National Park** on the Guinea border and reaching over 700m altitude. The relict forest fauna includes forest elephants (IUCN, 1987; Stuart *et al.*, 1990).

Lake Mape/Mabesi National Park Proposed
7°10'N, 11°43'W This proposed park covers 7511ha, including the important freshwater lakes of Mape and Mabesi, which require protection. Lake Mabesi is very shallow and shrinks in the dry season to form extensive swampy grasslands while Mape, nearer the coast, has more extensive open water all year round. Mabesi in particular supports a wide range of waterfowl and waders and should be regarded as a wetland of international importance. The proposed adjacent **Kpaka-Pujehun Game Reserve** covers 2500ha of mangroves (Gatter 1988; IUCN, 1987; Stuart *et al.*, 1990).

Lake Sonfon Strict Nature Reserve Proposed
9°15'N, 11°08'W Situated in the Sula Mountains, this contains the 5180ha Lake Sonfon, the only permanent lake on the inland plateau, which shrinks considerably and is covered with emergent vegetation in the dry season. The aquatic fauna has been relatively well studied. There is little human activity in the area and the lake currently lacks protection (Burgis and Symoens, 1987; Stuart *et al.*, 1990).

Loma Mountains Game Reserve - see **Loma Mountains National Park**

Loma Mountains National Park Proposed
9°10'N, 11°8'W Already a forest reserve covering 33,201ha, this area supports a relict forest fauna, including forest elephants; it is of particular importance as a local centre of endemism. This is the highest area in Sierra Leone and includes Mt Bintumani (1945m) which is higher than Mt Nimba. The threatened white-necked picathartes *Picathartes gymnocephalus* occurs and, apart from the Gola forests, these mountains probably surpass all other natural areas in Sierra Leone (IUCN, 1987; Stuart *et al.*, 1990; J. Waugh, *in litt.*).

Malen River
7°30'N, 12°00'E The lower section north of Gbundapi (Tormabum) is important for waterfowl (Stuart *et al.*, 1990).

Mamunta-Mayoso Swamp Proposed
This area of 2072ha is relatively flat and low-lying, with seasonally variable swamps (or bolilands). Vegetation comprises a varied mosaic of *Raphia* swamp, grassland, *Lophira* and other types of secondary regrowth with some high forest remnants. The area supports at least eight species of primate including chimpanzee; two threatened crocodile species live in the swamp and over 240 birds have been recorded, many being wetland species. However, there is a Fula encampment inside the reserve with several hundred cattle; the Fulas burn some savanna annually to improve grazing and cattle pollute the swamps, altering the character of their vegetation. Annual fishing, woodcutting, and shifting cultivation occur on a small scale (IUCN/UNEP, 1987).

Moa River - see **Gola Forest Complex**

Mogbai (Gola North) Strict Nature Reserve - see **Gola Forest Complex**

Port Loko Plains Strict Nature Reserve Proposed
 8°45'N, 12°53'W 2590ha; *Lophira* grasslands (Stuart *et al.*, 1990)

Port Loko Swamps - see **Port Loko Plains Strict Nature Reserve**

Pujehun - see **Lakes Mape and Mabesi National Park**

Sankan Biriwa (Tingi Hills) Game Reserve Proposed
 9°10'N, 11°08'W The reserve, which covers 11,885ha is of particular biological importance as a local centre of endemism. The relict forest fauna includes forest elephants. Mt Sugula (1853m) which is higher than Mt Nimba lies within the reserve, and supports some montane flora and fauna. The toad *Bufo cristiglans* is only known from here. Already a forest reserve it should receive full protected status (IUCN, 1987; Stuart *et al.*, 1990)

Scarcies River Estuary
 8°32'-9°05'N, 12°51'-13°18'W Comprising 19,000ha of mangroves and 4000ha of mudflats and/or sandbanks, the area is of importance as a wintering area for Palaearctic waders, especially *Limosa limosa*. Fairly extensive clearing of mangroves has taken place (Altenburg, 1987; Stuart *et al.*, 1990).

Sewa-Waanje Game Reserve Proposed
 7°22'N, 12°05'W Covering 10,000ha of mangroves and lakes south-west of Tormabum, to the west of the proposed **Lake Mape/Mabesi National Park**; manatees occur (Stuart *et al.*, 1990).

Sherbro River Delta - see **Bonthe Mangrove Swamp Strict Nature Reserve**

Sierra Leone River and Freetown Peninsula
 8°10'-8°47'N, 12°48'-13°18'W Including 42,000ha of mangroves, with 50km of sandy beaches on the western side of the peninsula and 2000ha of mudflats at a large number of sites; important to large numbers of Palaearctic wintering waders (Altenburg, 1987; Stuart *et al.*, 1990).

Sulima Mangrove Swamp Strict Nature Reserve Proposed
 2590ha

Turtle Islands
 7°38'N, 13°02'W This series of small islands, including Mut and Yele Islands, are situated off the tip of the Sherbro Peninsula just to the west of the Sherbro River Delta. They are an important marine turtle nesting area (Stuart *et al.*, 1990).

Wemago (Gola East) Strict Nature Reserve - see **Gola Forest Complex**

Western Area National Park

Proposed

8°58'N, 13°10'W Situated on the mountainous Freetown Peninsula, this includes forests which were logged over 100 years ago and have a mature structure. There is some hunting and wood-cutting but disturbance is fairly limited. Situated in one of the wettest parts of the country, with up to 6m of rain per year, and altitudes reaching over 800m. A few submontane plant species occur. Fauna includes threatened white-necked picathartes, an endemic amphibian *Cardioglossa aureoli*, Diana monkey and Jentink's duiker occur. The Freetown Peninsula as a whole supports over 370 bird species. A Western Area National Park is proposed to include the forest reserve. This area is close to the capital and ideally situated to become an important educational area (Field, 1974; IUCN, 1987; Stuart *et al.*, 1990).

Yelibuya Island Strict Nature Reserve

Proposed

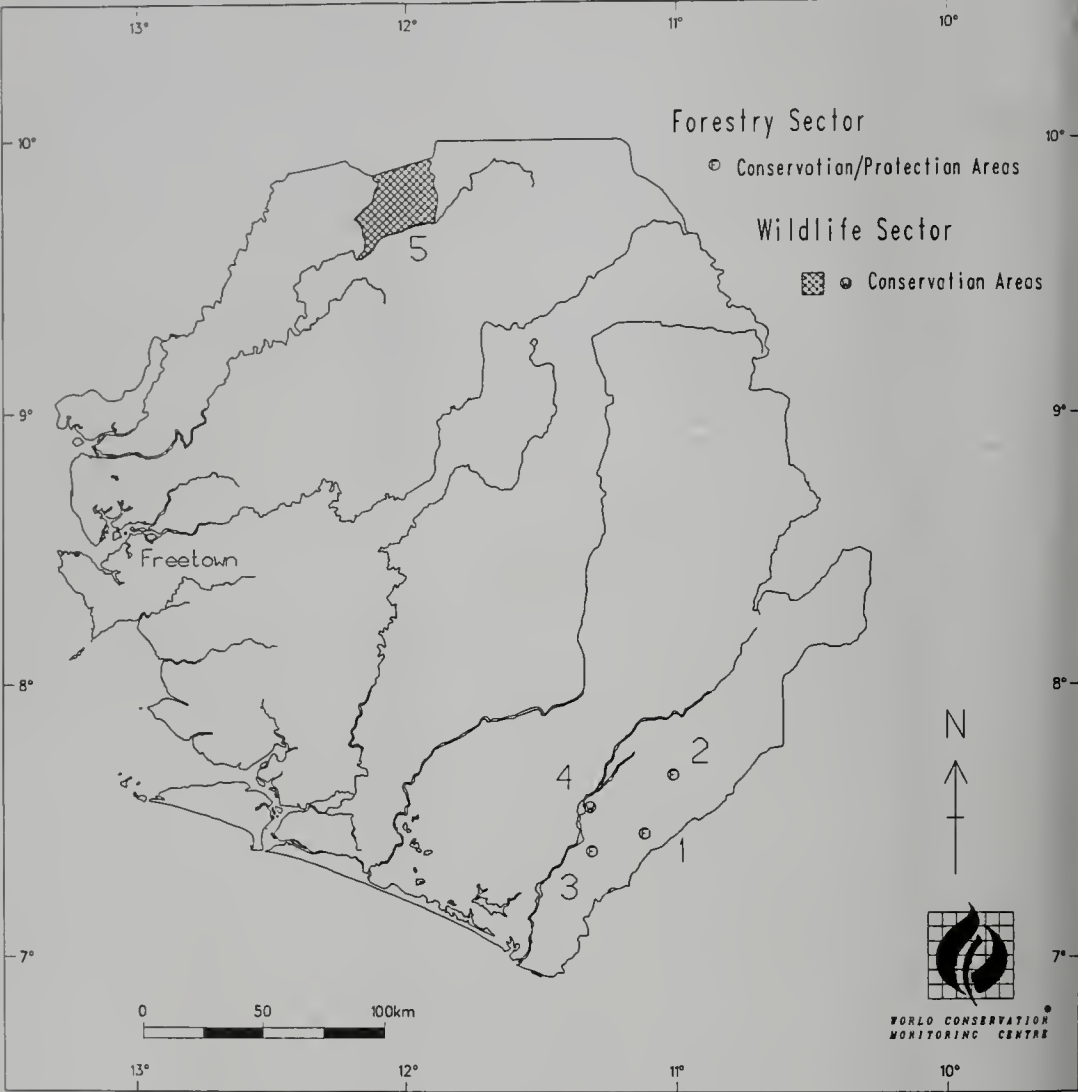
8°58'N, 13°28'W; 3885ha Mangroves (Stuart *et al.*, 1990)

SIERRA LEONE - PROTECTED SITES

National/international designations

Name of area and map reference (see Fig. 6.1)	Management area (ha)	Year notified
Forest Reserves		
Bojeni	738	
Dodo Hills	2,180	
Fabina	382	
Gboi Hills	207	
Farangbai	1,260	
Free Town Water Works	1,134	
1 Gola East	22,800	1926
Gola North Extension	3,885	
2 Gola North	45,800	1930
3 Gola West	6,200	1926
John Obey	207	
Kambui Hills North and South	-	
Kandesuri	5,957	
Kent Extension	644	
Kuru Hills	6993	1955
Lalay	476	
Leicester Peak	52	
Lhei Hills	155	
Malal Hills	339	
Matete	850	
Moku	146	
Moyamba	189	
Nimini South		
No.2 River	699	
Occra Hills	248	
Peninsular	17,800	
Port Loko	216	
Singamba	299	
Sipende	829	
Tama	17,000	1926
Tobi	1,671	
Tonkoli	48,000	1926
Wara Wara Hills	1,041	
Waterloo	85	
Game Reserve		
4 Tiwai Island	1,200	1987
National Park		
5 Outamba-Kilimi	80,813	1986

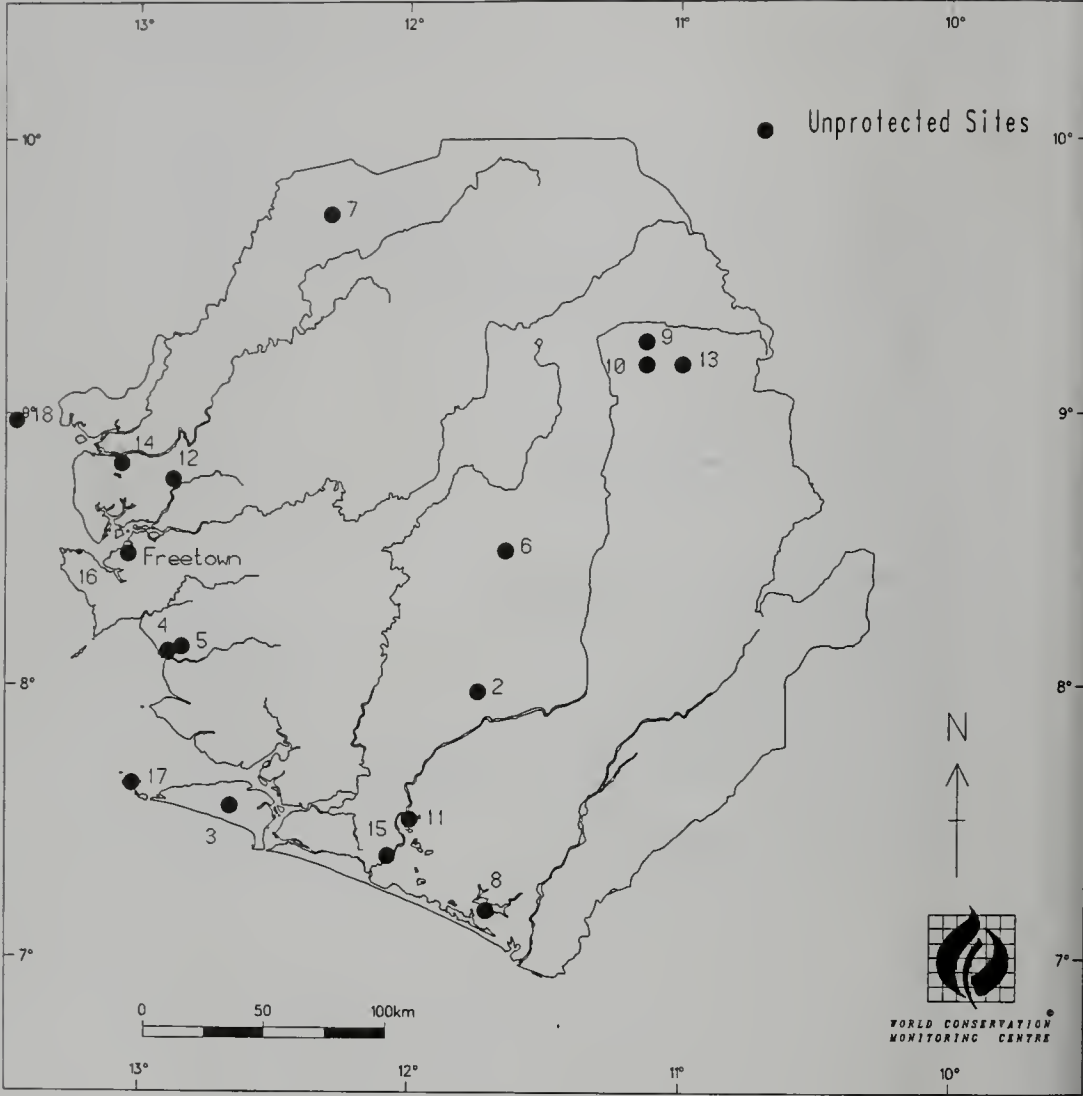
Fig 6.1 Sierra Leone: protected ecologically sensitive sites



SIERRA LEONE - UNPROTECTED SITES

Name of area and map reference (see Fig. 6.2)	Management area (ha)
1 Bagru-Moteva Creeks Game Reserve	5,000
2 Bo Plains Game Sanctuary	2,590
3 Bonthe Mangrove Swamp Strict Nature Reserve	10,101
4 Bumpe Mangrove Swamps Game Sanctuary	4,921
5 Kagboro Creek (Yawri Bay) Game Reserve	5,000
6 Kangari Hills Game Reserve	8,573
Kpaka-Pujehun	2,500
7 Kuru Hills National Park	6,993
8 Lake Mape/Mabesi National Park	7,511
9 Lake Sonfon Strict Nature Reserve	5,180
10 Loma Mountains National Park	33,201
11 Malen River	
Mamunta-Mayoso Strict Nature Reserve	2,072
12 Port Loko Plains Strict Nature Reserve	2,590
13 Sankan Biriwa (Tingi Hills) Game Reserve	11,885
14 Scarcies River Estuary	23,000
15 Sewa-Waanje Game Reserve	10,000
16 Sierra Leone River and Freetown Peninsula	
Sulima Mangrove Swamp Strict Nature Reserve	2,590
17 Turtle Islands	
Western Area National Park	17,688
18 Yelibuya Island Strict Nature Reserve	3,885

Fig 6.2 Sierra Leone: unprotected ecologically sensitive sites



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