Biodiversity: Strategic Action Plan

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FOREWARD

A major landmark in the Earth summit held in Rio de Janeiro in 1992 was the Convention on Biological Diversity. This Convention calls upon parties to conserve and sustainably use biological diversity while equitably sharing the benefits of the use of genetic resources. Its also calls for a renewed effort to deal with the plight of poverty, environmental degradation and biodiversity loss. These goals are key to sustainable development.

The Government of Sierra Leone recognises the important role biodiversity plays in poverty alleviation and in sustaining life on Earth. The provision of fresh water, soil conservation, climate stability, food, medicines, energy and shelter, all depend upon maintaining and using biodiversity. In fact biodiversity is now generally accepted as the living foundation for sustainable development and the foundation upon which our civilization has been built.

It is in recognition of the vital role biodiversity plays in sustaining our daily lives, and the pressures that human activities are placing on the living world that the Government of Sierra Leone, like many other countries, signed and ratified the Convention on Biodiversity in 1994 and 1996 respectively. By ratifying the convention we not only pledged to support the three basic objectives of the Convention namely, Conservation of Biological Diversity; the sustainable use and the equitable sharing of the benefits accruing from the use of genetic resources, but also pledged to develop a National Biodiversity strategy and Action Plan and to integrate the plan into the overall development plan of the country. The NBSAP shall build on and reinforce other existing national strategies and plans, particularly the national conservation strategy and the national environmental action plan.

I am delighted that despite the Ten (10) years of armed conflict, which ravaged our country, Sierra Leone has now fulfilled her obligation by producing three documents on Biodiversity together with 19 (nineteen) priority projects. This is in consonance with the overall Biodiversity vision for Sierra Leone “which aspires for the sustained exploitation and utilisation of our natural resources, maintenance of environmental quality and its aesthetics.”

The overall goal and strategic objectives of the National Biodiversity Strategy and Action Plan is to seek conservation measures that provide the framework for the sustainable exploitation of the country's biodiversity for the benefit of present and future generations. This document therefore, should be viewed as an investment in the future of Sierra Leone, a future that our children and their descendants will inherit and enjoy the extraordinary beauty and diversity of our land. This will however remain an illusion, unless urgent steps are taken to implement the actions prescribed in this document.

Past experience has shown that there is very little enforcement of many environmental programmes and conventions due mainly to poor funding and lack of public/local participation. This time round it is my belief that since the process leading to the production of this document has been very participatory involving all segments of the society, every effort will be made to ensure full enforcement of the actions proposed. Government will also provide the necessary environment to encourage International Donors to supplement government's effort to support and fund the priority projects highlighted in this document.

Finally, I am confident that the successful implementation of this first phase of our National Biodiversity Strategy and Action Plan will lead to more challenges ahead for the eventual realisation of our biodiversity vision and the overall goal of our vision 2025.

Solomon E. Berewa
VICE PRESIDENT
OF THE REPUBLIC OF SIERRA LEONE.

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Environment Dr Alfred Bobson Sesay and the Hon. Minister of Marine Resources Mr. Okere Adams without which the preparation of this document would not have been possible.

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NBSAP - 2003

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LIST OF ABBREVIATIONS AND/ACRONYMS

ACRE	Adoptive Crop Research and Extension
ACU	Agricultural Communication Unit
ASSD	Agricultural Sector Support Project
CBD	Convention on Biological Diversity
CCSL	Conservation Society of Sierra Leone
CF	Conservator of Forest
CHESL	Council of Human Ecology – Sierra Leone
CILSS	Convention Establishing a Permanent Interstate Committee for the Control of Drought in the Sahel
CITES	Conservation on International Trade in Endangered Species
DFID	Department for International Development
ED	Environment Division
EEC	European Economic Community
EEZ	Exclusive Economic Zone
EFA	Environmental Foundation for Africa
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organization
FBC	Fourah Bay College
FD	Forestry Division
GOSL	Government of Sierra Leone
IAR	Institute of Agricultural Research
IARC	International Agricultural Research Centre
ICRISAT	International Crop Research Institute for Semi-Arid Tropics
IDP	Internally Displaced Persons
IITA	International Institute of Tropical Agriculture
IMBO	Institute of Marine Biology and Oceanography
LWDD	Land and Water Development Division
MAFFS	Ministry of Agriculture, Forestry and Focal Security
MMRF	Ministry of Marine Resources and Fisheries
MSY	Maximum Sustainable Yield
NARCC	National Agricultural Research Coordinating Council
NBSAP	National Biodiversity Strategy and Action Plan
NEP	National Environment Policy
NEPA	National Environmental Protection Act
NGO	N0n-Governmental Organization
NTFP	Non-Timber Forest Products
NUC	Njala University College
PA	Protected Area
PEMSD	Planning Evaluation Monitoring and Statistics Division
RRS	Rice Research Station
SMP	Seed Multiplication Project
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme

UNCCC	United Nations Convention on Climate Change
WACAF	Protocol Concerning Cooperation on Combating Marine Pollution in cases of Emergency in West and Central African Region
WARDA	West Africa Rice Development Association
WARCI	West Africa Rice Research Institutes
WCB	Wild Life Conservation Branch

Executive Summary

BIODIVERSITY STRATEGY AND ACTION PLAN

BSAP

Overview of the Biodiversity Strategy and Action Plan

The Biodiversity Strategy and Action Plan (BSAP), is composed of three main parts (plus references) outlined below:

Table 1

Sections	*Brief description*	*Page range*
I – III	**Introductory Part** The overall status of living resources, their use and management (including the relevant institutional frame-work). This section also defines the goals and objectives of the BSAP and the vision orienting it.	
IV – V	**The Strategy** Contains an analysis of the 'Issues and Gaps', as well as the specific strategies for each of the 17 thematic areas, subdivided by three main groups: *(1) Terrestrial Biodiversity*; *(2) Aquatic Biodiversity*; *(3) Cross Cutting Areas*.	
VI – Annex 1	**The Action Plan** Outlines the actions foreseen, the actors involved, the expected outputs, the implementation schedule and the summary of required funding. It also includes an outline of the M&E framework, including the envisaged implementation arrangements. In Annex 1, the Action Plan is presented in a logframe form.	

Introductory Part

The Introductory Part contains a description of the overall classification of main ecosystems in Sierra Leone, the current threats to biodiversity and their causes. These systems are: ***(i) Forests***; ***(ii) Montane Ecosystems***; ***(iii) Savannah***; ***(iv) Agricultural Biodiversity***; ***(v) Wetlands and Freshwater***; ***(vi) Coastal and Marine***.

In regards to the overall status and threats to biodiversity in Sierra Leone, it is important to highlight the following:

- Sierra Leone ratified the **Convention on Biodiversity (CBD)** in 1996, assuming thereby five core obligations *(1)* conserving the biodiversity of natural ecosystems, *(2)* promoting the sustainable use of biological resources; *(3)* ensuring the equitable share of the benefits derived from the use of biological resources; *(4)* promoting the conservation of the diversity of domesticated species (agro-biodiversity); and *(5)* adopting biosafety measures regarding the use of genetically modified organisms. Other requirements are in support of the above-mentioned and include identification, monitoring, evaluation of biodiversity resources, as well as their effective management and the sharing of data and information for conservation purposes. The CBD also requires that parties to the convention develop plans and strategies, the national BSAP, being an important instrument in that regard.
- **The major threats to biodiversity in Sierra Leone** are unsustainable practices of agriculture, livestock farming, forest exploitation, fishing, energy production, mining, infrastructure development and waste disposal (not necessarily in this order).
- **Approximately 70% of Sierra Leone was once covered with forest. The area was today reduced to barely 5%**. The threat is mainly attributable to anthropogenic activities and has been largely exacerbated by the 10-year civil conflict. Slash-and-burn agricultural practices, commercial logging and collection of fuelwood by rural communities can be mentioned as the main causes of threat to forests and its wildlife. The current status of ecosystem protection is not sufficient to halt the trend of destruction and threat.
- There are two main types of **forests** in Sierra Leone: *tropical moist evergreen forest* and *moist semi-deciduous forest*. Tropical forests are generally rich in biodiversity. Of the 2000 plant species, 74 are endemic. Moreover, due to the geographic location of Sierra Leone – in the western tip of the Upper Guinea Lowland Forests – the country has the advantage of some **endemism** and a number of rare mammals.
- Of the **large wildlife living in the Savannahs** (elephants, leopards, hyenas, duikers, genets, civets, warthogs, aardvarks, chimpanzees, baboons, monkeys, etc.), at least six species are recorded as endangered, five as vulnerable and other six as endangered.
- At least 70% of the population depends on agriculture (and hereby **agricultural biodiversity**) for a living. The sector contributes currently to approximately 31% of the GDP. The use of agricultural biodiversity has therefore important implications both to food security (and hereby poverty alleviation) and to the sustainability of the production.
- **Wetlands and freshwater ecosystems** in Sierra Leone are vast (almost 5,000 square km) and rich in birds, molluscs, crustaceans, fish, and tree species. Although there are established protected areas covering these biomes, the expansion of rice production is a threat to be considered.
- Fish is an important source of protein to approximately 70% of the population. Although the overall annual catch is still below the estimated 'Maximum Sustainable Yield', it is important to protect and sustainably manage these resources.

Overall 'Goals and Objectives' of the NSAP

The overall goal of the BSAP is to seek conservation measures that provide the solid framework for the sustainable exploitation of Sierra Leone's biodiversity for the benefit of present and future generations.

Such goal is unfolded into Strategic Objectives, which are listed in **Annex I** of this Executive Summary. There are also sector-specific goals and objectives, which will not be listed for the sake of space.

Outline of the Policy, Legal and Institutional Scenario responsible for the Management of Biodiversity

There is not yet a post-conflict comprehensive piece of policy that deals specifically with biodiversity in Sierra Leone. There are the National Environmental Policy (NEP) of 1994 and the National Environmental Protection Act (NEPA) of 2000, which are more general and cover environmental management. Apart from it, several other pieces of legislation passed over the years incorporating elements of biodiversity management. A selected list of these, as well some of the important international conventions and instruments (apart from the CBD) are listed in **Annex III**.

When a country becomes member of an environmental convention (such as the CBD) or related international instrument, it is not only the responsibility of the government to implement it, but of the whole society, including a wide range of stakeholders. Those are not only the relevant ministries and departments/divisions, but also NGOs, community based organisations, research and academic institutions, as well as those directly involved in the management of the resources in question (peasants, loggers, fishers, miners, etc.). Some of the institutions involved in the management of biodiversity in Sierra Leone are mentioned in **Annex IV**. The institutional arrangements for the implementation of the BSAP is also discussed in the report.

The Strategy

The Strategy part of the BSAP report contains an analysis of the *'Issues and Gaps'* pertaining each of the thematic areas, which the strategy is subdivided in. It also outlines the *'Strategic Approach'* for addressing those issues. **At least 28 thematic areas were identified and clustered in three main groups.** These are listed in **Annex II**. The first two groups (*'Terrestrial'* and *'Aquatic Biodiversity'*) are the thematic strategies, whereas the third group deals with the *'General Measures'* and cuts across all the types of biodiversity.

The Action Plan

The Action Plan was based on the work of defining the issues, gaps and of strategising on the approach for a number of thematic areas of biodiversity. Likewise the Strategy, the Action Plan is subdivided in three main groups of themes (*'Terrestrial Biodiversity'*, *'Aquatic Biodiversity'* and *'Cross-Cutting Issues'*). But differently from the Strategy, the Plan focuses on 17 selected themes for action. The actors expected to be involved in the BSAP implementation are listed. Those are government institutions, divisions, research or academic institutions, local communities or NGOs. Estimates of costs and timeframe are also proposed. The Action Plan is also summarised in a logframe containing an implementation schedule, where outputs for the actions proposed are also included.

The funding requirements are summarised below:

Item	Sub-Component	Estimated Budget (US$ M)
1	Terrestrial Biodiversity (Wildlife)	35.000
2	Terrestrial Biodiversity (Inland waters)	3.000
3	Forest Biodiversity (Lowland, Montane and Savanna)	6.000
4	Marine and Coastal Biodiversity	9.000
5	Agricultural Biodiversity (Plants and Land)	9.000
6	Agricultural Biodiversity (Livestock)	6.000
	Thematic Component Total	***68.000***
1	Policy, Legislative and Institutional Review	3.000
2	Capacity Building	6.000
3	Identification and Monitoring	4.500
4	Sustainable use of Biodiversity Components	3.500
5	Incentive Measures	2.000
6	Research and Training	1.500
7	Public Education and Awareness	2.500
8	Access to genetic resources and benefit sharing	2.500
9	Indigenous Knowledge and Intellectual Property Right	1.000
10	Access to Technology and Handling of Biotechnology	0.500
11	Information Exchange and Technical/Scientific Co-operation	0.400
	Cross-Sectoral Component Total	***27.400***
	Total NBSAP	**95.400**

Overview of Priority Projects

Priority Project	Project Title	Timeframe	Budget (US$ M)	Notes
1	Post-Conflict Reconstruction and Management of Protected Areas in Sierra Leone	2004 - 2014	30.000	(a)
2	Medicinal Plant Conservation in Sierra Leone	2005 - 2007	0.420	
3	Development and Implementation of a Biodiversity Database System (Bioinformatics)	5 years	1.500	
4	Environmental Education and Awareness Raising Program	2004 - 2008	0.550	
5	Resuscitation of the National Herbarium of Sierra Leone	2004 - 2008	0.935	
6	Mapping and Documentation of the Flora and Fauna of Sacred Groves	2005 - 2007	0.375	
7	Inventorying the Non-Timber Forest Products (NTFPs) of Sierra Leone	2005 - 2009	1.500	
8	Post-Conflict Rapid Biodiversity Assessment of Large Mammals in Sierra Leone	2004 - 2005	0.320	
9	National Reforestation and Rehabilitation of Degraded Forest Resources	2004 - 2008	2.000	
10	Nationwide Forest Inventory to Restore and Redefine the Forest Estate after the Civil Conflict	2004 - 2005	2.000	
11	Small Holder Domestication of *Thryonomys swinderianus* (Cutting Grass) as a preferred bushmeat species in Sierra Leone	2004 - 2008	0.275	
12	Co-management and Rehabilitation of Mangrove Ecosystem in Southwestern Sierra Leone	2005 - 2009	0.670	
13	Control of Forest Fires in the Northern Savanna Region of Sierra Leone	2004 - 2005	0.250	(b)
14	Capacity Building for Biodiversity Conservation in Sierra Leone	2004 - 2005	2.000	
15	National Marine Biodiversity and Museum for Sierra Leone	2004 - 2008	1.500	
16	Assessment of the Marine Finfish and Shellfish Stocks of the Inshore Coastal Waters of the continental Shelf of Sierra Leone	2004 - 2008	1.000	
17	Studies on the Biodiversity of Major Estuarine Systems of Sierra Leone	2004 - 2008	1.500	
18	Small Ruminants Restocking Program	1 year	0.200	
19	Gola Conservation Concession Development Project	2004 - 2006	5.0 - 10.0	
	Approximated total		***47.745***	

Notes:

(a) Composed of four (04) sub-projects. Of the US$ 30 M, at least 50% is expected to come from GEF co-financing and the other half from a several donor agencies. Will involve a wide range of implementation partners (Government, NGOs, academic and research community).

(b) Foresees the setting-up of the Biodiversity Coordination Unit.

About the BSAP Formulation Process

In 1996, the Ministry of Agriculture, Forestry and Marine Resources requested, on behalf of the Government of Sierra Leone (GOSL), assistance from the Global Environmental Facility (GEF) through the United Nations Development Programme (UNDP) to formulate the Biodiversity Strategy and Action Plan (BSAP) and then,

accordingly, draft the Country Report to the CBD Conference of Parties (COP). The process was interrupted by the period of political instability, but restarted in 2000-2001.

The Focal Point function for the CBD is housed within the Ministry of Agriculture, Forestry and Food Security (MOAFF) and the Project Manager for the BSAP (also CBD Focal Point) was appointed in 2001.

In 2001 a Steering Committee was formed to supervise the BSAP process and to provide overall policy and technical direction and guidance. Members of the Steering Committee were drawn from a wide range of stakeholders including representatives from the public sector (government and public institutions), civil society (NGOs and BCOs), the private sector, as well as the donor community.

In 2002, a team of National Consultants was contracted to undertake a number of key studies, which would contribute to the development of BSAP reports.

The first National Stakeholders' Workshop on the BSAP was held in Freetown from 10th to 13th September, 2002. The Workshop reviewed and discussed the draft National Consultants Report, made recommendations on the way forward and adopted the Biodiversity Vision for Sierra Leone.

Moreover, six provincial workshops and regional workshops were also held between November and December 2002. These latter workshops were largely participatory and concentrated on major topics including Agriculture, Forestry, Wildlife, Benefit Sharing and Fisheries.

The Second National Workshop (August 2003) is the culmination of the above-mentioned processes. The draft National BSAP Report is presented and validated. This builds the basis for the country's submission to the CBD-CoP.

Annex I. Strategic Objectives of the BSAP

1. Review, revise and enact the appropriate legislation on biodiversity, updating and harmonizing sectoral laws and introduce institutional reforms for the sustainable management of biological resources;
2. Establish and properly manage all protected areas (national parks, wildlife sanctuaries, strict nature reserves) in representative ecosystems across the country.
3. Maintain essential ecosystem services and biological resources to sustain the growing population dependent on the use of biodiversity;
4. Create jobs through the conservation and sustainable utilization of biodiversity;
5. Create a fair redistribution of benefits and opportunities arising from the conservation and sustainable utilization of biodiversity;
6. Develop the human capacity and provide a conducive environment for the participation of all stakeholders (Civil Society, Traditional Rulers, Educational Institutions, NGOs Government Agencies, Researchers) in the conservation of biodiversity.
7. Rehabilitate all mined and degraded areas for the restoration of native biodiversity;
8. Prevent the introduction and spread of harmful alien and genetically modified organisms;
9. Improve the general understanding of biodiversity through research, public education and awareness;
10. Participate in and promote the sustainable utilization and conservation of biodiversity at the international level;
11. Establish mechanisms for assessment of state, trends and threats to biodiversity and to work out measures of mitigation;
12. Establish germplasm or gene banks;
13. Establish *ex-situ* conservation sites; and
14. Mobilize adequate financial resources for the purposes of conservation and sustainable use of biodiversity.

Annex II. Thematic areas of the Biodiversity Strategy

(1) Terrestrial Biodiversity
- Wildlife, Game Reserves, Parks and Sanctuaries
- Forest Biodiversity
- Agricultural Biodiversity (Plant and Land Resources)
- Agricultural Biodiversity (Livestock)
- Land Resources

(2) Aquatic Biodiversity
- Inland Water Ecosystems
- Coastal and Marine Biodiversity, Including Fisheries

(3) Cross-Cutting Issues in Biodiversity
- Policy, legislative and institutional measures
- Capacity building:
- Public participation
- Biodiversity planning
- Identification and monitoring
- *In-situ* conservation (protected areas)
- *In-situ* conservation outside protected areas
- Ecological restoration and species recovery
- Control of alien species
- *Ex-situ* conservation
- Sustainable use of biodiversity components.
- Incentive measures
- Research and training
- Public education and awareness
- Impact assessment and minimising adverse impacts
- Sharing of benefits arising from the use of genetic resources and indigenous knowledge
- Indigenous knowledge and intellectual property rights

- Access to technology and handling of biotechnology
- Information exchange and technical/scientific co-operation
- Relationship between the CBD and other conventions
- Financial resources

Annex III. Overview of the Legal Framework for Biodiversity Management

Selected important legislation in Chronological order:

- Forestry rules (1942; 1946; 1955)
- Forestry Ordinance (1960)
- Forest Industry Corporations Act (1992) as amended (1990)
- Fisheries Control and Preservations Act (1932)
- Wildlife Conservation Act, 1972
- Fisheries Management and Development Act (1988) as amended (1990)
- Fisheries Management and Development Act (1994)
- Guma Valley Water Company Act (1980)
- Sierra Leone Maritime Administration Act (2002)
- Merchant Shipping Act (2002)
- Mines and Minerals Act (1994)
- National Environment Protection Act (2002)

Sierra Leone is signatory of, or has ratified the following important international conventions and instruments (among others):

- Convention on Biodiversity (CBD)
- United Nations Framework Convention on Climate Change (UNFCCC)
- United Nations Convention to Combat Desertification (CCD)
- Convention on International Trade in Endangered species of Wild Fauna and Flora (CITES)
- Convention on Wetlands of International Importance (Ramsar)
- Convention on Biosafety
- United Nations Convention on the Law of the Sea
- Bassel Convention
- Vienna Convention and Montreal Protocol (ozone)

Annex IV. List of institutions* mentioned in the BSAP Report

- Agricultural Research and Support Institutions
- Co-ordination and Monitoring Unit (CMU)
- Institute of Agricultural Research (IAR)
- Institute of Marine Biology and Oceanography (IMBO)
- International Crop Research Institute of Semi-Arid Tropics (ICRISAT) and EEC
- Land and Water Development Division
- Ministry of Agriculture, Forestry and Food Safety, including: (MOAFFS)
    - Agriculture (Crop) Division
    - Livestock Division
    - Forestry Division
    - Wildlife Branch Planning
    - Evaluation Monitoring and Statistics Division
- Ministry of Fisheries and Marine Resources (MFMR)
- Ministry of Lands, Country Planning and the Environment (MLCE)

- Ministry of Transport and Communications
- National Agricultural Research Co-ordinating Council (NARCC)
- Njala University College (NUC)
- Non-Governmental Organizations (NGOs)
- Rice Research Station (RRS)
- Sierra Leone Maritime Administration (SLMA)

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* In alphabetical order.

1. INTRODUCTION

In the last few decades the world has realised that the conservation and sustainable use of biodiversity are the principal pillars for sustainable development. Biodiversity is the resource upon which families, nations and future generations depend for food, medicines, energy and other basic requirements. Despites its importance our actions are eroding this resource at a perilous rate. Several species have been lost largely due to various human activities including deforestation, wetland destruction, land degradation, over-grazing, and over-exploitation of biological resources, wild bush fires, urbanisation, pollution, mining and other inappropriate human activities such as the slash and burn agriculture.

It is estimated that 170 mammal species exist in Sierra Leone, 70 crop species (16 of which are commonly grown throughout the country) while 274 bird species have been recorded including 14 species of global conservation concern. The globally near threatened, Sterno balaenarum, was recorded in Sierra Leone for the first time in 1994. The African waterfowl Census in 1995 also recorded 13,168 water birds.

Sierra Leone is an agricultural country. About eighty percent of the people are exclusively dependent on farming for their livelihood and more than 90 percent of the farming population cultivate rice. It is estimated that a total area of 209000 ha are under cultivation in the Northern Province, followed by 103,000 ha and 98000 ha in the Eastern Southern Provinces respectively

The crops cultivated are divided into two main groups: perennials and annuals. The perennials include oil palm, cocoa, coffee, cola nuts, coconut palm, mango, rubber, cashew, sugar cane, pineapple, ginger, piassava, banana and plantain. The major annual crops cultivated are rice, cassava, sweet potato, groundnut, maize, cow peas, pigeon peas and assorted vegetables.

The livestock reared are cattle, small ruminants(goats and sheep), pigs and fowls. Most livestock are left to fend for themselves.
The water bodies support large volumes of fresh and marine water, which provide fish that is harvested and consumed by the local population.

The commercial logging of forest trees, the practice of the slash and burn agriculture, the uncontrolled burning of the savannah grassland ecology, mining, environmental pollution

and over hunting and fishing all have a devastating effect on the Agrobiodiversity. The ten years rebel war has further threatened and accelerated the extinction of some of the biodiversity. It is therefore prudent to devise measures that will arrest the extinction of the threatened biodiversity.

A new philosophy towards biodiversity loss was addressed in 1992 at the United Nations Conference on Environment and Development - The Earth Summit. In that summit, the biodiversity treaty gained rapid and widespread acceptance. The convention has three main goals:

1. The Conservation of Biodiversity
2. The sustainable use of the component of biodiversity and
3. The sharing of the benefits arising from the utilisation of the genetic resources in a fair and equitable way.

Sierra Leone signed and ratified the Convention in 1994 and 1996 respectively.

This NBSAP is intended to:

(1) provide a framework for setting priority policies and actions for the conservation and sustainable use of biological diversity in Sierra Leone;

(2) catalyse and provide guidance for legal policy and institutional reforms necessary to achieve effective conservation and sustainable use of biological diversity ;

(3) enhance the planning and co-ordination of national efforts aimed at the conservation and sustainable use of biological diversity ;

(4) Guide the investment and capacity building programmes for the conservation and sustainable use of bio-diversity; and

(5) Facilitate information sharing and co-ordinated action among the various stakeholders at the national level and foster scientific and technical co-operation with other countries and international organisation.

1.1. THE OVERALL VISION

Sierra Leone forms the westernmost extent of the Upper Guinea Rain forest in West Africa, one of the worlds most threatened "hot spots" with the highest mammalian species diversity, some of which are endemic to this region. Because Sierra Leone is tropical, it has a rich biological diversity (both terrestrial and marine) which offer the potential to benefit its population if adequately protected and utilised. But the threats to Sierra Leone's biological diversity are alarming especially after going through a civil conflict. Increased efforts need to be placed in protecting the remaining biological diversity in representative ecosystems across the country.

The vision for the National Biological Diversity Strategy and Action Plan should therefore seek conservation measures that provide a solid framework for the sustainable exploitation of Sierra Leone's biological diversity for the benefit of present and future generations. The Government of Sierra Leone has as its priority the Socio-economic development of its people through the eradication of poverty and the sustainable development of its economy. In parallel with the National Environmental Policy (NEP), these priorities will provide the milieu within which the objectives of the Convention on Biological Diversity (CBD) can be achieved: the conservation of biological diversity, the sustainable use of biological resources; fair and equitable sharing of benefits arising from the utilisation of genetic resources.

The present state of peace and stability in Sierra Leone provides an enabling environment within which this vision can be achieved. At the end of 2025, the reconstruction and development of Sierra Leone would be possible if ardent strides are made in the conservation and sustainable utilization of its biodiversity. The achievement of this vision will hinge upon the participation of a well-informed civil population through the implementation of the following objectives by 2025.

- Establish and properly manage all protection areas (e.g., national parks, wildlife sanctuaries, strict nature reserves and marine3 protected areas) in representative ecosystems across the country;

- Maintain essential ecosystem services and biological resources to sustain the growing population dependent on the use of biodiversity;
- Create jobs through the conservation and sustainable utilization of biodiversity;
- Create a fair redistribution of benefits and opportunities arising from the conservation and sustainable utilization of biodiversity;
- Develop of human capacity and provide a conducive environment for the participation of civil society (including non-government organization) in the conservation of biodiversity;
- Rehabilitate all mined and degraded areas for the restoration of native biodiversity;
- Prevent the introduction and spread of harmful alien and genetically modified organisms;
- Improve the general understanding of biodiversity through research, public education and awareness;
- Participate in and promote the sustainable utilization and conservation of biodiversity at the international level.

By 2025, the realization of this vision will herald a new chapter in the sustainable development of Sierra Leone, as the Sierra Leonean, population becomes aware and participates fully in the achievement of these objectives. Financial commitment is critical, and one could only hope that both nationally and internationally, adequate resources would be mobilized so that current and future threats to biodiversity will be effectively reversed, problems considerable reduced for the realization of the immeasurable benefits of biodiversity. There is bright future in biodiversity and the onus is one us all to protect utilise sustainably.

2. BACKGROUND TO BIOLOGICAL DIVERSITY IN SIERRA LEONE

2.1. THE COUNTRY BACKGROUND

Sierra Leone with a land area of approximately 72,300 km^2 is among the small countries in the Upper Guinea rain forest regime. It lies between latitudes 6^o 55' and 10^o 00' N and longitudes 10^o 00' and 13^o 17' W. The country shares borders with two other West African countries (Guinea and Liberia) and the Atlantic Coastline, which stretches approximately 400 km long.

The climate is essentially tropical, with mean monthly temperatures around 26 ^{o} C. Solar radiation is high, with high humidity occurring during the wetter months of the year. However, the cold and dry winds blowing across the Sahara Desert cause the humidity to be low and pleasantly comfortable during the months of December to February, which are essentially dry season months. Comparable cool months in the wet season are July and August. There are essentially two seasons, wet (May to October) and dry (November to April) seasons. Although there are distinct dry and wet seasons, the distribution of rains is considerably variable. Around the Number Two River in the Freetown Peninsula, rainfalls of 5000 mm per annum have been recorded. There is a general decrease in rainfall as one moves from the coast into the interior, with the North of the country receiving the lowest rainfall. The mean annual rainfall in this region is 2000mm with some months recording virtually no rain.

The country is divided into four main relief regions: Coastline, interior lowland plains, interior plateau and mountains. The coastline or coastal plains is relatively gentle and comprised of estuarine swamps, terraces, alluvial plains and beach ridges. The alluvial lowland plains extend from the coastal terraces in the west to the east of Sierra Leone occupying approximately 43 percent of the land area. At the edge of the lowland plains are the interior plateau, made up of granite that run from the Northeast to the Southeast of the country. They seldom rise above 700m and are comprised of alluvial ironstone gravel in the Southeastern region, while the Northern end is comprised of weathered outcrops of granite rocks. In the North and East of the country are found two of the highest mountains, with the Loma Mountains being the highest in West Africa, West of Mount

Cameroon. The highest peak in the Loma Mountains is Bintumani and rises to 1945 m while SanKan Biriwa on the Tingi Hills rises to 1805 m. West of these two mountains, is the Freetown Peninsula, which is also made up of dissected peaks, with the two highest peaks being Sugar Loaf and Picket Hills. The hills on the Freetown Peninsula are unique to this region and found nowhere else in the Sub-region.

The soils of Sierra are ferralitic and excessively leached as a result of the humid tropical conditions. This is particularly true for the upland soils with such common minerals, as calamite; aluminium and iron organic matter content is low, making the soils less suitable for cropping. In contrast the inland valley swamps are hydromorphic and relatively fertile and suited for rice cultivation.

It has been estimated that 70 percent of the country was at one time forested. The current distribution of forests hardly conveys that, with just under 5 percent of the country under mature forests. Human impact on the vegetation has been the most severe, largely due to logging and slash-and-burn agriculture. Broadly classified, there are 7 vegetation types and these include moist rain forest, semi-deciduous, montane, mangrove, savannah, farm bush and swamp forests. Farm bush arises from slash-and-burn agriculture and is becoming the dominant vegetation type in Sierra Leone. The savannah is limited to the northern parts of the country and is increasingly being subjected to frequent fires. Most of the moist and semi-deciduous forests are located within protected areas, often on mountain tops and slopes.

Sierra Leone has an estimated population of about 5.2 million. Certain regions in the country carry the bulk of the population including the Freetown Peninsula, Kono, Kenema and Bo Districts. The Northern part of the country is relatively sparsely populated. Sierra Leone's economy suffered a major stagnation (if not a regression) in the decade leading to the civil war and thereafter. A large number of people live below the poverty line. The economy was largely dependent on the extraction of minerals (such as Diamonds, Rutile and Bauxite) and subsistence agricultural practices. Nearly 80 percent of the labour force is engaged in agriculture, largely slash and burn, with rice cultivation making up the bulk of the subsistence activity. Cash crops in the form of cocoa and coffee are still exported on a small scale compared to countries like Cote

d'Ivoire and Ghana, which have plantations and a large share of the world market. Industrial development is still in the formative period with import substitution comprising the major industrial activity. Development in the country has stagnated for too long. Illiteracy is high, life expectancy low and large sections of the population remains unemployed, especially among the youths.

Located in the Upper Guinea Rain forest region, Sierra Leone is rich in both plant and animal life, as well as abounds with diverse natural ecosystems. Current estimates of the level of biological diversity that exits in the country are unreliable. However, there is no shortage of information regarding past biological inventories in the country. What is lacking is a collation of existing information to provide policy makers and other users of biological diversity the relevant information for planning and implementing conservation activities.

Human impact on the natural ecosystem and its resources has been severe. Once dominated by forest, the country now has less than 5 percent of mature forest remaining. Logging, mineral exploitation and slash-and-burn agriculture have all taken a toll on the country's rich biological life With nearly 28 categories of protected areas in representative ecosystems, the area coverage is still less than 4 percent of the land area, with nearly all of these protected areas suffering from inadequate protection due to lack of manpower, technical support and financial resources. Sierra Leone has also gone through a costly civil unrest with severe impact on its human life and biological diversity.

2.2. THE CURRENT STATUS OF BIOLOGICAL DIVERSITY

Ocean, freshwater, brackish water, coastal beaches (rocky, sandy and muddy), wet lands (mangrove swamps) inland valley swamps, boli-lands) savannah woodlands and tropical rain forests characterise the diversity of ecosystems at the disposal of a little more than 5 million people.

Half of Sierra Leone is a low-lying plain with swampy areas, Inland, the terrain rises to a hilly plateau extending Northward to the Guinea border. The Eastern flank of the country has important mountains – mount Bintumani (about 1940m) is the second highest point in West Africa, and Sanka Biriwa(1715m) in the Tingi Hills.

About 15,000 plants species have been identified. Sierra Leone has 295,950 ha of forest, game reserves and national parks and 32,000 ha of community forest. There are an estimated 5,250 species of useful plants.

There are two types of forests in Sierra Leone: Tropical moist evergreen forest and moist semi-deciduous forest. These can be further divided into mountain and lowland types. The tropical evergreen occurs where relative humidity is high, annual rainfall is greater than 2,500mm and the dry seasons are not longer than 3 months. The Gola Forest Reserve is predominantly lowland tropical moist evergreen rain forest with small areas of moist semi-deciduous forest. The moist semi-deciduous forest needs less total rainfall, 2000-2500mm annually with a four to five months long dry season. There are more deciduous trees (shedding leaves annually) but the total diversity of plants is less than in the tropical moist evergreen forest. The Loma Mountains, Tingi Hills and Tama Tonkolili forest Reserve all have moist semi-deciduous forests.

Widely spaced trees and tall grasses characterise savannah woodlands. These trees are fire resistant that grows only 7 to 9 m. high. The abundant elephant grass can grow as high as 3 to 4 m. The open savannah woodland supports a more limited variety of wildlife than the forest.

Boli-lands are depressions in the drainage areas of large rivers that flood in the rainy season, and by March are dry grasslands again. These areas provide fine grazing for buffalo because the soil is too moist for coarse elephant grass. Migratory waterfowl are attracted to the boli when the water regime begins to recede in December. The flooding and drying of the soil offers a wonderful environment for the tiny invertebrates, snails, and worms that the birds eat. However, boli-lands are also attractive for rice cultivation. Wildlife and people thus compete for these areas.

With its high rainfall, Sierra Leone has an extensive system of rivers and swamps. A variety of mammals, birds and reptiles are found in the water, on the rocks and sandy beaches or on the trees along the riverbanks. Rivers that periodically flood and dry in the rains and dries respectively have a variety of migratory bird species that nest on the exposed rocks and sandbanks. The palm nut vulture and the West African fish eagles are birds commonly seen perched on tree sandbars. Hippopotamus, Otters (river dogs) Crocodiles, Nile monitor Lizards are common riverine species in Sierra Leone.

Common trees in the savannah woodlands are Lophira, Locust bean (*Parha biglobosa*) and cow foot (*piliostigma thenningir*) There are several types of grasses and sedges, the most obvious being the elephant grass. Termite mounds dot the savannah. The bush pigs (red ricer hog), bush cat, and leopards are also found in the savannah grasslands of Sierra Leone. Millipedes, snails, earthworms, millions of termites, army ants, many species of insects form an integral part of the biological diversity.

An estimated 200,000 to 300,000 ha of mangrove swamps fringes the coastline of Sierra Leone. Mangroves are restricted mostly to the four main estuaries (Scarcies, Rokel, Yawri Bay and Sherbro Rivers) that fringe the coastline of Sierra Leone. The mangroves of Sierra Leone have been studied mostly as a resource rather than a place of extreme biological diversity. The mangroves are dominated by five species (*Rhizophora racemasa, R. Harrisoni, R. Mangle, Langucuncularia racemosa and Avicennia nitida*). Intermingled among the mangroves may be other species of plants including Paspalum *vaginatum, sesuvium portulacastrum and Philoxerns vermincularis, Rhizophora sp* often inhabit the sea front whilst *Avicennia and Languncularia* are found landwards.

The continental shelf is about 125 km wide in the North around Yelibuya and tapers to only 13-km at Sulima in the South. The Coastline itself is about 560 km long and the shelf covers an area (up to 200m depth) of 50,000 km^2. The Exclusive Economic Zone (EEZ) is 155,700 km^2. The shoreline consists of a Western and Eastern part. The Western part has four large estuarine systems separated by rocky and sandy coastlines and the Eastern part consisting of about 280 km of almost unbroken steep sandy coast backed with swamp communities.

Detailed study on coastal and marine biological diversity recorded 5 genera of *dinoflogellates,* 14 genera of diatoms; 2 genera of *chlorophyta.* Twenty-six species of copepods have been recorded. There were also 1 species of *ostracoda,* 2 species of *cladocera,* 4 species of *mysidacea,* 5 species of *camacea,* 2 species of *Isopoda,* 10 species of *amphipoda,* 2 species of *Decapoda,* 9 species of *chaetogratha,* 3 species of *protochordata,* 2 species of *pteropods* and 2 species of *coelenterate.* Other studies have

recorded 9 genera of *copepods*, 4 genera of *chaetognatha*; 1 genus of *Euphausid*, Miscellaneous includes *cladocerans, codonterates, polychaots Isopods, ostracopods, heteropods and protozoans.* Diatoms usually dominate the plankton samples with *dionphyceae and cyanophyceae* being abundant during the dry season. Copepods are usually the dominant *zooplankton* category throughout the year. In 1996 IMBO recorded 30 species of bivalves and 62 species of gastropods.

Fish stocks of Sierra Leone are the most diverse along the West Coast of Africa. Marine and coastal fish stocks of Sierra Leone can be classified into two broad categories based on the biology and physico-Chemical parameters of the environment. About 213 species of pelagic and demersal fish stocks have been recorded so far. The stocks can be classified into 3 categories from both biological and management point of view, namely; pelagic, Demersal and Shellfish (crustacea and Molluscs)

Pelagic fish stocks consist of the true pelagic and a largely loose category often referred to as semi-pelagic.

The Demersal fish stocks can be classified into four categories:

(i) *Sciaenid* fauna
(ii) *Sparid* fauna
(iii) Deep shelf community and
(iv) Continental slope

Forde (1978) noted that soviet trawlers caught some 243 species of fish in 1976. FAO (1990) recorded 237 species of fish for the West African region belonging to 108 different families. The contribution of various categories of fish stocks over the year are close to estimates provided by Coutin (1989) as follows: small pelagics (43 to 55%); demersals (30-40%), large pelagics (3%) and shrimps (2%).

The total biomass is estimated at between 300,000 and 700,000 Mt.

2.3. MAJOR THREATS TO BIOLOGICAL DIVERSITY

Trends in threats of resource use in Sierra Leone over the years have depended on the specific historical conditions that have existed over the years. Pre-colonial Sierra Leone was characterised by an increasing awareness of degradation of biological diversity. The formation of the Sierra Leone Forestry Department in 1911 was a direct result of surveys done on biological diversity. Thirteen forest Reserves were established. Research into conservation of biological diversity in post-world war era involved the introduction of quick growing tree species as a result of forest degradation due to population pressure. The post independent Sierra Leone paid little or no attention to the conservation of biological diversity. Policies and strategies spelt out in development plans were characterised by apathetic attitudes towards implementation.

The status on the threatened animal species indicates that there are 761 species of mammals and birds. Of the bird species, six are threatened with extinction. There are 15 primates, all of which are either endangered or vulnerable. Of the 18 antelopes, two are extinct and the 16 are threatened. Other mammals like elephant and hippos have been drastically reduced. Of the birds, six are threatened.

Biological diversity in Sierra Leone is faced with diverse threats including; logging for timber; fuel wood, charcoal and poles extraction, trade in bush meat and pets; slash-and-burn agriculture; mineral exploitation, civil conflict, over-fishing of marine resources; ill-conceived policies, conflicting mandates and poverty.

Logging for Timber. During the colonial period, the lowland rain forest of Sierra Leone provided the bulk of high quality timber for Britain to the extent that before independence, much of the timber resources along the coast had already been severely depleted. Whatever timber remained was in the interior and this also came under severe assault as logging companies pushed further into those areas with no proper management after felling the timber, slash-and-burn agriculturists were quick to move into the areas vacated by the logging companies. Most of these sites received little or no attention in terms of replanting or engaging in regeneration activities. The 29 potential rain forest reserves in the country fall within the lowland rain forest ecosystem and logging with

permit has been allowed to occur. In recent times the level of illegal logging activities has become unprecedented. During the civil conflict, most of the timber needs of Freetown were met from the Western Area Forest Reserve as access to the interior was effectively restricted by the rebels. Two timber species were the focus of intense exploitation and included *Heritiera utilis* and *Terminalia ivoriensi*. Even though illegal logging activities still go on in the Western Area forests, attention has been directed to the forest Reserves in the interior, most of which lack effective management. Because forest reserves offer limited protection for most wildlife, logging activities coupled with hunting is a potentially devastating combination for forest biological diversity .

Fuel Wood, Charcoal and Poles Extraction: The lack of cheap and affordable electricity and fuel(kerosine) in the Urban as well as in the rural areas, mean that energy needs have to be met from alternative sources. The most common and frequently utilised energy sources are fuel wood and charcoal and the bulk of these come from the exploitation of preferred species from lowland rain forests, mangrove swamp forests and the Lophira savannah in the North of the country. An estimated 85 percent of the Sierra Leonean population is dependent on the use of fuel wood and charcoal for domestic heating and cooking. This percentage is expected to rise as the population increases and no investment is made in the production of modern electricity needs. On a daily basis, one can see many heavy-laden truckloads of fuel wood and charcoal being brought to Freetown. Most of the coastal mangrove swamp forests have become depleted as demand for wood for fish smoking and evaporation of salt has laid to waste vast areas of former prime mangrove swamps. This practice has been identified as detrimental to the breeding of marine biological diversity. Construction poles also form a significant portion of the non-timber forest products extracted from the lowland rain forest ecosystem. Farm bush form the preferred sites for the exploitation of poles with *Anisophyiles laurina and Pentadesma bulyraceae* comprising the bulk of poles brought into Freetown for sale.

Bush meat and Pets: Bush meat is an important protein source from wildlife, and forms an integral part of the diet of rural and urban populations. All manner of wildlife is

hunted for the increasing bush meat trade and in all the big towns and cities, there is increasing demand for the meat of wild animals, which generates a considerable amount of income. Even threatened and endangered wildlife have not been spared from this trade and throughout many of the protected areas, hunting pressures are on the rise. Recent surveys point to the near extinction of the red colobus monkey (*piliocolobus badius badius*). Perhaps more devastating to the wildlife population of this country is the taking of wild animals for trading as pets.

Chimpanzees (*Pan troglodytes verus*) are endangered in West Africa, but form the bulk of wild animals captured for the pet trade. Even though there is legislation against the capture of chimpanzees as pets, the laws are not strictly enforced and continue to deplete the wild population.

Slash-and-burn Agriculture: Slash-and-burn agriculture has been blamed for the large-scale deforestation of Sierra Leone's forests and continue to degrade the remaining forest as fallow periods fall with increasing human population. On some of the most difficult terrains (steep slopes), farmers perilously stake claims to land for the cultivation of crops. Such sites are prone to erosion and are known to lead to the impoverishment of biological diversity. Most farming activities nowadays, extend very close to the riverbanks, and potentially result in siltation of freshwater streams and rivers. The by-product of slash-and-burn agriculture is farm bush and is increasingly becoming the dominant vegetation in most areas in the country. This is occurring at the detriment of species dependent on high forest.

Mineral Exploitation: Sierra Leone is rich in mineral deposits in almost all of the ecosystems and all these have been under either artisan or industrial scale mining schemes at one time. Diamonds, iron ore, Rutile, bauxite, gold, granite, chromites and platinum are some of the diverse mineral wealth of Sierra Leone and many of these are still in production. The operations of many of the mining companies in the past were not subjected to environmental impact assessment, which have led to the most devastating mining practices in the history of this country. Deforestation, siltation and displacement

of human population have potential impact on the biological diversity of the country. In most forested areas of the south and East of the country, artisan mining also results in the exploitation of wildlife, with a large number of domestic and migrant hunters supplying the bush meat needs of miners.

Civil Conflict: During the past decade, Sierra Leone went through one of the bloodiest civil wars on the African continent with devastating impact on human lives and infrastructure. The war was equally damaging to the environment, as the breakdown in law and order led to unprecedented exploitation of both land and marine resources. Illegal logging activities in all protected areas increased and brought with it the attendant problem of creating easy access to remote parts of the forest for hunters. Trade in wild animal pets involving chimpanzees rose as did the demand for bush meat in most urban centres. The large number of displaced and unemployed refugees eked out a living by exploiting forest resources at unsustainable levels. Marine Resources were also over exploited by foreign fishing vessels as resources needed for patrolling the vast ocean expanse were lacking. In the Outamba Kilimi National Park, a large herd of buffalos, primates and hippos were reported slaughtered, while in the Gola rainforest, illegal logging activities are reported to be going on at an alarming rate.

Over-fishing of Marine Resources: Sierra Leone's marine resources, particularly fishes and shrimps, are under immense pressure for over-exploitation, with many raising concern about the long-term sustainability of current exploitation levels. *Sardinella Maderensis and Ethmalosa fimbriation* are reported to be the most exploited fish species in the marine ecosystems and *Penaeus notalis* being the most exploited shrimp species. Most foreign trawlers are not effectively patrolled to avoid over exploitation. Artisanal fishing has also come under fire for unsustainable practices involving the use of beach seine netting. The mesh sizes involved are small (usually less than 25 mm diagonal stretch length) are considered illegal by Sierra Leonean law. They are extremely detrimental to marine resources as they take even the smallest fishes and shrimps that could have grown up to form the next breeding population. Around the mama beach

another unsustainable exploitation of marine resources involving the defining of sharks has been observed.

Ill-conceived Policies: In the early 1940s and throughout the 1950s, the Agricultural Department in the colonial administration implemented a pest control policy that became known as "monkey drive". Numerous complaints by farmers of crop damage by monkeys resulted in a bounty being offered for the head of every dead monkey. This laid the foundation for migrant hunters from Liberia to move into Sierra Leone and killed an estimated 254,000 monkeys of all species in just under a ten year period. By the time this policy was brought to a halt, severe damage had already been caused to most wildlife to the extent that their populations never fully recovered. In recent time, the Department for International Development (DFID) provided a dozen chair-saws to several Paramount Chiefs throughout Sierra Leone under a Good Governance Programme. The aim was to allow them to exploit timber resources for reconstruction efforts in their chiefdoms. This is an unfortunate and ill-conceived idea and policy as most of these saws could end up being used in illegal logging activities in the forest reserves.

Conflicting Mandates: The Forestry Division in the Ministry of agriculture, Forestry and Food Security has overall jurisdiction for managing the biological diversity in four of the five ecosystems including lowland rain forest, montane, savannah and wetland ecosystems. The management of marine resources is under the Ministry of Marine Resources and Fisheries. There is a small understaffed Wildlife Conservation Branch (WCB) under the direct control of the Forestry Division. Most of the resources are disproportionately allocated to the forestry sector and in terms of staffing, technical support, logistics and national recognition, the Forestry Division is by far ahead of its subsidiary. There is a complete lack of professional staff in the Wildlife Conservation Branch that is contrary to what obtains in the Forestry sector. The difference in the level of training of staff members is very striking, with most senior staff in the Forestry sector having the equivalence of a past graduate degree (M.Sc.) while the most senior staff at (WCB) has the equivalence of a two-year diploma. In addition the focus of the Forestry sector is largely on timber and the exploitation of other minor forest products, which

occur at the detriment of forest biological diversity. In the non-hunting forest reserves, timber exploitation is not carried out in concert with wildlife management. More often than not, there are more foresters present in the forest reserves than wildlife personnel are.

Poverty: Poverty is of the biggest indirect threat to biological diversity in Sierra Leone. The majority of the population depends entirely on natural resources for their livelihood, which are often exploited emotionally. Such high demands coupled with unsustainable practices of exploitation and utilisation has placed undue pressure on the natural resource base thereby considerably impacting negatively on biological diversity.

2.4. MEASURES TAKEN FOR THE CONSERVATION AND SUSTAINABLE USE OF BIO-DIVERSITY

Actions and Institutional arrangements for the conservation and sustainable use of biological diversity in Sierra Leone are derived from concerns about the environment, forestry and wildlife. In 1911 the Forestry Department was specifically established in direct response to concerns raised about the rapid rate of deforestation of the Western area Forests due to logging for timber meant for export. Thirteen forest reserves were established. To date there are 48 forest reserves and conservation areas in Sierra Leone with the Outamba Kilimi National Parks (Savannah ecosystem) and the Tiwai Island wildlife Sanctuary (lowland rain forest Ecosystem) fulfilling the World Conservation Union Classification system. Several protected areas have been proposed as national parks, game reserves, etc.

The Government of Sierra Leone has identified the continued loss of biological resource as one of the most important environmental problems/issues that needs immediate attention. It has therefore been and is still concerned over the depletion of the natural resources in general and the biological resources in particular. Biological diversity continue to be threatened by deforestation (as a result of the agricultural practices of slash-and-burn), commercial spot and traditional hunting and more recently as a result of the ten year old rebel war, displaced persons, refugees and local populations engaged

themselves in deforestation for security reasons, mining precious minerals, commercial exploitation of forest products and continued hunting of threatened species that could result to their complete extinction. Local construction, construction of housing at sites unsuitable for housing development, especially in the Western Area and the unplanned and haphazard pattern of urbanisation are also threats to biological diversity. From these practices a large number of useful and economic species of plants and animals have been lost to science and socio-economic development. Policy strategies and market failures are indirect threats to biological diversity.

Likewise habitats and ecosystems have been protected, through establishment of parks. Sierra Leone has 295,950 ha. of forest game and national parks and 32,000 ha of community forest. The concept of community forests is generally designed to create an environment for the active participation of local communities in forest management, protection and utilisation and to empower communities to take charge of their own affairs and accrue benefits from the forest resource through revenue retention or direct use. Plans are underway to introduce community based natural resource management for the wildlife sub-sector for the effective participation of local communities in wildlife schemes and the generation of income at the local level. In recent years Government has adopted a strategy for public education through the mass media to create greater awareness, community conservation and research.

2.4.1 LEGAL; POLICY AND INSTITUTIONAL MEASURES

Policies and laws designed to forster the conservation and national management of natural resources date back to the colonial era. In the 1960's most of these laws were incorporated into the laws of Sierra Leone. The military interregnum in 1992, of the National Provisional Ruling Council (NPRC) saw some of these laws replaced by degrees.

Legislation dealing with biological diversity can be classified under three categories.

(a) Laws dealing with Agro-biological diversity;

(b) Laws dealing with Forestry Biological diversity; and

(c) Laws dealing with coastal and marine Biological diversity

There is no specific legislation for the protection and Conservation of biological diversity as a whole. The Provinces Land Act Cap 122 of the laws of Sierra Leone 1960 on Land Tenure, the Wildlife Act of 1972, the Forestry Act of 1988 and the Fisheries Management and Development Act of 1996 form the current basis for the conservation of biological diversity in Sierra Leone. Some of the provisions of these legislations are insufficient, obsolete and above all, the institutions set up to implement the legislation lack manpower capacity to effectively implement the provisions contained there in.

Agro-Biological diversity : There are several piecemeal legislations on Agriculture but notable amongst them is the one enacted in 1946, captioned "An ordinance for the control and Preservation of Agricultural Produce". Shortly after the enactment of this legislation several rules and regulations were promulgated albeit to give the legislation its intended purpose. These rules include: the Plant Pests Import Rule; Plant Pests Inspection of Crop Rules; Movement of Rice Restriction Rules; Noxious Weed Control Rules; Cocoa Movement Control Rules; and the Locusts Destruction Rules.

Apparently this ordinance and its related rules were enacted primarily for the control and preservation of Agricultural produce with very little or no provision for the conservation of Agricultural lands. In 1960, this ordinance and its piecemeal regulations were embedded in cap 185 and incorporated into the laws of Sierra Leone in 1960. This ordinance empowered the Governor to make rules for the effective control and preservation of Agricultural produce subject to the approval of Parliament. The Director of Agriculture was the Titular head of the Department of Agriculture for the implementation of these regulations. This ordinance remained in force until enactment of the 1974 and 1975 produce Inspection Rules and the Plant Phytosanitary Import Rules respectively. These latter legislations made minor amendments regarding the nomenclature and designation of officials, licences for and penalty provisions of Cap 185.

Inspite of these minor amendments Cap 185 is still regarded as the substantive law governing the control and preservation of agricultural produce in Sierra Leone.

Forest Biological diversity : The second categories of legislations dealing with biological diversity in Sierra Leone are those relating to forestry and wildlife conservation. The relevant legislation in this respect is the Forestry Ordinance Cap 189 of the laws of Sierra Leone in 1960. This legislation consolidated the 1942, 1946 and 1955 forestry rules. Under this legislation the Chief Conservator of Forests was entrusted with the task of forest management to be assisted in the exercise of his functions by the tribal authority of the respective chiefdoms in which the forest reserves are situated. This legislation established 42 forest reserves throughout the country. Laws relating to Bush fire prevention were also enacted in 1932 and the provisions contained there in are now incorporated in Cap 190 of the laws of Sierra Leone 1960. The Wild Animals Birds and fish preservation legislations were also enacted and are now incorporated in Cap 194 of the laws of Sierra Leone 1960. Cap 194 made provisions for the prohibition of hunting in protected forests except with a valid licence, it further requires holders of licences to observe native rights and to deposit security in order to ensure compliance with the dictates of the licence. The legislation entrusted the Director of Forestry together with other officials of the Forestry Department with the task of preserving the forest reserves. Cap 194 also contains mandatory provisions prohibiting the exportation of wild animals from Sierra Leone except through the port of Freetown.

This was the state of the law on Forest biological diversity until when the need was felt to prune the hedges and cut off the dandelions, which for over 70 years had grown and surrounded it. Eventually the wildlife Conservation Act of 1972 was enacted. The title of this legislation states "Being an Act to make further and better Provisions for the control of Fauna and flora of Sierra Leone and to give effect to the International Convention Relating to the Protection of Fauna and Flora in such natural state-1953" as amended by the International Convention for the Protection of Fauna and Flora of Africa of 1953. This legislation established significant provisions for the conservation of wildlife ranging from the constitution of strict nature reserves, national Parks, Prohibition

of hunting of animals generally, except with a valid Licence and/or permit. The Act also contains enforcement and penalty provisions. This legislation marked a tremendous development for the conservation of wildlife in Sierra Leone and it is the current law on the conservation of wildlife in the country.

Like the Wildlife Conservation Act of 1972, the Forestry Act of 1988 and its Regulations for 1990 also made significant provisions for the conservation of Forest biological diversity. The title of this legislation states "Being an Act to make new provisions in the Law relating to forestry in Sierra Leone and for connected purposes. This legislation established provisions ranging from the administration and management of the Forest Reserves, community forests, national parks, licences fees and enforcement provisions.

In 1990, the Wildlife Conservation (Amendment) Act was passed. It was captioned "Being an Act to Amend the Wildlife Conservation Act of 1972". The amendment merely relates to definition of terms, modifications and qualifications. For instance section 25 of the Wildlife Act of 1972 prohibits hunting of elephants in prohibited forest reserves only where as section 7 of the wildlife (Amendment) Act of 1990 prohibits hunting elephants in any forests, protected areas or National parks without the written permission of the Chief Conservator. Further the 1990 wildlife (Amendment) Act provided for the change of name from the Forestry Department to the Forestry Division. Despite these minor amendments, the 1972 wildlife Conservation Act and the Forestry Act of 1988 are still regarded as the substantive legislations on forest biological diversity in Sierra Leone.

Marine Biological Diversity: Legislation dealing with Fisheries and fishing Industries abound but the notable and earliest amongst them was enacted in 1932 known and styled as the "Fisheries Control and Preservation Act of 1932". Now incorporated in Cap 195 of the laws of Sierra Leone 1960 the provisions in this legislation include the requisite licences fees for motor fishing vessels, prohibition on the use of certain trawl net, provision relating to prohibited areas of fishing, measurement of the baseline and enforcement provisions. It is worth noting that Cap 195 was the prevailing law on the control and preservation of Fisheries from its inception until 1988. With the passage of

time this legislation became obsolete and the need was felt for a new legislation to rid it of its anachronisms and obsolescence. This eventually led to the enactment of the Fisheries Management and Development Act of 1988 and the Fisheries regulation of 1990. This legislation and its subsequent regulations to a large extent made a partial improvement on the conservation of marine resources.

The major draw back of the 1988 Fisheries Act was that it had very little or no specific conservation provisions. This resulted to the enactment of the Fisheries Amendment Act of 1990. This latter legislation was short lived as it was annulled by the National Provisional Ruling Council and replaced by Decree No. 19 of 1994. The title of this decree states "Being a Decree to make better Provisions for the Management, Planning and Development of the Fisheries and Fishing Industry" by laying down palpable provisions for the conservation of marine resources. Section 4 of this decree empowers the Secretary of State (Minister) for Marine Resources to carry out the preparation and implementation of additional policy geared towards the general improvement of fisheries and fishing industry of Sierra Leone". Under this decree the Director of Fisheries in consultation with the relevant Government Officials and/or representatives from the Fisheries section formulate and develop policy recommendations for the Secretary of State (Minister) Marine Resources to be translated into law. The 1994 Decree further established sufficient provisions for the conservation of Marine Resources ranging from specific conservation provisions, monitoring, control and surveillance provisions and also provisions relating to enforcement.

Legislations relating to biological resources have traditionally been split amongst a number of statutes, many of them covering other materials with little to do with the area of conservation. However, this is undoubtedly changing as the international concern and the political importance for the conservation of natural resources has gained momentum. This is substantiated by the enactment of the Environment Protection Act of 2000 in which an attempt is made to make provision for the effective protection of the environment and the institutional and administrative machinery for its implementation. The Act is divided into five parts.

Part 1 deals with the commencement date of the Act and the interpretation provisions.

Part II make provisions for the establishment of the National Environment Protection Board, the composition and nature of the Board, functions of the Board, Establishment of the National Environmental Technical committee, meetings of the Board and the committee and provisions relating to Honorarium. Part two also make provisions for the establishment of the Department of Environment; the Director of Environment; the duties and responsibility of the Director and the Department of Environment respectively.

Part III of the Environment Protection Act contains provision dealing with the carrying out of Environmental Impact Assessment. More specifically this part provides for the prohibition of certain activities; application for and issue of licences, licences fees; cancellation and suspension or modification of licences, transferability of licences, the monitoring of projects by the Director, various duties of owners of projects, identification of authorised officers; protection of officers, financial security, environmental standards, toxic and hazardous substances, notification of the Minister of Environment and finally provisions dealing with legal proceedings. Part three of the Environment Protection Act contains provisions dealing with the carrying out of Environmental Impact Assessment. More specifically this part provides for the prohibition of certain activities; application for and issue of licences, licences fees; cancellation and suspension or modification of licences, transferability of licences, the monitoring of projects by the Director, various duties of owners of projects, identification of authorised officers, protection of officers, financial security, environmental standard, toxic and hazardous substances, notification of the Minister of Environment and finally provisions dealing with legal proceedings.

Part IV contains provisions for the establishment of the National Environment fund, the objectives of the fund, account and audit.

Part V contains provision which empowers the Minister responsible for the environment to make regulations for the effective implementation of the Act.

In addition to the above legal provisions, Sierra Leone is a signatory and a party to various regional and international treaties and agreements, which are related to or affect biological diversity.

The international conventions include:

(1) Convention on Biological diversity (CBD);

(2) Convention on International Trade in endangered species of wild fauna and flora (CITES);

(3) Convention on Wetlands of International Importance (RAMSAR);

(4) Convention Covering the protection of the World cultural and Natural Heritage;

(5) United Nations Convention on the law of the sea;

(6) United Nations convention to combat Desertification (CCD);

(7) United Nations framework convention on climate Change (UNFCCC)

(8) Vienna convention for the Protection of the Ozone Layer;

(9) Montreal Protocol on substances that Deplete the Ozone Layer and the London Amendments to the Montreal Protocol on substances that Deplete the Ozone Layer;

(10) Basel convention on the control of Trans-boundary Movement of Hazardous wastes and their Disposal; and

(11) Treaty Banning Nuclear Weapons Tests in the Atmosphere, in outer space and under water

The Regional Agreements to which Sierra Leone is a party include the:

(1) Convention on the African Migratory locusts;

(2) Convention for co-operation in the protection and Development of the Marine and Coastal Environment of the West and Central African Region (WACAF);

(3) Protocol concerning co-operation in combating marine pollution in cases of Emergency in West and Central African Regions (WACAF);

(4) Bamako Convention on the Ban of the Import into Africa and the control of Trans-boundary Movement and Management within Africa of Hazardous Wastes; and

(5) Convention Establishing a Permanent Inter-state committee for the control of Drought in the Sahel (CILSS).

2.5. INSTITUTIONAL RESPONSIBILITIES AND CAPACITIES

The conservation and management of biological diversity in Sierra Leone currently cuts across several sector Ministries, Divisions and Units-including the Ministry of Agriculture, Forestry and Food Security; the Ministry of Fisheries and Marine Resources; the Ministry of Lands Country Planning and the Environment, The University of Sierra Leone and several Non-Governmental Organisations. The Institutions have different capacities but generally lack trained manpower, and equipment to execute their mandates. Other institutions with indirect responsibilities for the conservation of biological diversity include the Ministries of Finance, Tourism; Economic Planning and Development, Transport and Communications; Energy and Power and Mineral Resources.

Several International and National Non Governmental Organizations have an indirect bearing on the environment. However it is only the Conservation Society of Sierra Leone that directly carries out conservation of biological diversity activities. The mandates of some of these institutions are summarised below:

Ministry of Agriculture, Forestry and Food Security (MAF&FS). The MAFF&S has three technical Divisions and two service Divisions: Agriculture, Livestock, Forestry, Land and Water Development and Planning Evaluation Monitoring and Statistics Division. In addition there are several Units, but the account Unit headed by the Chief Accountant reports directly to the Permanent Secretary. All heads of Divisions including the District Directors of Agriculture report to the Director General. The MAF&FS has the mandate to support the production of all crops and livestock in an environmentally sustainable manner and to ensure the achievement of Food Security. The mandate for food security was only very recently added to the Ministry.

A Minister who is responsible for making all agricultural policies heads the MAF&FS. A Deputy Minister supports him. The Ministers are advised on a day-to-day basis by the Permanent Secretary who is the Accounting and Administrative Officer of the Ministry and the Director General who is responsible for all operational matters. In this respect all heads of Divisions, the National Extension co-ordinator and the District Directors of Agriculture assist the Director General.

Agriculture (Crops) Division

This Division has a remit for crop husbandry and protection programmes nation-wide and the head of this Division is the Chief Adviser to the Director General on these matters. A Director of Crops who is assisted by a Deputy Director of Crops and three Assistant Directors of Crops heads the Division. The Division is responsible for all crop extension work and directs this function through its field staff. It has suffered from funding difficulties and its extension programmes are not well focused. In the

1970's and 1980's this situation was further compounded by the preponderance of enclave projects which systematically undermined its institutional fabric and lured away its best and most talented staff. Morale and motivation of staff that remained outside such projects was low.

The following sections/Units report directly to the Director of Crops:

Staff Development and Training: A Unit within the Division is responsible for staff affairs for the whole of MAF&FS.

Crop Protection: The service has sections for phyto-sanitary control at Border crossing, for Pest Control and for biological control. It is currently importing chemicals for pest control. The Acting Principal Crop Protection Officer is the only graduate.

Produce Inspection: Liaises with produce exporters for inspection and grading of produce under the control of the Principal Inspector of Produce.

Agricultural Engineering: has few responsibilities since the privatisation of mechanised farming. A Chief Agricultural Engineer heads it. There is currently no qualified engineer. The work consists largely of maintaining the MAF&FS fleet with some development work on processing equipment.

Fertilizer: The Principal Agricultural Officer in charge has had almost no fertilizer for more than ten years

Horticulture: Has no qualified staff, the nominal head being an Agricultural Officer.

Agricultural Communication Unit (ACU). This Unit is responsible for Development Support Communication functions of MAF&FS and is answerable directly to the National Extension Co-ordinator. The functions performed by ACU are

of fundamental importance for the preparation and dissemination of extension and other materials and messages to support a wide range of agriculture and rural development activities with a view inter-alia to increasing agricultural production.

The Unit is functional as a full audio-visual production centre, and deliver radio programmes, slide/films, cinema shows, photographic and print materials to farmers throughout the country. It is now in a defunct status and lacks equipment, transport and communications and has regressed to the point where the only output is press releases reporting on events in Freetown.

The only media production, which continues at the unit, is the making of cloth banners with stencils for display in Freetown.

Livestock Division

This Division is responsible for the control of notifiable diseases, inspection of animal products and general livestock extension. It is headed by a Director of Livestock. Two Deputy Directors of Livestock and two Assistant Directors of Livestock support him. The Division has a core technical staff of six Veterinarians. As of now the most senior officer is a Senior Veterinary Officer.

The Division is divided into animal health and animal production units. The health section deals with disease diagnosis and treatment, preventative health care and vaccination against diseases. The production section is concerned with improvements in husbandary practices. The former is a clinical function and the latter an extension function. The Division used to run an extension service in parallel with the crops Division through its District Veterinary Officers, Regional Veterinary Officers are stationed in each District.

Two training Officers, who were in post at the Teko Livestock station, were moved to Freetown when the war intensified. A central diagnostic laboratory with investigation

facilities was sited at Teko. The division had remit for developing the Work-oxen training programme.

The Division extension work programme has suffered from a series of setbacks. Firstly, the livestock extension workers lack basic training in extension methods and communications. Secondly extension supervisors are not animal production specialists but veterinarians. This has tended to downgrade the importance of good husbandary in any livestock programme which have been undertaken. More importantly running parallel extension services (i.e. crops and livestock) that could easily be merged is unnecessarily costly.

Forestry Division

The Divisional head is the Director of Forests, who has a Deputy Director and an Assistant director. The main task is forest conservation, but other duties include forest research and surveys, with small units for wildlife conservation, protection and utilisation. There appears to be no division of responsibility for these tasks between the senior staff. There used to be a Rubber Unit but this was disbanded following privatisation in 1992. An advisory role was retained but this was in abeyance during the war. There are District Forest Officers in each District. These vary in rank from a Conservator of Forests (CF) through Senior Assistant Conservator of Forests to Assistant Conservator of Forests.

Land and Water Development Division (LWDD)

The Division was created in 1981 after the termination of a joint UNDP/FAO Land Resources Survey Project. In the general terms the Division is mandated to appraise land and water resources for their suitability for agricultural purposes providing information and technical support for improving the use of land, soil, water and climatic resources so as to make possible sustainable agriculture. It has a vital role in addressing the critical issues of agriculture development and protection of the land based environment.

The LWDD has several sections including:

Soils: carries out soil and land resources survey countrywide. This includes carrying out detailed soil surveys and studies in priority areas and for private clients.

Agronomy has responsibility for compilation of available field and experimental data on soil fertility, land management, crop production practices and land suitability evaluation. This is done in close liaison with the soil section.

Water Resources investigates the water resources of the country with regard to their utilization for agriculture and rural development. This includes topographic survey, engineering designs for inland valley swamps development and liaising with the Water Supply Division to identify water resources for agriculture use.

Agro-Climatology Manages a network of agro-climatological stations set up during the National Land Resources Survey, which brought the Division into existence, and analyses data collected from these and other sources for agriculture purposes.

Central services include a remote sensing section with responsibility for aerial photography interpretation, the central analytical laboratory, a small library, a cartographic section for preparing and printing of maps and reports and Administration and Accounts which is the management core of the Division.

Seed Multiplication Project (SMP)

Although this institution does not have a direct remit of biological diversity conservation, its activities have implications for it. The SMP is the major public institution responsible for the production and supply of seed rice. In addition to rice, limited quantities of maize and groundnut seeds are also sold to farmers. It also sells imported vegetable seeds. It obtains most of its local seed supply from small-scale contract growers. The Rokupr Rice Research Station (RRS) used to produce breeder's seed for rice, which were then supplied to SMP for further multiplication by

its contract growers. When the war intensified in 1997 the activities of SMP were considerably scaled down.

Planning, Evaluation, Monitoring and Statistics Division (PEMSD)

The PEMSD was largely established by and benefited from the Agriculture Sector Support Project (ASSP). It has suffered from lack of funding since ASSP support stopped. PEMSD is headed by a Director and nominally has three sections:

Planning and Budgeting – to recommend policies and strategies on agricultural development; to advice on investment priorities to co-ordinate preparation of annual development estimates and public investment programmes; and to evaluate feasibility of projects.

Monitoring and Evaluation – to monitor project progress and agricultural production; to survey manpower requirements in MAF&FS and to evaluate impact of projects.

Statistics – to prepare crop forecasts and agricultural census programmes; to design data collection surveys, to analyze survey data and prepare annual production reports; to establish sample farm management surveys, to establish an early warning system and information network as a basis for national food security.

Agricultural Research Institutions

For a long time research in Sierra Leone has lacked direction and focus. It has been inadequately co-ordinated and funded. Over lapping of functions, duplication of resources and petty rivalry were common place. It is in recognition of these problems that the Government decided to set up a National Agricultural Research Co-ordinating Council (NARCC).

Presently active agricultural research is conducted by the Institute of Agriculture Research 0(IAR) and the Rice Research Station (RRS) at Rokupr. Other institutions doing research are Fourah Bay College, PEMSD and Njala University College (NUC)

National Agricultural Co-ordinating Council (NARCC)

Government and non-governmental Organisations have initiated a lot of Agricultural Research. Government's efforts are normally expressed through the two Institutions (IAR and RRS). Much of the Research work is fragmented, piecemeal and largely uncoordinated because the country lacked a research management system that can make the most efficient use of the country's limited resources. Effective Institutional arrangements to review, integrate and rank the research programmes of all relevant research activities do not exist.

The Government of Sierra Leone (GOSL) established NARCC in April 1985 to formulate agricultural policy, set research priorities in the light of farmer's needs, researchers' recommendations and GOSL policy objectives. It is expected to enforce these priorities through procedures by which research programmes will be designed and funded.

The NARCC has been understaffed since its creation.

Institute of Agricultural Research (IAR)

This was established out of the terminated and closed Adaptive Crop Research and Extension Project (ACRE). The primary purpose of the ACRE Project was to encourage the adoption of farming systems Research/Extension approach in the national research and extension system. A detailed "Cropping Systems Development Project" was prepared and forwarded to Government as a logical follow-up to the ACRE project in 1988, but it did not attract funding. Consequently the Government decided to establish IAR at Njala using the infrastructure of the terminated ACRE project. Its mandate is to conduct research on major food crops other than rice. The Institutes proximity to University surroundings has enabled it to forge productive collaborative links with Njala University College (NUC) and Fourah Bay College (FBC). It commissions specific research projects by University staff. This enables the Institute to maximise its comparative advantage in the face of dwindling budgetary provisions and also make good use of synergistic opportunities that present

themselves as a result of its location. IAR has a decentralised research team in each of its six zones (Rokupr, Kabala, Makeni, Magbossi, Njala and Kenema). The institute has seven constituent departments.

- Crop improvement
- Resource management
- Training and Information
- Crop management
- Socio-economic Research
- Food and Nutrition
- Technology Transfer

The Institute has links with IITA in Nigeria, where germ plasm of cassava, maize, and cow peas are received. Germ plasma has also been received from SAFGRAD and ICRISAT. There is also some collaboration with ISNAR, FAO, WARDA, and EEC. The Institute is faced with a lot of operational problems that militate against its productivity.

Rice Research Station (RRS)

This station was established in 1934 to conduct research on mangrove swamps by the colonial Department of Agriculture who managed it until 1953 when it was transformed to a rice Research station for the whole of West Africa and became the West African Rice Research Institute (WARRI). In 1962, the Ministry of Agriculture took possession of it but found it complex and difficult to manage. It transferred it to NUC at its creation in 1964. In 1971 it reverted to the Ministry of Agriculture and was upgraded to a fully-fledged research institute with its own board of directors. Its original mandate was limited to research in the mangrove swamp ecology. The need became felt eventually to broaden the mandate to incorporate research in rice, sorghum and millet in all ecologies.

The institute is headed by a Director and has few support staff and researchers on its establishment. It is composed of the following divisions.

- Varietal Improvement
- Agronomy

- Crop Protection
- Farming System and Farm Management
- Agricultural Engineering

The station has collaborative programmes with several International Agricultural Research Centres (IARCs) such as WARDA, IITA, ICRISAT and ICRAF. It has strong links with IAR, SMP, and NGOs.

RRS has five outstations

- Makeni
- Kabala
- Blama/Kenema
- Rotifunk
- Bo

Senior staff heads all these stations.

Njala University College (NUC)

This was established in 1964 along the lines of Land Grant Universities in the United States. It has three faculties, each with several academic Departments.

- Agriculture
- Education
- Environmental Sciences

Postgraduate programmes have very recently been initiated at the University. The NUC carries out basic and applied research and has a very strong collaboration programme with both IAR and RRS. It contributes to the creation of a favourable research environment at IAR by providing the much needed scientific personnel. The University

however, suffers from inadequate research materials, inadequate maintenance and poor laboratory facilities.

Fourah Bay College

This is another constituent body of the University of Sierra Leone system. It houses the Institute of Marine Biology and Oceanography (IMBO) IMBO is effectively the faculty of fisheries, with teaching and pure research programmes.

Environment Division (ED)

The environment Division is part of the Ministry of Lands, Housing and the Environment. The mandate of the ED is to co-ordinate environmentally related activities of Government Ministries and Local Authorities.

Non Governmental Organization (NGOs)

There are 56 NGOs directly or indirectly operating in the environment sector. Of these only the CSSL, CHEC-SL and the Environmental Foundation for Africa (EFA) have organized structures and clear mandates. The mandate of the conservation society of Sierra Leone (CSSL) is to promote the conservation and wise use of Sierra Leone's natural Resources through research education, advocacy and support to site management. The mission statement of the council for Human Ecology-Sierra Leone CHEC-SL) is to support the GOSL in promoting through education, policy implementation and project execution, the extension of the science of ecology as applied to the human environment in the interest of sustainable human well being and quality of life. CHEC-SL was founded in 1990.

The Environment Foundation for Africa is working for the conservation of biological diversity and for a sustainable management of the biological resources.

- For restoration through community based agro-forestry projects;
- For empowering people to take positive action for their environment and;
- Through environmental awareness raising for a better environment.

Ministry of Marine Resources and Fisheries (MMR&F).

The MMR&F is responsible for policy formulation, resource management and administration, including licensing and revenue collection of the fishery sector within the framework of the Fisheries Management and Development Act 1988 and Fisheries regulation 1990. MMR&F has a small research section and also operates a Government Boat yard. It has residual responsibility for the Marine Training School. For inland fisheries and aquaculture, the MMR&F has substations at Bo and Makeni.

There are also other authorities with responsibility relating to fisheries, which support MMR&F. These institutions include the Ministries of Transport and Communications, Finance, Development and Economic Planning, Trade, Industry and State Enterprises, Defence, Justice, Foreign Affairs, Health and Sanitation and Education. Science and Technology

2.6 SECTOR SPECIFIC CONSERVATION GOALS AND OBJECTIVES

The need for the conservation and sustainable use of biological diversity is recognised in various Government Policies, plans and programmes. Biological diversity concerns were more explicitly recognised when the environmental problems identified towards the end of the 1990's included:

- land degradation brought about by a variety of factors such as agriculture and mining activities, cattle grazing, recurrent bush fires and population pressure;
- deforestation due to an increase in the demand for agriculture land and urban requirement for forest products such as timber and fuel wood;
- loss of biological diversity ;
- pollution of fresh water resources due to mining and municipal wastes; and
- poor municipal waste management

In addition to the above problems the rebel war had serious impact on the environment through the destruction of water resources and uncontrolled mining activities. During the 1990s substantial effort was made to address environmental concerns. In 1992 a draft environmental policy was formulated establishing broad objectives and strategies to achieve sustainable development. The policy was revised in 1994 and accompanied by a National Environmental Action Plan. With the support of the World Bank and UNDP a draft legislation was prepared to give clout to the policy and action plan. Political difficulties however, delayed the passing of the draft legislation into law until February 2,000 when it was promulgated by the Parliament of Sierra Leone. The Environment Protection Act, as the law is known, provides for effective protection of the environment and establishes the administrative machinery to implement the necessary measures. A major difficulty relates to the weak institutional capacity for policy implementation.

Long before the environment protection Act was promulgated different sectors had set different sector policies, goals and objectives and long term sector strategies which are relevant to the conservation and sustainable use of biological diversity. The key relevant sector policy objectives include the following:

Mining: Government policy is to continue to improve the livelihood of small scale miners and to provide a conducive environment to attract private investment into capital–int ensive large-scale mining as well as to ensure environmentally friendly mining practices. Government will therefore continue to enforce the provisions of the current mining policy that encourages both local and foreign private investment in the sector and ensures the rehabilitation of the environment damaged by mining activities.

Forestry Sector: The primary objective is to conserve, maintain, develop and manage the 5% of the total land area under forest with a view to enhance environmental protection through minimising soil degradation and erosion. Protecting wetland and improving, conserving and preserving biological diversity.

Crops Sector: To ensure the judicious and sustainable exploitation of the country's resource base so as to conserve and improve biological diversity and increase agricultural productivity in a sustainable manner so as to achieve food security within the shortest possible time.

Livestock Sector: To keep livestock production in balance and at levels consistent with limitations of the rural resources and integrate crop and livestock production systems so as to reduce environmental degradation and improve soil fertility while enhancing availability of supplementary feed from crop residues.

Fisheries Sector: To promote efficient conservation, management and development of inland and marine fisheries with a view to ensuring the optimum and sustainable utilization of the fisheries resources for the benefit of the people of Sierra Leone.

Water Resources Sector: Provide an information base pertaining to water resources and climate monitoring so as to enhance conservation of biological resources and address the requirement of the conservation on Biological diversity .

Environment Sector: Control environmental degradation and pollution in both natural and human ecosystems through firm regulations and application of the Environmental Protection Act

Wildlife Sector: To establish National Parks and Nature Resources covering at least 10 percent of the total land area for the conservation, protection, management and sustainable use of fauna and flora with a view to improving the management capacity of the Wildlife Conservation Unit and increase revenue generation from wildlife resources for the development of both wildlife and surrounding local communities.

3. THE NATIONAL BIODIVERSITY STRATEGY

3.1. INTRODUCTION

The National Biodiversity Strategy of the GOSL having taken into account several factors including, the current status of biodiversity within the major ecological belts in the country sources of threats to biodiversity, pressures on the resources and options and priority actions needed for ensuring the conservation and sustainable use and equitable sharing of biological resources, seeks to lay down a viable framework for the reduction in the rate of loss of biodiversity.

The role of the resource users or stakeholders is recognized and their capacity is to be greatly enhanced. The linkages and consultations among Government Ministries, Agencies, including NGOs and resource users is to be greatly strengthened. Both regional and intenational cooperation is also strongly advocated.

The strategies are divided in two broad categories, the thematic strategies and general measures (i.e. cross-sectoral strategies). This is in line with the guidelines laid down by the Convention on Biological Diversity (CBD) (2001). The main thematic areas considered are Wildlife, Forest Biological diversity, Agricultural biological diversity, Inland water biological diversity and Marine and Coastal biological diversity.

The cross-sectoral strategies cover cross-cutting issues including policy legislation, Capacity building, Public participation, Planning, Monitoring, Protected areas Conservation, Sustainable use, Incentive measures, Research and Training, Public Education, Impact assessment, Access to Technology, Information Exchange, Sharing of Benefits, Indigenous knowledge and Financial resources.

The NBSAP adopts a participatory approach and seeks to impress on all stakeholders the need for conservation sustainable use and equitable sharing of benefits of biodiversity.

Awareness raising at community level has been stressed. The strategy recognizes that illiteracy, mass poverty and the 10 year brutal civil conflict that led to the displacement of

a large populations with the breakdown of law and order underscores the need for conservation measures as a matter of urgency.

Priority needs to be addressed by the adoption of appropriate strategies include; training, research, capacity building, appropriate policy, legislative and monitoring and enforcement and sufficient funding.

3.2. SUMMARY OF THEMATIC (SECTORAL) STRATEGIES

The thematic areas considered in this section on strategies proposed in the NBSAP are terrestrial biodiversity (Wildlife), Agricultural biodiversity, Inland water ecosystem, Marine and Coastal biodiversity including fisheries and forest biodiversity.

3.2.1. TERRESTRIAL BIODIVERSITY

3.2.1.1. WILDLIFE, GAME RESERVES, PARKS AND SANCTUARIES

Issues and Gaps:

- Lack of comprehensive up-to-date knowledge of the biodiversity of the Wildlife of the various terrestrial ecosystems;
- Lack of up-to-date information on the taxonomy, species richness, degree of endemism and vulnerability of major taxonomic categories in existing and proposed wildlife Game reserves, Parks and Sanctuaries;
- Lack of proper inventory of wildlife population in the country;
- Lack of an up-to-date wildlife Act and Policy;
- Lack of adequate human resources and institutional capacity for wildlife management;
- Lack of a centralized mechanism for the coordination of wildlife management among various agencies;
- Lack of awareness and low key participation by the community in wildlife management;
- Lack of monitoring and adequate law enforcement mechanism in conservation work; and

- Lack of adequate financial resources for Government and private institutions for wildlife management activities.

Strategies:

(i) Undertake a comprehensive up-to-date scientific study of the biodiversity of the major ecologies;

(ii) Establish an up-to-date database on major key species, their richness, degree of endemism and conservation in proposed and existing reserves and parks;

(iii) Undertake nationwide inventory survey of wildlife population;

(iv) Review and enact an effective policy and Wildlife Act;

(v). Establish an effective framework for human resource and institutional capacity development for wildlife management;

(vi). Establish a centralized mechanism for the co-ordination of all wildlife activities nationwide;

(vii) . Promote awareness raising activities and empower the local communities to manage parks, and reserves;

(viii). Ensure sustainable harvesting and utilization of wildlife resources;

(ix). Establish an effective monitoring and enforcement mechanism for conservation especially in protected areas and empower local communities to conserve wildlife outside reserves; and.

(x) Actively seek and provide funding for wildlife activities.

3.2.1.2 Forest Biodiversity

Issues and Gaps:

- Pressure mainly due to urbanization, increased population and IDP activities;
- Lack of enforcement of Forestry laws and regulations;
- Lack of community byelaws for the harvesting of forest products;
- Uncontrolled bush fires;
- Illegal logging activities;
- Lack of Public awareness on forest conservation issues;
- Tree cutting for charcoal and firewood;
- Lack of human resources especially at the technical level and institutional capacity to manage forest resources;
- Poor farming systems and encroachment;
- Lack of knowledge on the regeneration of native tree species;
- Uncontrolled mining activities;
- Lack of proper inventory of forest resources in the country;
- Overgrazing; and,
- Proliferation of power chain saws in the harvesting of forest products.

Strategies:

(i) Ensure that urbanization is well planned and co-ordinated;

(ii) Strengthen and ensure success of the ongoing resettlement programmes;

(iii) Ensure that the forestry laws and regulations for forest management systems are enforced;

(iv) Promote and enhance those measures that could minimize or mitigate negative impacts of anthropogenic activities leading to forest degradation and loss;

(v) Promote and encourage community participation in forest management;

(vi) Enhance and promote reforestation activities at local community level;

(vii) Undertake public awareness/education campaign at the community level;

(viii) Undertake research programmes on the regeneration of native tree species;

(ix) Undertake training and recruitment of Forest Rangers, Surveys and Field Technicians;

(x) Undertake forest inventories/surveys to ensure sustainable utilization of forest biodiversity; and,

(xi) Restrict/control power chain saws by providing appropriate technologies and regeneration system that enhance forest biodiversity.

3.2.1.3. AGRICULTURAL BIODIVERSITY (PLANT AND LAND RESOURCES)

Issues and Gaps:

- Emphasis on rice production and plans to use a wide range of ecologies for the purpose;
- Lack of capacity on the part of small holder farmers to change and adopt new farming practices instead of shifting cultivation involving slashing and burning;
- Use of arable land for other purposes such as mining;
- Lack of promotion of crops for use as medicines, dyes and ornaments;

- Land degradation due to poor land management; and,
- Loss of plant and genetic resources in research institutions due to the war ;

Strategies:

(i) Adopt a Government policy that promotes agricultural systems and practices that enhance agricultural biodiversity;

(ii) Promote the production of other grain and foodstuffs along with rice;

(iii) Facilitate small holder farmers to adopt agricultural practices that could minimize loss of biodiversity;

(iv) Control mining by enforcing the present policies and regulations;

(v) Promote research into production of crops for other purposes other than just food;

(vi) Support and strengthen research institutions to carry out research and recover genetic resources lost through the war;

(vii) Train and provide logistics for more extension work; and,

(viii) Promote Agroforestry techniques as an efficient land use practice.

1.4 AGRICULTURAL BIODIVERSITY (LIVESTOCK RESOURCES)

Issues and Gaps:

- Loss of livestock due to the war;
- Inadequate support services in the veterinary services;
- Poor animal husbandry practices; and.
- Absence of improved ……management, and

- Friction between livestock/crop farmers

Strategies:

(i) Restocking of animals with improved appropriate breeds;

(ii) Promote research into production of indigenous animal genetic resources;

(iii) Enhance and promote appropriate animal husbandry practices;

(iv) Promote and enhance community veterinary services among the farmers; and,

(v) Encourage farmers to diversity their production towards non-conventional indigenous animal genetic resources and encourage agrosilvo pastoral system in range management.

(vi) Demarcation and improvement of specific grazing areas.

3.2.1.5 AGRICULTURAL BIODIVERSITY (LAND RESOURCES)

Issues and Gaps:

- Lack of a comprehensive up-to-date land use policy and legislation; need to revise the land tenure system;
- Lack of sufficient knowledge of the nature and extent of land degradation; very little co-ordinated research;
- Poorly co-ordinated activities related to land use including, urbanization, transportation, mining, agriculture and waste disposal, and,
- Inadequate resources and logistic support for land use planning and monitoring.

Strategies:

(i) Review of the land use policy and legislation taking into consideration the land tenure system;

(ii) Strengthen the human and institutional capacity of those agencies involved in land use management to promote those practices that promote biodiversity;

(iii) Undertake measures to control all illegal activities promoting biodiversity loss;

(iv) Promote and encourage an integrated approach to the use of land nationwide; and,

(v) Optimise landuse by categorizing land according to productive capacity of the land.

3.2.2. AQUATIC BIODIVERSITY

3.2.2.1. INLAND WATER ECOSYSTEMS

Issues and Gaps:

- Lack of specific policy and institutional framework for the management of inland water ecosystems;
- Changes in water quality and volume due to activities including mining, irrigation, waste disposal and hydroelectric power generation;
- Over-exploitation of wetland resources;
- Over-lapping and conflicting mandates among agencies responsible for the management of inland water ecosystems;

- Population pressure due to the war; and,
- Inadequate financial support to agencies (government and NGOs) for inland water ecosystem management.

Strategies:

(i) Formulation of national policy and legislation on inland water ecosystems management that focuses on an integrated approach;

(ii) Legislature and Control on the exploitation of wetland resources;

(iii) Promote community- driven sustainable use of wetland and inland water ecosystems resources;

(iv) Promote support and enhance the ongoing rehabilitation and resettlement programmes for displaced populations; and,

(v) Solicit financial support for agencies involved in the management of inland water ecosystems including research.

(vi) Promote those activities that do not adversely affect water quality and ……

3.2.2.2. COASTAL AND MARINE BIODIVERSITY, INCLUDING FISHERIES.

Issues and gaps:

- Lack of up-to-date information on the status and trends on the biodiversity of the coastal and marine biotopes;
- Degradation/ fragmentation and loss of seabed integrity due to activities such as coastal infrastructural development fishing, sand mining, oil exploitation and agriculture;

- Over-exploitation of commercial species especially fishes through increasing pressure and poor fishing practices;
- Uncontrolled introduction of pollutants, (solid waste, sewage, oils, chemicals)into the coastal environment;
- Lack of integrated approach to the management of coastal and marine areas;
- Lack of sufficient support to marine and coastal protected areas; and,
- Lack of an effective monitoring control and enforcement mechanisms against marine transgressions.
- Lack of appropriate legislation for the protection of vulnerable//endangered wetland

Strategies:

(i) Conduct research into the status of biodiversity in the major coastal and marine biotopes;

(ii) Promote an integrated approach to the management of the marine and coastal ecosystems;

(iii) Adopt and implement the FAO code of Conduct for Responsible Fishing;

(iv) Enhance the enactment of the proposed Marine Pollution Act;

(v) Promote and support the establishment of an effective Monitoring Control and Surveillance system for EEZ and IEZ; and,

(vi) Promote and support the implementation of the management of the existing and proposed conservation areas.

3.2.3. SUMMARY OF GENERAL MEASURES (CROSS-CUTTING STRATEGIES)

The section that follows summarizes proposed strategies for biodiversity under the main cross-cutting issues and are as follows:

3.2.4.1. POLICY, LEGISLATIVE AND INSTITUTIONAL MEASURES

Issues and Gaps:

- Lack of up-to-date policy and legislation addressing biological diversity;
- Lack of manpower, infrastructure and other support facilities for the enhancement of biodiversity programmes;
- The rapid urbanization, reconstruction and development programmes
- Lack of guidelines, for biodiversity conservation;
- Lack of policy and legislation on a coordination mechanism for biodiversity utilization and conservation; and,
- Inadequate National and International Technical and Financial Support for biodiversity programmes.

Strategies:

(i) Review and enact policy and legislation that enhances biodiversity strategies;

(ii) Enhance human and institutional capacity for biodiversity conservation activities;

(iii) Incorporation of specific guidelines and regulations into those programmes involving urbanization, reconstruction and development and undertake EIA's prior to any project implementation.

(iv) Support and promote the setting up of a mechanism and institutional framework for co-ordination among agencies on matters related to biodiversity; and,

(v) Advocacy and support for adequate National and International Technical and financial support for programmes related to biodiversity conservation.

3.2.3.2 CAPACITY BUILDING:

Issues and Gaps:

- Lack of adequately trained personnel staff especially scientists to undertake biodiversity programmes;
- Lack of sufficient financial resources;
- Lack of adequate support facilities, such as libraries, laboratories and equipments; and,
- Lack of capacity to overcome research problems (taxonomy, ecological complexity)

Strategies:

(i) Enhance the human resources capacity through appropriate training for biodiversity management;

(ii) Establish and strengthen support facilities for biodiversity management; and,

(iii) Strengthen the financial resources capacity of both Government and Private Sector involved with sustainable use and conservation of biodiversity.

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3.2.3.3. PUBLIC PARTICIPATION

Issues and Gaps :

- Lack of sufficient involvement of the civil society especially the youths in the management of biodiversity;
- Lack of adequate awareness raising and advocacy activities among the Government agencies and NGOs for public participation in biodiversity management;
- Lack of specified policy and legislation requiring public participation in biodiversity activities; and,
- Lack of incentives to promote public participation in biodiversity conservation.

Strategies:

(i) Promote and enhance civil society involvement in biodiversity activities, and provide financial support to youth programmes that enhance biodiversity conservation;

(ii) Adopt participatory approaches to conservation at all levels including village management committees; and,

(iii) Establish a clear policy and legislative framework for civil society participation in all biodiversity activities.

3.2.3.4. BIODIVERSITY PLANNING

Issues and Gaps :

- Lack of comprehensive biodiversity planning in Sierra Leone;
- Lack of specific provisions for planning at sectoral levels; and,

- The National Environmental Protection Act (NEPA) is fairly general and selective with no particular emphasis on environmental planning.

Strategies:

(i) Strengthen and equip the established Biodiversity Planning Unit within the MOAFFS

(ii) Incorporate biodiversity planning into sectoral policies; and,

(iii) Adopt a participatory approach to biodiversity planning and decision making at all levels.

3.2.3.5. IDENTIFICATION AND MONITORING

Issues and Gaps:

- Lack of an up-to-date comprehensive policy and legislative framework for identification and monitoring of components of biodiversity;
- Lack of information on trends that affect the integrity of the ecosystems; and
- Lack of specific guidelines for identification and monitoring of biodiversity in the existing conservation related programmes.

Strategies:

(i) Strengthen existing NEPA and regulations to include monitoring of various components of biodiversity over time;

(ii) Promote and enhance studies on the species diversity, status and trends of biodiversity in various ecologies;

(iii) Provide guidelines for the identification and monitoring of various components of biodiversity;

(iv) Develop and implement a biodiversity monitoring programme; and,

(v) Establish data bases for biodiversity and link them to the clearing house mechanism for information to be disseminated worldwide.

3.2.3.6 IN-SITU CONSERVATION (PROTECTED AREAS)

Issues and Gaps:

- Lack of up-to-date policy and legislative framework on protected Areas;
- Lack of unified guidelines in various sectoral institutions for management of PAs;
- Weak information base on PA some of which may no longer exist;
- Lack of training and insufficient manpower capacity to manage PAs; and,
- Lack of sufficient information on the impact of the war on PAs;

Strategies:

(i) Review and update existing sectoral policies and legislation relating to PAs;

(ii) Issue unified guidelines for the management of PAs;

(iii) Strategically reassess the status of existing and proposed PAs in post war situation;

(iv) Enhance training and manpower capacity to manage PAs; and,

(v) Enforce appropriate regulations relating to management of PAs

3.2.3.7. IN-SITU CONSERVATION (OUTSIDE PROTECTED AREAS)

Issues and Gaps:

- About 98 % of the biodiversity of Sierra Leone lies outside the protected areas:
- Lack of adequate knowledge of published and unpublished materials on biodiversity of regions outside protected areas;
- Lack of adequate scientific knowledge of the ecology of the species in the various ecologies in areas outside PAs;
- Lack of management plans of the ecologies outside the PAs; and,.
- Ineffective law enforcement outside protected areas due to land tenure.

Strategies:

(i) Review and incorporate into sectoral policies and laws biodiversity management of ecologies outside PAs,

(ii) Identify and assess the status of the species outside PAs,

(iii) Develop and implement guidelines for the sustainable use of natural resources outside PAs; and,

(iv) Promote the participation of local communities NGOs and private sector in the areas outside the PAs.

3.2.3.8 ECOLOGICAL RESTORATION AND SPECIES RECOVERY

Issues and Gaps:

- Lack of knowledge of the provisions of Article 8(f) of the CBD relating to the ecological restoration and species recovery;

- Lack of knowledge and non compliance with the regulation of the NEPA on rehabilitation of ecosystems after the implementation of projects requiring substantial changes in natural environment;

- Inadequate manpower capacity and enforcement mechanisms for existing regulations;

- Lack of community based programmes for the restoration of ecosystems; and,

- Lack of species recovery programmes nationwide.

Strategies:

(i) Identify and demarcate critical ecosystems under threat;

(ii) Review and update sectoral policies and laws in line with the provisions of Article 8(f) of the CBD;

(iii) Promote manpower development and the enforcement of the existing regulations on ecosystem restoration and species recovery;

(iv) Develop and implement species recovery programmes especially for endangered species; and,

(v) Promote the active participation of the local communities in ecological restoration and species recovery work.

3.2.3.9. CONTROL OF ALIEN SPECIES

Issues and Gaps:

- Lack of adequate scientific knowledge of invasive species in the various ecologies of Sierra Leone;

- Lack of identification and monitoring mechanisms for alien species;

- Lack of control and mitigation mechanisms for combating the harmful effects of alien species;
- Lack of public awareness of the harmful effects of invasive species on biodiversity;
- Lack of up-to-date policies and legal provisions for the control of importation of exotic species in Sierra Leone; and.
- Too much emphasis on alien or exotic species in afforestation programmes in Sierra Leone.

Strategies:

(i) Promote scientific investigations into the types, origin and potential impacts of alien species on native biodiversity;

(ii) Review and strengthen existing policies and legislation on alien species;

(iii) Develop and promote programmes for monitoring, control and surveillance of alien species;

(iv) Enhance public education and awareness about the impacts of alien species;

(v) Promote the use of indigenous species in restoration work; and,

(vi) Forestry Division to limit the use of invasive alien species like *Acacia Magnum*, *Buceana* etc. in reforestation programmes.

3.2.3.10. EX-SITU CONSERVATION

Issues and Gaps:

- Ex-situ conservation activities are confined to educational and research institution;

- Ex-situ facilities were adversely affected or destroyed during the war;
- Weak institutional framework for the establishment of ex-situ conservation facilities such as gardens, aquaria and herbal gardens; and,
- Lack of comprehensive sectoral policies and laws on ex-situ conservations.

Strategies:

(i) Develop the national capacity for ex-situ conservation by rehabilitating existing facilities and establishing new ones;

(ii) Strengthen educational and research institutions to further ex-situ activities;

(iii) Incorporation of ex-situ conservation measures into sectoral policies and laws; and,

(iv) Promote private sector initiatives and participation in ex-situ conservation activities.

3.2.3.11. SUSTAINABLE USE OF BIODIVERSITY COMPONENTS.

Issues and Gaps:

- Lack of policy and legislative guidelines in some sectors on sustainable exploitation methodologies for biological resources;
- Internally Displaced Populations (IDPs) have contributed significantly towards overexploitation of biological resources such as those of forest, agriculture, wildlife and fisheries;
- Use of inappropriate technologies in harvesting of biological resources;
- There are significant post harvest loses for products from sectors such as forestry, wildlife, agriculture and fisheries; and,

- Lack of adequate enforcement mechanisms for existing sectoral policies and regulations relating to sustainable exploitation of biological resources.

Strategies:

(i) Review and update sectoral policies and legislative guidelines on sustainable exploitation and use of biological resources;

(ii) Resettle the IDPs to prevent overexploitation of biological resources from sources such as forestry, wildlife, agriculture and fisheries;

(iii) Promote the use of appropriate technologies in the harvesting of biological resources;

(iv) Promote and encourage measures that reduce post harvest loses significantly in all sectors;

(v) Promote measures that encourage modest consumption;

(vi) Strengthen and upgrade existing enforcement mechanism for sectoral policies and regulations on sustainable use of biodiversity components;

(vii) Undertake public education programmes on sustainable use;

(viii) Encourage national surveys to determine consumption patterns and hence prescribe allowable cutons (i.e. balance supply and demand); and,

(ix) Promote and support customary and traditional resource use patterns that promote sustainable use of biodiversity.

3.2.3.12. INCENTIVE MEASURES

Issues and Gaps:

- There is no explicit policy or legislative framework on incentive measures for the conservation and sustainable use of biological diversity in Sierra Leone;
- Certain sectoral policies and legislations lay emphasis on incentive for ecosystem restoration and biodiversity conservation;
- Present incentives in sectoral policies are for programmes which promote overexploitation of resources in the drive to meet target performance levels; and,
- NGOs promote incentive measures in a rather uncontrolled manner.

Strategies:

(i) Review the existing NEPA and regulations to incorporate incentive measures for the conservation and sustainable use of biodiversity;

(ii) Review and update sectoral policies to include incentive measures for programmes for conservation and sustainable use of biodiversity;

(iii) Develop a national programme on incentives to promote the design and implementation of new target oriented incentive measures to address specific threats and underlying causes of biodiversity loss;

(iv) Promote and co-ordinate the private sector initiatives to include incentive measures in conservation and biodiversity programmes; and,

(v) Provide incentives to Forest Managers that maintain or enforce existing forest boundaries in reserves.

3.2.3.13. RESEARCH AND TRAINING

Issues and Gaps:

- Research into biodiversity related areas has been carried out largely by institutions of higher learning and research institutions;
- Most of research emphasis were largely for the purposes of exploitation rather than for the conservation and sustainable use of biodiversity;
- Most of the findings of past and ongoing biodiversity related matters have remained either largely unpublished or inaccessible; and,
- Almost all agencies responsible for the management of biological resources lack the necessary capacity to undertake research.

Strategies

(i) Identify and undertake studies on all aspects of biodiversity in all the major ecosystem categories;

(ii) Identify research priorities for the successful implementation of programmes for conservation and sustainable use of biodiversity;

(iii) Carry out training needs assessment for professionals and extension staff in all the sectors responsible for biodiversity conservation; and,

(iv) Strengthen the capacity of existing research institutions to train the required Personnel and to conduct research on all aspects of biodiversity conservation.

3.3.3.14. PUBLIC EDUCATION AND AWARENESS

Issues and Gaps:

- Major indirect threats to the conservation and sustainable use of biodiversity in Sierra Leone are, illiteracy, ignorance, poverty and lack of awareness;
- Lack of awareness of biodiversity conservation and sustainable use among the general public is widespread and not just confined to the rural and illiterate majority;
- Media coverage and awareness raising campaigns are rudimentary and confined to major cities where environmental disasters have been obvious in recent times;
- Environmental programmes for inclusion into basic education curricula are fairly recent and do not explicity stress biodiversity; and ,
- Various sectoral legislations make no specific provisions for environmental education.

Strategies:

(i) Promote and implement awareness raising programmes for opinion leaders at all levels of society including civil society, NGOs, funding agencies, the media and

Government officials;

(ii) Develop and implement comprehensive public education and awareness

programmes and campaigns on biodiversity nationwide in post war Sierra Leone;

(iii) Promote the incorporation of awareness raising and environmental programmes for biodiversity into sectoral policies and legislative frameworks;

(iv) Promote the integration of environmental education, including biodiversity into basic education and tertiary education curricula; and,

(v) Promote and encourage the introduction of non-formal approaches to environmental education for the majority of the rural population.

3.2.3.15. IMPACT ASSESSMENT AND MINIMISING ADVERSE IMPACTS

Issues and Gaps:

- There is an increase in activities that impact negatively on the environment due to needs for reconstruction, rehabilitation and economic development in postwar Sierra Leone;
- Large scale projects in various sectors which significantly affect biodiversity are ongoing or planned including the mining (kimberlite, bauxite, rutile, sand, offshore oil), agriculture, hydroelectricity, generation, waste disposal, logging and industrial fishing;
- Information on the recently elaborated EIA guidelines are yet to receive public attention nationwide; and,
- Lack of an effective monitoring and enforcement mechanism for all regulations under the newly published EIA guidelines.

Strategies:

(i) Review and develop a more comprehensive list of categories of activities covered by the EIA guidelines;

(ii) Ensure and facilitate the active participation of stakeholders in the impact assessment processes, including; NGOs, company representatives, government agencies and local communities; and,

(iii) To promote and strengthen the effective monitoring and enforcement mechanisms of the existing regulations under the EIA guidelines especially for large-scale programmes.

3.2.3.16. SHARING OF BENEFITS ARISING FROM THE USE OF GENETIC RESOURCES

Issues and Gaps :

- Lack of comprehensive legislation about access to the genetic resources and the sharing of the benefits arising from the use of biological resources;
- Few sectoral legal provisions regulating access to genetic resources exist in the country;
- Sectoral legal provisions regulating access to genetic resources are outdated; and
- Lack of explicit provisions in either the NEP or NEPA (2002) to regulate access to genetic resources and the sharing of benefits.

Strategies:

(i) Promote the introduction of a comprehensive legislative framework for the regulation of access to genetic resources and sharing of benefits from the use of those resources;

(ii) Review and update existing sectoral legal provisions in line with the proposed comprehensive framework on the access to genetic resources and the sharing of benefits;

(iii) Carry out awareness raising campaigns to sensitize the public on the regulation of access to genetic resources and sharing of benefits;

(iii) Promote and enhance the amendment of the National Environmental Protection Act (2002) to address issues of access, benefit sharing and intellectual property Right;

(iv) Promote the establishment of the institutional framework with the relevant capacity to regulate access to genetic resources and the sharing of benefits; and

(v) Promote private sector participation and local entrepreneurship in the regulation of genetic resources and sharing of benefits from the use of biological resources.

3.2.3.17. INDIGENOUS KNOWLEDGE AND INTELLECTUAL PROPERTY RIGHTS

Issues and Gaps:

- Lack of adequate information in indigenous knowledge and practices in the conservation and sustainable use biodiversity;

- Outdated and inadequate legislation on intellectual property rights;
- Sources of indigenous knowledge often not acknowledged or rewarded;
- High rate of attrition and loss of indigenous knowledge as the older people die off; and
- Lack of general awareness among local communities on the intellectual property rights and rewards

Strategies:

(i) Undertake some comprehensive studies on indigenous knowledge and practices among local communities for the conservation and sustainable use of biodiversity;

(ii) Review and update existing legislation on intellectual property rights to Internationally acceptable standards in the conservation and sustainable use of biodiversity;

(iii) Promote public awareness about intellectual property rights and rewards in conservation and sustainable use of biodiversity; and

(iv) Promote the customary use of biodiversity traditional resources management systems and indigenous knowledge of local communities.

3.2.3.18. ACCESS TO TECHNOLOGY AND HANDLING OF BIOTECHNOLOGY

Issues and Gaps:

- Lack of knowledge of the legal requirements for the transfer of technology;

- Lack of statuary framework for the regulation of biotechnology;
- Outdated patent laws in Sierra Leone focus on sectoral issues; and
- Existing institutions have not included biotechnology risks assessment into their programmes.

Strategies:

(i) Assess the legal requirements for the transfer of technologies to benefiting country;

(ii) Promote and ensure the establishment of a legal framework for the regulation of biotechnology;

(iii) Review and update existing sectoral patent laws of Sierra Leone; and,

(iv) Identify and strengthen the capacity of existing institutions for biotechnology risk assessment including introduction of genetically modified living organisms.

3.2.3.19. INFORMATION EXCHANGE AND TECHNICAL/SCIENTIFIC CO-OPERATION

Issues and Gaps:

- Sierra Leone as a contracting party needs to comply with the necessary provisions of Article 17 and 18 of the CBD on exchange of technical and scientific information;
- Lack of specific provisions in sectoral laws on the exchange of information on biodiversity conservation and its sustainable use;
- Lack of a centralized agencies with a mandate and capacity for information gathering and decimination at national and international levels; and,

- Lack of a clear government policy for the facilitation of exchange of technical and scientific information in the fields of biodiversity.

Strategies:

(i) Assess the legal and capacity needs of Sierra Leone for compliance with the requirements of relevant provisions of Articles 17 and 18 of the CBD;

(ii) Develop and implement a clear policy and legal framework for the facilitation of exchange of technical and scientific information both nationally and internationally;

(iii) Review and update sectoral laws to include mechanisms for the ex-change of information on biodiversity and its sustainable use; and,

(iv) Establish a clearing house mechanism to facilitate exchange of technical and scientific information on biodiversity both Nationally and Internationally.

3.2.3.20. RELATIONSHIP BETWEEN THE CBD AND OTHER CONVENTIONS.

Issues and Gaps :

- The focal points for the implementation of various treaties and conventions to which Sierra Leone is a party are in line Ministries and Agencies;
- Very little co-ordination and often weak linkages exist between implementing bodies of the national obligations under the different conventions; and,

- Programmes are often duplicated and implemented by different agencies due to poor coordination.

Strategies:

(i) Promote and enhance the establishment of a coordinating body or agency for the implementation of programmes under the different conventions by line ministries and agencies;

(ii) Encourage the establishment of steering committees for the joint identification,

planning implementation and monitoring of the programmes under the different

conventions, and,

(iii) Ratify all relevant biodiversity related conventions to complement the CBD

to promote the conservation and sustainable use of biodiversity.

3.2.3.21. FINANCIAL RESOURCES

Issues and Gaps:

- In addition to weak infrastructure and staff shortages, the GOSL is plagued with chronic shortage of financial resources;

- Budgetary allocation in post war Sierra Leone is mostly directed towards reconstruction and rehabilitation work rather than toward conservation of biodiversity;

- There are new World Bank guidelines for conservation of biological diversity in projects requiring World Bank funding;

- Sectoral budgetary allocations by the GOSL for biodiversity conservation activities is grossly inadequate;

- Most NGOs involved in biodiversity work face financial constraints as the most serious impediment;

Strategies:

(i) Promote an increase in sectoral budgetary allocation from GOSL for biodiversity conservation;

(ii) To promote activities and projects by providing financial support for biodiversity

work;

(iii) To develop a legislative framework incorporating user fees (licences, royalties)

for biodiversity exploitation and use;

(iv) To promote monitoring, control and surveillance schemes involving penalties for biodiversity transgressions; and

(v) To foster donor support through Private foundations and NGOs for biodiversity activities.

4. THE ACTION PLAN

4.1. INTRODUCTION

The action plan proposed in the Sierra Leone Biodiversity Strategy and Action Plan comprises a series of measures and mechanisms intended to conserve and promote the sustainable use of the different components of the country's biodiversity. The actions proposed cover several key thematic areas under: terrestrial biodiversity, inland water ecosystems, forest biodiversity, marine and coastal biodiversity and agricultural biodiversity. In addition, actions are also proposed for key cross cutting issues affecting the sustainable utilization of biodiversity, including: policy, legislation and institutional review, capacity building, identification and monitoring, sustainable use, incentive measures, research and training, public education and awareness, regulation of access to genetic resources, protection of indigenous knowledge and intellectual property rights of local communities, technology transfer and handling of biotechnology and exchange of information and technical cooperation.

The actions proposed in this plan are diverse. The time frame that will ensure the maintenance of biodiversity is estimated to be between 5-10 years if the measures proposed are undertaken. Some of the actions proposed will either serve to protect, restore or lead to the sustainable utilization of biodiversity. Other actions will focus on assessments and research, the provision of policy and institutional framework, etc. Below, each major theme and cross cutting sub-components are summarized, including actors and lead agencies needed for implementation, financial cost and timeframe needed for successful implementation. These are also summarised in Annex 1.

4.2. THEMATIC ACTION PLANS

4.2.1 TERRESTRIAL BIODIVERSITY

4.2.1.1 PARKS AND WILDLIFE MANAGEMENT

Actions Proposed

- Review existing literature and documents relating to the flora and fauna of Sierra Leone;
- Carry out an assessment of herbaria and museum collections and produce a list of endemic species;
- Verify biodiversity information collected on the ground by conducting field assessments;
- Train personnel (para-taxonomists, technicians, etc) to carry out biodiversity assessment;
- Reclassify, gazette and establish a system of protected areas to include national parks, wildlife sanctuaries, strict nature reserves, etc, in representative ecosystems and ensure their proper management;

- Conserve all vulnerable, threatened and endangered species in the different ecosystems and protected areas;
- Ensure the proper management of forest reserves under logging to protect biodiversity against illegal settlements, forest clearance and hunting of wildlife;
- Identify the current status of all existing protected areas in terms of current manpower needs, scientific information and levels of threats facing them;
- Increase funding for protected areas commensurate with the size of the area, manpower needs and logistics needed to effectively control illegal logging, hunting and trapping of wildlife;
- Undertake a national census of all large mammals (e.g., chimpanzees and elephants) as a matter of urgency;
- Control the trade in bushmeat by identifying species threatened by the trade, introduction of a moratorium and the provision of alternatives;
- Review the 1972 Wildlife Conservation Act and pay attention to the status of species regarded as vulnerable, threatened or endangered;
- Elevate the status of the Wildlife Conservation Branch to a Wildlife Division and provide support services to carry out its new mandate;
- Encourage the active participation of NGOs in the management of protected areas;
- Encourage co-management of protected area resources and seek to involve important local institutions with adequate gender balance;
- Initiate and develop active research programs in all protected areas for regular and basic ecological monitoring of flora, fauna and their habitats;
- Advocate for an increase in the numbers and size of protected areas;
- Develop and implement management plans for all protected areas;
- Develop action plans for the conservation of species listed as habitat specifics, threatened and endangered;
- Develop infrastructure within protected areas for research, tourism and local communities;
- Carry out training needs assessments;
- Develop a training program for biodiversity conservation and management;
- Organize training courses for national parks and protected area managers as well as law enforcement officers;
- Establish and equip a biodiversity coordinating unit under the Ministry of Agriculture, Forestry and Food Security to oversee the implementation of the NBSAP;
- Map/Demarcate the location and area extent of sacred groves, natural monuments and heritage sites;
- Conduct an inventory of the flora and fauna of sacred groves;
- Advocate for a national policy for the conservation of sacred groves, natural monuments and heritage sites;
- Develop educational and awareness raising programs to improve on the negative attitudes of people towards protected areas;
- Conduct a review of the national protected area system;
- Encourage, support and provide incentives for the establishment of private protected areas;

- Conduct an assessment of the present and future needs of the current protected areas;
- Encourage broader stakeholder participation in the development and implementation of management plans for protected areas;
- Enhance the scientific and socio-economic value of protected areas to benefit adjacent communities;
- Encourage and promote land zoning outside of protected areas through financial incentives for biodiversity conservation on private and adjacent lands;
- Support the habitat restoration and rehabilitation of degraded lands in and around protected areas;
- Promote a landscape approach to protected area and species conservation;
- Support the establishment of botanic gardens as sites for wild plant genetic resource conservation;

Timeframe: 2004-2009

Actors: WCB, FD, University, NGOs

Estimated Cost: US$35 Million

4.2.1.2. FOREST BIODIVERSITY

Actions Proposed

- Assess the underlying causes of forest loss from an interdisciplinary perspective;
- Carry out proper management of logged out areas to ensure maintenance of biodiversity;
- Develop and implement alternatives to slash-and-burn agriculture in the forest zones;
- Encourage the sustainable exploitation of forests and the maintenance of important ecosystem services;
- Seek the involvement of local communities in the management and sustainable utilization of forest resources;
- Provide incentives and benefits to communities engaging in sustainable management of forest resources;
- Support and encourage sustainable forestry programs that protect biodiversity;
- Regulate the introduction and spread of exotic and overabundant species in forested areas;
- Encourage traditional practices and knowledge that are beneficial to the sustainable management and exploitation of forest biodiversity;
- Encourage and support ecosystem approach to forest management both at the national and local levels;

- Develop and implement guidelines that reflect the scientific, socio-economic and cultural benefits of forests to all;
- Promote the sustainable utilization of the existing forest reserves through proper planning and management;
- Analyze the representation and adequacy of existing forest areas for biodiversity conservation;
- Encourage the rehabilitation of degraded and deforested areas especially in mountainous areas;
- Develop broad valuation methods for the multiplicity of benefits offered by forest biodiversity;
- Develop, implement and improve on indicators/criteria for forest biodiversity exploitation and management;
- Seek the involvement of women and other key stakeholders in multiple use forestry programs;
- Introduce tax incentives/breaks on imported forest products to reduce threats on our national forests;
- Train an adequate number of individuals to engage in the assessment and valuation of forest biodiversity;
- Train forest tree-spotters;
- Provide subsidies and encourage the development of alternative energy sources to firewood/charcoal such as solar, gas, hydro- and electricity;
- Protect montane ecosystems and mountain water-shed areas from farming, grazing and logging activities;
- Support and encourage the establishment of forest plantations in degraded areas to supply timber and fuelwood needs;
- Analyze the demand and market structure for fuelwood in all urban areas;
- Develop and implement fuelwood projects;
- Encourage and support forest patrol officers at the national and community level;
- Improve and adopt stringent licensing systems for the exploitation of forest resources;
- Undertake stock surveys of all natural forests prior to exploitation so as to determine allowable cuts;
- Ban/restrict the use of power chain saws by unlicensed loggers;
- Undertake surveys of NTFPs and their uses to local communities;
- Limit the spread of forest fires;
- Encourage the afforestation of both the Northern Savana zones and the Mangroves in the Southwest of the country;
- Promote silvicultural techniques that encourage natural regeneration of native species;
- Promote incentive packages to communities and forest officers that maintain or enlarge the boundaries of the forest estate;

Timeframe: 2004-2008

Actors: FD, WCB, University, NGOs, Local Communities, Local Government

Estimated Cost: US$6 Million

4.2.1.3 AGRICULTURAL BIODIVERSITY (PLANT AND LAND RESOURCES)

Actions Proposed

- Strengthen crop genetic resource conservation;
- Encourage and promote the use of medicinal plant cultivation and domestication in our farming system;
- Promote sustainable farming practices that lead to agricultural productivity, maintenance of soil fertility and the protection of biodiversity;
- Promote and support agro-forestry programs for farmers that are beneficial to biodiversity conservation;
- Review and assess the impact of the seed multiplication projects and recommend areas of improvement;
- Discourage farming practices in mountainous areas that lead to soil erosion and siltation;
- Document the types, distribution and abundance of pollinators of agricultural crops;
- Identify useful agricultural practices that maintain pollinator abundance and diversity;
- Encourage and promote soil and water conservation practices in both low lying and mountainous areas;
- Regulate the excessive use of agro-chemicals to prevent adverse effects on biodiversity;
- Encourage and promote sedentary and intensification of agriculture over slash-and-burn agriculture;
- Regulate agricultural expansion into natural and undisturbed ecosystems like forests, montane and wetlands;
- Control and regulate animal husbandry and livestock numbers in the agro-pastoral landscape;
- Conduct crop suitability assessments prior to the establishment of crop agricultural programs;
- Develop and promote agricultural practices that conserve wild relatives of agricultural crops;
- Promote and support crop breeding programs at national and traditional levels to increase agricultural productivity and variety;
- Assess the current distribution and levels of threats facing medicinal plants, ornamental plants and little known food crops;
- Promote research and breeding programs to enhance income opportunities and food security;
- Encourage and promote ex-situ conservation and propagation of medicinal plants, little known food crops and ornamental plants;
- Encourage and support research on threatened indigenous plant species;

- Assess and monitor the impact of agricultural activities and major development projects on the maintenance and promotion of agricultural biodiversity;
- Encourage and support in-situ conservation of wild genetic materials;
- Encourage the optimization of land use by marching crop species to site;
- Promote public awareness programs through various media outlets about maintaining agricultural biodiversity;
- Identify and implement appropriate incentive packages to encourage the sustainable use and management of agricultural biodiversity;
- Promote and support farmers association that collaborate with extension workers and researchers in the use of and maintenance of agricultural biodiversity;
- Promote the use of and maintenance of indigenous agricultural knowledge and practices that are beneficial to biodiversity;
- Incorporate and integrate indigenous systems in National Plans.
- Develop and implement legal framework for IPR local counterparts to all bio-prospecting and research institutes;
- Enhance/organize local communities to design agreeable equitable sharing framework;
- Conduct an environmental impact assessment of all bio-prospecting community exploitation activities.

Timeframe: 2004-2009

Actors: Agriculture, Research Institutions, University, Local communities, NGOs

Estimated Cost: US$9 Million

4.2.1.4 AGRICULTURAL BIODIVERSITY (LIVESTOCKS)

Actions Proposed

- Strengthen livestock genetic resource conservation;
- Encourage and support local and commercial farmers to rear local breeds of livestock;
- Carry out a survey of market demands for preferred bushmeat products traded in urban areas;
- Strengthen and support programs (disease control, genetic improvement, nutrition, etc) that lead to better management of small ruminants and cattle;
- Encourage and promote the rearing of wild animals (especially mammals) that have market demand and frequently traded for bushmeat;
- Support and promote the domestication of wild species of birds such as guinea fowls, geese and ducks;
- Support and improve on traditional poultry production system;
- Promote the establishment of cottage industries in the production of dairy products like milk, cheese, cream, etc.;

- Support the establishment of bee keeping programs in rural communities;
- Support the establishment of ranches to encourage sedentary livestock rearing;
- Assess range conditions, carrying capacities of grazing sites and tolerance to repeated grazing by livestock;
- Develop management strategies and plans for all ranches and grazing sites to include fire control, soil stabilization, ground cover improvement, feeding techniques, rangeland improvement, livestock health, control of poisonous plants, fallow improvement, etc.;
- Encourage de-stocking when livestock numbers exceed carrying capacity;
- Promote the establishment of feed mills that rely on the utilization of locally produced grains and other agricultural products;
- Promote the establishment of watering sites or water holes for livestock;
- Encourage the formation of livestock associations by herders and farmers;
- Enhance and strengthen extension services for livestock owners and farmers;
- Promote public education and awareness on wildfire control, range management & improvement, stocking densities, range improvement, etc.

Timeframe: 2004-2009

Actors: Agriculture, Livestock Unit, Njala University College, Agriculture Institutions, NGOs

Estimated Cost: US$6 Million

4.2.2. AQUATIC BIODIVERSITY

4.2.2.1. Inland Water Ecosystems

Actions Proposed

- Carry out an inventory of all wetlands and apply appropriate conservation actions;
- Identify the causes of wetland loss and degradation;
- Map the distribution and abundance of threatened wetland vertebrates like Manatees, Crocodiles and Pigmy Hippos;
- Assess the level of human disturbance in and around the major watersheds;
- Prepare and implement an integrated management plan for key watershed areas;
- Examine the impact of alluvial diamond mining on wetlands in eastern and southern Sierra Leone;
- Involve all key stakeholders in the preparation and implementation of management plans and development projects that affect aquatic resources;
- Develop and adopt a national wetland policy;
- Examine the impact of agro-chemicals and other pollutants on wetland ecosystems;

- Support training programs and collaboration at institutional level to enhance the conservation and sustainable utilization of wetland resources;
- Disseminate information on the importance and potential risk of destroying wetlands;
- Encourage public participation in wetland resource use and management;
- Establish and implement legal, administrative and incentive packages for public participation in wetland biodiversity use and management;
- Promote efficient use of water in urban areas by curbing on pipe leakages and wastage;
- Mandate the use of EIA for all wetland related development projects with potential impact on biodiversity;

Timeframe: 2004-2008

Actors: FD, LWDD, WBC, Agriculture, NGOs, University, Local Communties

Estimated Cost: US$3 Million

4.2.2.2. MARINE AND COASTAL BIODIVERSITY, INCLUDING FISHERIES

Actions Proposed

- Support and equip the naval wing of the Sierra Leone Navy to make frequent patrols of territorial waters;
- Give adequate protection to coastal and marine habitats important for spawning and nursing of marine life;
- Use legal measures to control sea-based sources of marine pollution;
- Develop and support awareness programs for the sustainable exploitation of marine resources;
- Develop and promote policies to prevent physical alterations of marine habitats;
- Pursue the restoration of degraded marine areas;
- Support and strengthen research, monitoring of marine biodiversity;
- Identify and protect critical fishing grounds;
- Promote measures to prevent the introduction of alien and exotic species into marine and coastal habitats;
- Assess the impact on adjacent coastal communities on the loss of marine biodiversity;

- Undertake studies to identify potential marine sites for the establishment of marine protected areas;
- Develop management plans for marine protected areas;
- Develop and promote mariculture using native species;
- Seek the involvement of local communities and the private sector in mariculture;
- Undertake assessments and monitor the populations of threatened and endangered marine resources;
- Assess the impact of the potential release of aqua-culture species like Tilapia, etc., into freshwater ecosystems;
- Promote and enhance the positive aspects of mariculture on marine and coastal productivity;
- Study the ecology of important freshwater fisheries;
- Assess the socio-economic importance of marine and freshwater resources;
- Analyze freshwater fish consumption levels and species preferences;
- Determine MSY for commercially important species;
- Carry out a national review of government policies on fisheries management and development;
- Support educational and awareness raising programs in local communities about public policies and regulations on marine biodiversity;
- Support and legalize co-management systems for community fisheries management;
- Promote relevant indigenous knowledge and practices about fisheries and their management;
- Promote policies to facilitate the growth and functioning of artisanal fisheries
- Analyze gender issues and support women in the artisanal fishing industry;
- Promote and strengthen policies and regulations to prevent unsustainable exploitation of marine fisheries by trawlers;
- Ensure that yearly catches do not exceed the MSY;
- Organize training and information sharing workshops with stakeholders on sustainable fishing and management;
- Support collaborative activities at regional and international level in fisheries research, stock assessment and regulations;
- Provide human and technical resources for the marine and fisheries institutions to conduct research, surveillance, monitoring, information gathering and database management;
- Establish a “fisheries consultative committee” to promote a better understanding of fisheries management and policies, and to maintain a balance between the private and public sector;
- Support the establishment of a “mangrove management committee” to facilitate public education and encourage its proper management;
- Encourage and support locals to form fishing cooperatives;
- Raise awareness of the potential risk to the marine resources of channel fishing;
- Support and promote the conservation and rehabilitation of mangroves;
- Support research to assess and monitor fish stocks;
- Discourage the use of chemicals and dynamite in fishing;
- Discourage agricultural activities along the coastal areas;

- Encourage the development of eco-tourism along the beaches;
- Promote public awareness programs using various media outlets;
- Mandate and enforce the use of appropriate net sizes to prevent by-catch and wastage;

Timeframe: 2004-2008

Actors: Marine, IMBO, University, Private sector, Local communities, NGOs, WCB, FD

Estimated Cost: US$9 Million

4.2. CROSS-SECTORAL ACTION PLANS

4.2.3.1. POLICY, LEGISLATIVE AND INSTITUTIONAL REVIEW

Actions Proposed:

- Review and update the Wildlife Conservation Act of 1972 and the Forest Regulations of 1988 to aid in the implementation of various treaties involving biodiversity;
- Review and update national legislation on fisheries with emphasis on the protection of threatened and endangered species;
- Review and harmonize land tenure practices that support biodiversity conservation;
- Prepare, circulate, enact and adopt a National Biodiversity Policy and Act;
- Correct and remove market distortions that negatively impact and undervalue biodiversity;
- Encourage the sustainable exploitation of undervalued timber species;
- Regulate the destruction of coastal and marine ecosystems arising from sand mining, mangrove cutting, etc;
- Enact policies and regulate the uncontrolled discharge of raw sewage, industrial waste and household garbage into coastal/marine and wetland ecosystems;
- Strengthen and support family planning programs that reduce our population growth rate, and hence our over-exploitation of biodiversity;
- Promote and adopt policies that are sustainable in biodiversity exploitation;
- Encourage innovative programs that minimize our over-exploitation of biodiversity;
- Pursue policies that do not lead to over-dependence on monocultures;
- Promote sustainable logging practices;
- Assess marginal demand and consumption of NTFPs;
- Establish a technical team on biodiversity to advice on the integration of biodiversity concerns into sectoral and cross sectoral policies;
- Promote decentralization of natural resource management responsibilities with local authorities and communities;
- Implement and enforce policies that aid in the sustainable conservation of biodiversity;

Timeframe: 2004-2006

Actors: Government Agencies, NGOs, University, Local Authorities & Communities.

Estimated Cost: US$3 Million

4.2.3.2. CAPACITY BUILDING

Actions Proposed:

- Support and conduct a training needs assessment for government agencies and local NGOs currently responsible for biodiversity management;
- Provide training programs for current professionals in fields critical to the conservation and sustainable use of biodiversity;
- Support networking among professionals in fields related to biodiversity;
- Support the training of para-taxonomists and tree spotters;
- Conduct institutional needs assessment of all institutions with interest and responsible for biodiversity;
- Provide financial and material support for institutions addressing biodiversity issues;
- Support and strengthen actions that establish self-financing mechanisms in institutions addressing biodiversity issues;
- Support the review of policies and regulations that prevent the active involvement of local NGOs in biodiversity conservation;
- Enhance the capacity of local NGOs in relevant skills through training workshops and seminars;
- Promote and support NGO access to relevant information held by government institutions;
- Establish a clearing house mechanism for sharing of information on biodiversity;

Timeframe: 2004-2007

Actors: FD, Environment, WCB, Marine, most Government Departments, University, NGOs, Local communities.

Estimated Cost: US$6 Million

4.2.3.3. IDENTIFICATION AND MONITORING

Actions Proposed:

- Organize a workshop to ascertain national taxonomic priorities and the needs of the end-users of the information generated;
- Develop programs that focus on the re-training of a handful of professionals in taxonomy-related fields;
- Support the training of scientists in specialized fields like molecular systematics and bioinformatics;
- Collect and collate information on practicing taxonomists in the country;
- Inventory key taxonomic groups of plants, animals and micro-organisms;

- Conduct an inventory of rare, threatened and endangered wildlife species in the country;
- Conduct an inventory of fauna and flora of all protected areas in the country;
- Carry out ecological studies on all endangered and threatened species;
- Establish and support a fully functional Biodiversity Monitoring Unit in the Ministry of Agriculture, Forestry and Food Security;
- Conduct baseline surveys and inventories to determine the health and quality of key ecosystems;
- Support the use of GIS and other technology in monitoring change over time;
- Monitor the population and distribution of large and exploited mammal species in the country;
- Develop monitoring mechanisms for different threat levels to biodiversity in the different ecosystem types;
- Set up a database on the biodiversity of the country;
- Identify biodiversity data sources and institutional capacities for collection and managing biodiversity information;
- Undertake capacity building needs assessment of the various institutions dealing with plant and animal taxonomy (herbarium, arboretum, botanic reserves, museum, etc)

Timeframe: 2004-2009

Actors: FD, Environment, Marine, Agriculture, University, Local Communities, NGOs.

Estimated Cost: US$4.5 Million

4.2.3.4. SUSTAINABLE USE OF BIODIVERSITY COMPONENTS

Actions Proposed:

- Review current logging concessions to ensure future compliance with stipulated harvest levels, logging and hauling methods and forest regeneration;
- Promote the role of non-timber forest products (NTFPs) in sustainable forestry;
- Develop and promote timber certification programs for both state owned and private logging concessions;
- Develop criteria, guidelines and indicators for sustainable harvesting of NTFPs;
- Support and promote domestication of preferred bushmeat species;
- Support and promote the cultivation of medicinal plants;
- Establish MSY for frequently exploited marine and freshwater species;
- Strengthen regulatory measures to minimize over-exploitation and by-catch;
- Promote mariculture and aquaculture;
- Promote alternatives to slash-and-burn agriculture especially in the forest regions;
- Promote organic farming methods and reduce reliance on agro-chemicals;

- Study and implement carrying capacities and guidelines for visitors to our protected areas;
- Promote low-impact eco-tourism and architectural infrastructure in all protected areas;
- Promote the "no sale" of wildlife to tourists and visitors;
- Promote educational awareness programs about human impact on our biodiversity;
- Undertake inventories to determine yield controls;

Timeframe: 2004-2006

Actors: FD, Marine, Agriculture, NGOs, University, Local Communities

Estimated Cost: US$3.5 Million

4.2.3.5. INCENTIVE MEASURES

Actions Proposed:

- Promote private sector investment in the sustainable exploitation of biodiversity;
- Promote co-management arrangements with local communities and private sector for secure and equitable benefit sharing in the management and sustainable exploitation of natural resources;
- Discourage unsustainable use of natural resources through the strengthening of existing laws, statutes and regulations;
- Promote the use of EIA prior to the conversion of natural areas into agro-pastoral lands;
- Promote policies that reduce the infrastructural development of mangroves, coastal areas and marine environment;
- Promote low-input agriculture over high input agriculture through policy review and reforms;
- Study the impact of macro-economic factors arising from international trade, structural adjustment programs, government privatization programs, etc on biological diversity;
- Develop and support measures for the implementation of incentive measures;
- Target specific threats to biodiversity by providing targeted incentive measures;
- Integrate both the economic and non-economic values of biodiversity into development plans and national accounting systems;
- Promote taxation for private sector businesses that depend on biodiversity;
- Provide tax breaks to businesses that promote programs to minimize their impact on biodiversity;
- Develop training programs for key planners, managers, NGOs and economists in the design and implementation of incentive measures;

- Develop compensation schemes for local communities whose access to protected areas has been curtailed;
- Modify and review policies that create market distortions thereby leading to increased loss of biodiversity;
- Encourage the payment of royalties to landowners and community groups

Timeframe:2004-2009

Actors: FD, Agriculture, most Government agencies, NGOs, Local Communities, Marine, University

Estimated Cost: UD$2 Million

4.2.3.6. RESEARCH AND TRAINING

Actions Proposed:

- Develop and implement policies on research and training;
- Assess the impact of different forestry practices on the conservation of biodiversity;
- Study the ecology (e.g. distribution, feeding, reproduction, migration, etc.) of rare, endemic, threatened and endangered species (both plants and animals);
- Conduct studies on the regeneration system of important timber and Non-timber forest products;
- Analyze the impact of different land uses (e.g., agriculture, urbanization, forest plantations, etc.,) on the maintenance of biodiversity;
- Determine the impact of alien/exotic species on local biodiversity;
- Determine the impact of pollution on freshwater and marine ecosystems;
- Assess the impact of mining on biodiversity;
- Study successional processes in mined out areas;
- Study the consumption of non-timber forest products and recommend sustainable levels of exploitation;
- Carry out research on the exploitation of sharks for the Asian fin soup market;
- Assess the impact of agro-chemicals on plant and animal life in the country;
- Promote agro-forestry trials as an efficient form of land-use;

Timeframe: 2004-2008

Actors: University, Research Institutions, FD, Marine, Agriculture, WCB, NGOs.

Estimated Cost: US$1.5 Million

4.1.3.7. PUBLIC EDUCATION AND AWARENESS

Actions Proposed:

- Develop and promote a media campaign emphasizing the importance of biodiversity;
- Develop and integrate biodiversity conservation and sustainable use of natural resources in school curriculum;
- Provide support to local NGOs to engage in environmental awareness raising programs;
- Provide support for the production and dissemination of information materials on biodiversity through songs, theatrical performances, arts, etc;
- Ensure teacher training institutions and colleges develop and implement appropriate courses in biodiversity;
- Develop educational materials on endemic, rare, threatened and endangered species;
- Translate educational materials on endemic, rare, threatened and endangered species in key local languages;
- Produce and disseminate educational materials like posters, newsletters, brochures and leaflets, billboards, etc on biodiversity;
- Encourage the print and broadcast media to cover biodiversity issues;

Timeframe: 2004-2009

Actors: NGOs, Training Colleges, University, FD, Marine, Agriculture, Local communities.

Estimated Cost: US$2.5 Million

4.2.3.8. ACCESS TO GENETIC RESOURCES

Actions Proposed:

- Analyze existing policy, legislative and administrative measures on genetic resources and benefit sharing;
- Assess the strengths and weaknesses of institutions and individuals addressing issues surrounding genetic resources and benefit sharing;
- Conduct nation-wide awareness raising programs on the value of genetic resources, need for regulation, rights of individuals, institutions and communities harboring genetic resources and indigenous knowledge;
- Develop capacity of key individuals and officials through training on genetic resources and benefit sharing;
- Provide support for the development of entrepreneurial skills in bio-prospecting by in-country scientists and investors and local communities;
- Examine the impact on the status of genetic resources due to bio-prospecting;

- Develop a national policy measure to facilitate the equitable sharing of benefits arising from genetic resources;
- Develop policy measures to regulate the exploitation of genetic resources through the introduction of permits and regulatory procedures;

Timeframe: 2004-2009

Actors: Agriculture, Justice Department, FD, University, Local Government, NGOs, Local Communities, Marine, Tourism.

Estimated Cost: US$2.5 Million.

4.2.3.9. INDIGENOUS KNOWLEDGE AND INTELLECTUAL PROPERTY RIGHTS

Actions Proposed:

- Document past and existing resource management practices and knowledge in local communities;
- Examine the level of incorporation of indigenous knowledge and practices in current management and decision making processes;
- Analyze existing laws and legislative policies that protect and promote indigenous knowledge and intellectual property, innovations and practices in local communities;
- Ensure the protection of indigenous knowledge and practices relevant to the conservation and sustainable use of biodiversity;
- Promote collaboration between relevant government institutions and local communities in the use and adoption of indigenous knowledge systems and practices;
- Develop a national policy measure to facilitate the equitable sharing of benefits from the use of indigenous knowledge in such areas as medicinal plants;
- Develop a national intellectual property rights system to safeguard the knowledge and innovations of local communities;

Timeframe: 2004-2007

Actors: Justice Department, Local Government, Local Communities, University, NGOs, FD, Marine, Agriculture.

Estimated Cost: US$1 Million

4.2.3.10. ACCESS TO TECHNOLOGY AND HANDLING OF BIOTECHNOLOGY

Actions Proposed:

- Assess and identify existing technologies relevant to the country;
- Promote the transfer of relevant technologies to Sierra Leone;
- Develop and enact patent laws to protect local inventions;
- Design and implement measures to safeguard against the harmful introductions of genetically modified organisms;
- Develop standards and early warning measures against harmful introductions of genetically modified organisms;
- Support awareness raising programs on bio-safety and the associated risks with the mistreatment of biotechnology;

Timeframe: 2004-2006

Actors: Education, Health, Agriculture, University, NGOs.

Estimated Cost: US$500,000

4.2.3.11. INFORMATION EXCHANGE AND TECHNICAL/SCIENTIFIC CO-OPERATION

Actions Proposed:

- Establish a National Biodiversity Database and Information Center to provide networking opportunities, repository of biodiversity information, and its dissemination (a clearing house mechanism);
- Provide training in the collection, organization, updating and communication of biodiversity information;
- Provide training to end-users to ensure the full utilization of the information collected and stored;
- Promote the development and implementation of joint initiatives with other countries on important biodiversity issues (e.g. trans-boundary protected areas for peace and co-operation);
- Encourage the exchange of experts and expertise with neighboring countries on biodiversity;
- Promote and support regional co-operation in biodiversity conservation that border on trade in endangered species or genetic resources;
- Support information exchange in remote and rural areas;
- Assess and identify existing technologies relevant to the country;

Timeframe: 2004-2006

Actors: Information, Education, NGOs, FD, Marine, Agriculture, WCB, University, Local Communities.

Estimated Cost: US$400,000

5. SCHEDULE OF IMPLEMENTATION

The National Biodiversity Strategy Action Plan (NBSAP) will be launched at the beginning of 2004, with a wider participation of the general public ranging from educational institutions to local communities will be sought through regular TV broadcasts and radio messages, seminars and workshops.

The initial implementing phase of the NBSAP will last for seven years (2004-2010), during which time the needed resources will be mobilized, institutional arrangements established, baseline studies conducted and policy reviews undertaken. It is during this period that the priority activities identified in the action plan will be undertaken. Details of the actions, outputs/signs, actors and timeframe for implementation are presented in Annex 2, and will serve to provide indicators as to whether progress is being made in a timely manner. A review of the NBSAP will commence in 2010, with deficiencies being corrected and new priorities identified with the view to updating the NBSAP.

5.1. THE BUDGET

The amount of financial commitment needed for successfully implementing the actions and activities proposed in the NBSAP is huge, and sustainable sources of funding would have to be identified to make it possible. It is hoped that government's commitment to biodiversity conservation will see increased budgetary allocations, with additional funding being sought from bilateral donors to Sierra Leone Government, private sector businesses, and fees and royalties from the potential exploitation of biodiversity. All the financial resources marshaled will be deposited into a National Biodiversity Trust Fund, with the accruing interest utilized for conservation related activities.

Below is a tentative budget required for the implementation of the NBSAP:

Item	Sub-Component	Estimated Cost (US$)
1.	Terrestrial Biodiversity (Wildlife)	35 Million
2.	Terrestrial Biodiversity (Inland waters)	3 Million
3.	Forest Biodiversity (Lowland, Montane and Savanna)	6 Million
4.	Marine and Coastal Biodiversity	9 Million
5.	Agricultural Biodiversity (Plants and Land)	9 Million
6.	Agricultural Biodiversity (Livestock)	6 Million
	Thematic Component Total	**68 Million**
1.	Policy, Legislative and Institutional Review	3 Million

2.	Capacity Building	6 Million
3.	Identification and Monitoring	4.5 Million
4.	Sustainable use of Biodiversity Components	3.5 Million
5.	Incentive Measures	2 Million
6.	Research and Training	1.5 Million
7.	Public Education and Awareness	2.5 Million
8.	Access to genetic resources and benefit sharing	2.5 Million
9.	Indigenous Knowledge and Intellectual Property Right	1 Million
10.	Access to Technology and Handling of Biotechnology	0.5 Million
11.	Information Exchange and Technical/Scientific Co-operation	0.4 Million
	Cross-Sectoral Component Total	**27.4 Million**
	Total NBSAP	**95 Million**

The NBSAP will implement a series of specific projects and programs undertaken by key institutions and agencies in the country. Lead agencies will be responsible for implementing specific projects covering a given set of strategies and action plans in the NBSAP. In Annex 2, 10 priority project profiles are presented, amounting to a total of $**.

5.3. MONITORING AND EVALUATION

The implementation of the proposed strategies and action plans will be the primary responsibility of the NBSAP Coordination Unit. The unit will be responsible for monitoring and reviewing progress on a regular basis with recommendations for improvement. Targets will be set with clearly defined indicators. Progress reports on a bi-annual basis will be produced and published and circulated to the general public, with the results made available in a report to the Conference of Parties to the CBD. Evaluation and review of the NBSAP will be done after five years.

VII. SHARING OF NATIONAL EXPERIENCE

The preparation of the NBSAP Action Plans benefited from a series of country reports prepared by national consultants. In addition, Biodiversity Action Plans completed for other countries were made use of extensively, and has served to enrich the action plans and strategies proposed here. In particular, the following documents were made use of for the Sierra Leone Biodiversity Strategy Action Plan:

i. Global Biodiversity Strategy (1992)

ii. Biodiversity Action Plan for Indonesia (1993)

iii. The Gambia National Biodiversity Strategy and Action Plan (1998)

iv. Canadian Biodiversity Strategy (1995)

v. Biodiversity in France: Action Program for fauna and flora (1997)

vi. National Report on Biological Diversity, Government of Netherlands (1996)

vii. The National Strategy for the Conservation of Australia's Biological Diversity (1996)

viii. Action Plan on Biological Diversity, Swedish Environment Protection Agency (1996).

Annex 1: NBSAP IMPLEMENTATION SCHEDULE

THEMATIC SECTORAL ACTION PLAN
Terestrial Biodiversity

a) Wildlife Sub-Component

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Review existing literature and documents relating to the flora of Sierra Leone.	A comprehensive knowledge of our biodiversity produced including Red Data List	The University of Sierra Leone, FD							
Review existing literature relating to animals in Sierra Leone	A comprehensive knowledge of our biodiversity produced including Red Data List	The University of Sierra Leone							
Assess Herbaria and Museum Collections.	A list of endemic species produced	The Unviersity of Sierra Leone, Forestry Division							
Verify information collected on the ground by conducting field assessment	Biodiversity information verified	Wildlife Conservation Branch, FD							
Train personnel to carry out above functions	Staff trained to carry out biodiversity assessment	Research Institutes							
Reclassify and gazette existing protected areas	Protected areas and national parks reclassified and documented	The University, GOSL, FD							
Advocate for increase in numbers and size of protected areas	Protected areas and national parks increased in size and area	GOSL, FD, The Unviersity, NGOs							

Develop management plans for all protected areas	Management plans developed for all protected areas	Forestry Division, Wildlife Conservation Branch, NUC							
Develop actions for the conservation of species	Species action plan developed	Research Institutes, FD							
Develop infrastructure within protected areas for research, tourism and the local community	Infrastructure developed	The University, Civil Society, Donor agencies							
Carry out training needs assessments	Gaps in knowledge, expertise and skills identified	The University of Sierra Leone							
Develop a training program for biodiversity conservation and management	A comprehensive training program for parks, protected areas, managers and law enforcement officers developed	The University of Sierra Leone, Polytechnics, FD							
Organize training courses for national parks and protected area managers as well as law enforcement officers	At least ten (10) trainers trained in protected area management	The University of Sierra Leone, Forestry and Wildlife Conservation Branch							
Establish and equip a biodiversity Coordinating Unit	Well-staffed and equipped coordinating unit established	Research Institutes and Government Ministries							
Integrate conservation education in educational institutions and local communities	Conservation education integrated in schools, curricular, development	NGOs, Educational Institutions							

Map the location and area extent of sacred groves and other sites	Sacred groves and other sites mapped and located	Secret Societies, The University of Sierra Leone							
Conduct an inventory of plants and animals of sacred groves	Plants and animal species of sacred groves inventoried	Chiefdom authorities, Government Ministries, The University of Sierra Leone							
Advocate at national level for a policy for the protection and conservation of sacred groves	National policy for sacred groves developed	Researchers, Chiefdom authorities							
Establish and equip a Biodiversity Coordinating Unit	A well-equipped and staffed unit in the Ministry of Agriculture, Forestry and Food Security established	Forestry Division, Wildlife Branch, University							
Encourage co-management of protected areas	Co-management implemented	Forestry, WCB, local communities							
Develop research programs in all protected areas	A comprehensive research program developed	Forestry, WCB, University							
Organize training courses for park managers and law enforcement	At least 60 park personnel and 30 law enforcement officers trained	WCB, NGOs, Police, Military, University							
Develop educational programs on protected areas									

Support and provide incentives for the development of private protected areas	At least one private protected area established	Forestry, WCB, NGOs, private sector, local communities							
Assess present and future needs of protected areas	At least 2 workshops held to identify the needs of PAs	Forestry, WCB, University, NGOs, local communities							
Seek broader stakeholder participation in implementation of management plans	All stakeholders consulted and consensus sought	All key stakeholders							
Encourage land zoning outside of protected areas	Land zoning done for at least 6 PAs	WCB, Forestry, NGOs, local communities, private sector							
Restore and rehabilitate degraded land outside of protected areas	Land outside 6 PAs restored and rehabilitated	Forestry, NGOs, local communities							
Promote landscape approach to protected area and species management	Landscape approach adopted for at least 2 PAs	All key stakeholders							
Support the establishment of botanic gardens	At least 2 botanic gardens established	University, private sector							

b) Forest Biodiversity Sub-Component

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Assess underlying causes of forest loss	Causal factors identified and remedial measures put in place	Forestry, NGOs, local communities							
Ensure proper management of logged areas	Guidelines for proper logging developed and implemented	Forestry, Local communities, private sector, NGOs							
Develop alternatives to slash-and-burn agriculture	Maintenance of soil fertility, increased crop yields	LWD, Agriculture, IAR, Rice Research							
Encourage sustainable exploitation of forests	Sustainable forestry practices put in place for all forest areas	Forestry, Local communities, NGOs							
Involve local communities in sustainable use and management of forests	At least 12 seminars and workshops held to seek involvement of local communities	Forestry, WCB, NGOs, Local communities							
Support sustainable forestry programs that protect biodiversity	At least 3 sustainable forestry programs developed and implemented	Forestry, local communities, NGOs							
Regulate the introduction and spread of exotic species	Guidelines and measures for controlling exotic species developed and implemented	University, forestry, WCB, private sector, local communities							

Encourage traditional knowledge and practices beneficial to biodiversity	Traditional knowledge and practices integrated in biodiversity conservation	Local communities, Forestry, WCB, NGOs							
Encourage and support ecosystem approach to forest management	Ecosystem approach incorporated in all forest management plans	Forestry, University, NGOs, local communities							
Develop and implement guidelines that reflect multiple benefits of forests	Clear guidelines developed for a range of benefits	Local communities, Forestry, NGOs							
Promote sustainable utilization of forests through proper planning and management	Sustainable utilization of all forest areas developed	Forestry, local communities, NGOs							
Analyze the representation and adequacy of existing forest areas for biodiversity conservation	Gap analysis of current forest reserves done	Forestry, NGOs, University							
Rehabilitate degraded and deforested mountain areas	At least 10 mountain areas restored	Forestry, NGOs, Local communities							
Develop valuation methods for multiplicity of forest biodiversity	Forest valuation methods developed	University, FD							
Develop, implement and improve on indicators/criteria for forest biodiversity exploitation and management	Gaps in existing initiatives identified	Forestry, WCB, NGOs							
Involve women and other key stakeholders in multiple use forestry programs	More women involved in forestry programs	Forestry, NGOs, women's group							
Provide tax incentives/breaks for imported forest products	Tax breaks provided for key products	Private sector, Forestry, NGOs							

Train an adequate number of individuals for assessment and valuation of biodiversity	At least 20 individuals trained	Forestry, University, WCB							
Provide subsidies and encourage alternative energy development	Alternative sources of energy promoted	NGOs, private sector, Forestry							
Support the establishment of forest plantations in degraded areas for firewood and timber	At least 6 plantations for timber established	Forestry, private sector, local communities							
Analyze market demand and structure for fuelwood in urban areas	Fuelwood demand in all urban areas established	University, FD							
Develop and implement fuelwood projects	At least 6 plantations for firewood established	Forestry, local communities, private sector, NGOs							
Reorient the role of forest officers to be facilitators for forest management rather than controllers	At least 30 forest officers retrained and deployed in collaborative forest management	Forestry, WCB, NGOs, University, local communities							
Improve and adopt stringent licensing systems for forest exploitation	New guidelines and licensing protocols developed and implemented	Forestry, university, NGOs							

Agricultural Biodiversity (Plant and Land Resources) Sub-Component

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Strengthen crop genetic resource conservation	Key food crops protected	University, Agriculture, IAR, Rice Research							
Promote medicinal plant cultivation and domestication in farming system	At least 2 medicinal plant cultivation programs initiated	University, IAR, herbalists							
Promote sustainable farming practices	Improved production and productivity	Agriculture, IAR, Njala University							
Review and assess the impact of the seed multiplication projects in the country	Gaps identified and corrective measures used	University, Agriculture							
Discourage farming practices on steep slopes	Soil erosion and siltation minimized	Agriculture, IAR							
Document the types, distribution and abundance of pollinators of agricultural crops	Important pollinators identified	University, Agriculture							
Identify useful agricultural practices that maintain pollinator diversity	Increased pollinator diversity	IAR, Agriculture, NUC							
Promote soil and water conservation practices	Enhanced soil fertility and water availability	LWD, NUC Agriculture							
Regulate excessive use of agro-chemicals	Careful use of fertilizers and pesticides	IAR, Agriculture, farmers							
Promote sedentary agriculture over slash-and-burn agriculture	At least 3 farm families practicing sedentary agriculture by 2009	Farmers, Agriculture, IAR							

Regulate agricultural expansion into natural and undisturbed ecosystems	Reduction in uncontrolled agricultural practices in forested areas	Farmers, Agriculture							
Conduct crop suitability assessment	Crop zoning data acquired	NUC, IAR, Agriculture							
Promote agricultural practices that conserve wild relatives of agricultural crops	Wild populations identified and protected	NGOs, Agriculture, National Herbarium							
Support crop breeding programs at national and traditional levels	Production of suitable crop varieties	IAR, Rice Research, University							
Assess threats facing medicinal plants, ornamentals and little known food crops	Threats identified and corrected	University, National Herbarium							
Encourage research on threatened indigenous plant species	Information on threatened conservation	University, NGOs, Forestry							
Assess impact of agricultural and development projects on maintenance and promotion of agricultural biodiversity	Institutionalized EIA program	Environment, Agriculture, University							
Encourage and support in-situ conservation of wild genetic materials	At least 3 in-situ conservation programs developed	University, NGOs							
Promote public awareness programs about maintaining agricultural biodiversity	Public awareness implemented	NGOs, Agriculture							
Identify and implement incentive packages for managing agricultural biodiversity	Incentive package developed	Agriculture, IAR, Rice Research, NGOs							

Promote and support farmer associations to collaborate with extension workers and scientists	At least 4 seminars and workshops on collaboration organized	NGOs, IAR, Rice Research, University, Agriculture							
Promote the use of indigenous agricultural knowledge and practices	Sustainable agricultural practices	Local communities, NGOs, Agriculture							

Agricultural Biodiversity (Livestock) Sub-Component

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Strengthen livestock genetic resource conservation									
Encourage and support local and commercial rearing of local livestock breeds	Increased local livestock production	Local communities, University, NGOs, Agriculture							
Survey market demands for bushmeat products traded in urban areas	Preferred species identified	University, NGOs							
Strengthen and support programs that lead to better management of small ruminants	Increased meat supply	University, private sector, NGOs, agriculture							
Encourage and promote the rearing of wild animals	Increased meat supply	University, NGOs, private sector, agriculture							
Support and promote the domestication of wild species of birds	Diverse sources of meat products	University, agriculture, private sector, NGOs							
Support and improve on traditional poultry production	Increased meat supply	University, private sector, local communities, agriculture, NGOs							

Promote the establishment of cottage industries for dairy products	At least 2 cottage industries established	Local communities, NGOs, Agriculture							
Support bee keeping programs in rural communities	Increased income possibilities	Local communities, NGOs, private sector							
Support the establishment of ranches for livestock rearing	Easy access to medical services	Private sector, Agriculture							
Assess range conditions, carrying capacities and range sites	Range management information established	Agriculture, University							
Develop management plans and strategies for all ranches and grazing sites	Management plan/strategy for ranches & grazing sites	Livestock, University							
Encourage de-stocking when livestock numbers exceed carrying capacity	Improved range condition	Livestock							
Promote the establishment of feed mills based on locally produced grains and inputs	Integrated livestock and crop production	Livestock, Agriculture, NGOs							
Promote the establishment of watering sites and holes for livestock	Livestock evenly dispersed	Livestock, private sector, local communities							
Encourage the formation of livestock associations by herders and farmers	Focused farmer associations	Local communities, private sector, Livestock							
Enhance and strengthen services for livestock owners and farmers	Effective extension services	Extension, NGOs, Agriculture							
Promote public education and awareness on wildfire, management, etc.	Effective participation by informed public	NGOs, Livestock							

Aquatic Biodiversity
a) Inland Water Ecosystems

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Carry out an inventory of all wetlands	Complete inventory of wetlands	University, WCB, NGOs, Forestry, Fisheries							
Identify causes of wetland loss and degradation	Threats and causes identified and measures put in place	Forestry, LWD, Agriculture, NGOs, local communities, Mineral resources							
Map the distribution and abundance of threatened wetland vertebrates	Distribution map and information produced	University, NGOs, WCB							
Assess the level of human disturbance around major watersheds	Better protection for watersheds	Forestry, private sector, para-statal							
Prepare and implement management plan for key watershed areas	Management plan developed for at least 3 Ramsar sites	NGOs, University, Forestry, Agriculture, LWD							
Examine the impact of alluvial diamond mining on wetlands	Data on the effect of diamond mining	University, Mineral Resources, NGOs							
Involve key stakeholders in preparation of management plans for aquatic resources	A comprehensive management plan developed	All key stake holders							

Develop a national wetland policy	Wetland policy implemented	Government, Agriculture, Forestry, Environment							
Examine the impact of agro-chemicals and pollutants on wetlands	Problem areas identified and corrected	Environment, Agriculture, Forestry, WCB							
Support training and collaborative programs at institutional level	Collaborative programs established	University, forestry, WCB							
Disseminate information on potential impact of wetland loss	Well informed public	NGOs, Forestry, WCB, LWD							
Encourage public participation in wetland resource use and management	Stakeholder involvement in the planning and management of at least 3 wetland sites	Public, Forestry, WCB, local communities							
Establish and implement administrative and incentive packages for public participation in wetland biodiversity management	Incentive packages and well-functioning administration	IPAM, Forestry, NGOs, local communities							
Promote efficient use of water in urban areas	Efficiency in water use	Guma Valley, public, NGOs							
Mandate the use of EIA for all wetland related development projects	EIA institutionalized	Environment, Forestry, Agriculture, NGOs							

Marine and Coastal Biodiversity, Including Fisheries

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Support and equip naval wing to make frequent patrols	Poaching minimized	Military, Fisheries							
Give adequate protection to coastal and marine habitats important for spawning and nursing of marine life	A network of spawning and nursery areas established	University, Marine, NGOs							
Use legal measures to control sea-based sources of marine pollution	Pollution minimized	Marine, NGOs, Environment							
Develop and support awareness programs for the sustainable exploitation of marine resources	A well enlightened public	NGOs, Marine, University							
Develop and promote policies to prevent physical alterations of marine habitats	Action plans for key marine habitats developed	Marine, Tourism, NGOs, Agriculture							
Restore degraded marine habitats	At least 2 sites restored and protected	Marine, Environment, NGOs							
Support and strengthen research and monitoring of marine biodiversity	Technical research capacity built	University, Marine							
Identify and protect critical fishing grounds	A network of protected fishing grounds	Marine, NGOs							
Prevent introduction of alien species into marine and coastal habitats	Deterrents put in place	Marine, NGOs							
Assess the impact of marine biodiversity loss on coastal communities	Sustainable programs developed	Marine, NGOs, Local Communities							

Identify sites for establishment of marine protected areas	Guidelines developed and sites selected	Marine, NGOs, WCB, University							
Develop management plans for marine protected areas	Management plan for marine PAs	Marine, NGOs, University, WCB							
Develop and promote mariculture using native species	Increased protein supply	Marine, University, private sector							
Seek the involvement of local communities and private sector in mariculture	Mariculture system for threatened species developed	Local communities, private sector, Marine, University							
Undertake assessments and monitor the populations of threatened and endangered marine resources	Surveys and monitoring instruments developed	Marine, University							
Assess the impact of the potential release of aqua-culture species into freshwater ecosystems	Potential problem species identified and culled	Marine, University							
Study the ecology of important freshwater species	Increased options for aquaculture	University, Marine							
Assess the socio-economic importance of freshwater and marine resources	Sustainable income sources developed	Marine, University							
Determine MSY for commercially valuable species	Baseline data developed	Marine, University							
Review government policies on fisheries management and development	Revised government policy on fisheries resources	Marine, NGOs, private sector, local communities							

Support educational and awareness raising programs about public policies and regulations on marine biodiversity	Well informed public	NGOs, Marine							
Promote relevant indigenous knowledge and practices about fisheries and their management	Integrated fisheries management	Local communities, private sector, Marine, NGOs							
Analyze gender issues and support women in the artisanal fishing industry	Women provided appropriate support services	Women's group, NGOs, Marine							
Promote and strengthen policies to prevent unsustainable exploitation of marine fisheries by trawlers	Less waste and dumping	Marine, local authorities, NGOs							
Organize training and information sharing workshops with stakeholders on sustainable fishing and management	Effective participation of well informed public	Marine, NGOs, local communities							
Provide human and technical resources for the marine and fisheries institutions to conduct research, surveillance, monitoring, etc.	Well equipped and functioning	Marine, University, Military							
Raise awareness about the risks of channel fishing	Less channel fishing	Marine, private sector							
Support and promote the conservation and rehabilitation of mangroves	Well protected mangroves	NGOs, Marine, Forestry, WCB							
Mandate and enforce the use of appropriate net sizes to prevent by-catch and wastage	By catch and wastage minimized	Marine, NGOs, WCB, Military							

Policy, Legislative and Institutional Review

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Review and update the Wildlife Conservation Act of 1972	A new act put in place	WCB, FD, NGOs, University							
Review and update national legislation on fisheries	New fisheries legislation	Marine, NGOs, University							
Review and harmonize land tenure practices that support biodiversity conservation	Biodiversity conservation across different property rights	NGOs, Lands, Judiciary, Forestry,							
Prepare a draft national biodiversity policy	A draft national biodiversity policy/bill	Forestry, Marine, Agriculture, Environment, NGOs, University							
Correct market distortions that undervalue biodiversity	Economic policy supportive of biodiversity	Development, Forestry, Environment, NGOs, University							
Encourage the sustainable exploitation of undervalued timber species	Increased supply of forest products	Forestry, NGOs, Local communities							
Regulate the destruction of coastal and marine ecosystems	Increased biodiversity	Marine, Forestry, Environment, Lands, Agriculture							
Strengthen and support family planning programs that reduce human population	Reduced pressure on biodiversity	Health, NGOs							

Enact policies and regulate uncontrolled discharge of sewage and pollutants into marine/coastal ecosystems	Tougher penalties for waste discharge and pollution control	Health & Sanitation, Environment, Marine, NGOs							
Promote and adopt policies that are sustainable in biodiversity exploitation	Efficient exploitation of biodiversity	Forestry, Marine, WCB, Agriculture, NGOs							
Pursue policies that do not lead to over-dependence on monocultures	Increased biodiversity	Forestry, Agriculture, NGOs							
Promote sustainable logging practices	Efficient harvesting of logs	Forestry, WCB, NGOs							
Assess marginal demand and consumption of NTFPs	Information for developing sustainable resource use	Development, NGOs, Forestry, University							
Establish a technical team on biodiversity to advice on the integration of biodiversity concerns into sectoral and cross sectoral policies	Intersectoral biodiversity planning body	University, Agriculture, NGOs, Forestry, Environment, private sector, Local communities, Marine							
Promote decentralization of natural resource management responsibilities with local authorities and communities	Local participation in managing biodiversity	Forestry, Environment, Marine, NGOs, University, Local communities							

Implement and enforce policies that aid in the sustainable conservation of biodiversity	Improved policy environment for biodiversity	Forestry, WCB, NGOs, Development, Environment, Marine							

Capacity Building

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Support and conduct a training needs assessment for government agencies and local NGOs	Human resource development needs	University, Forestry, Marine, Environment, NGOs							
Provide training programs for current professionals in fields critical to the conservation and sustainable use of biodiversity	Human capacity increased and improved	University, Forestry, Marine, Environment, NGOs							
Support networking among professionals in fields related to biodiversity	Increased capacity and quicker response time	University, Forestry, Marine, Environment, NGOs							
Support the training of taxonomists, para-taxonomists and tree spotters	Increased and improved technical team	NUC, FBC							
Conduct institutional needs assessment of all institutions with interest and responsible for biodiversity	Plan for developing biodiversity management capacity	University, Forestry, Marine, Environment, NGOs, Lands, Agriculture							
Provide financial and material support for institutions addressing biodiversity issues	Adequately staffed and equipped institutions	University, Forestry, Marine, Environment, NGOs, Lands, Agriculture							

Support and strengthen actions that establish self-financing mechanisms in institutions addressing biodiversity	Self-financing mechanisms established	University, Forestry, Marine, Environment, NGOs, Lands, Agriculture							
Support the review of policies and regulations that prevent the active involvement of NGOs in biodiversity conservation	Increased NGO participation in biodiversity management	NGOs, University, Forestry, Marine, Environment, Lands, Agriculture							
Enhance the capacity of local NGOs in relevant skills through training workshops and seminars	Increased capacity within NGO community	NGOs, University, IPAM							
Promote and support NGO access to relevant information held by government institutions	Informed NGO community	NGOs, University, IPAM							

Identification and Monitoring

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Organize workshops to ascertain national taxonomic priorities and the needs of the end-users of the information generated	National taxonomic priority lists	University, NGOs, Forestry, Marine, Agriculture							
Develop programs that focus on the re-training of a handful of professionals in taxonomy related fields	Training modules in Taxonomy	NUC, FBC, Rice Research							
Support the training of scientists in specialized fields like molecular systematics and bioinformatics	Increased national capacity	NUC, FBC							
Collect and collate information on practicing taxonomists in the country	National Register of taxonomists	FBC, NUC							
Inventory key taxonomic groups of plants, animals and micro-organisms	Updated register of fauna and flora	FBC, NUC							
Conduct an inventory of rare, threatened and endangered wildlife in the country	Updated information/data	WCB, NUC, FBC, FD							
Conduct an inventory of fauna and flora of all protected areas in the country	Well documented PAs	WCB, NUC, FBC, FD							
Carry out ecological studies on all threatened and endangered species	Species Action Plans produced	WCB, NUC, FBC, FD							
Establish and support a fully functional biodiversity monitoring unit in the Ministry of Agriculture, Forestry and Food Security	Fully equipped and staffed biodiversity monitoring unit	Forestry, University, Environment, Marine							

Conduct baseline surveys and inventories to determine the health and quality of key ecosystems	Biodiversity checklist	Forestry, WCB, University							
Support the use of GIS and other technology in monitoring change over time	GIS maps produced	Forestry, WCB, University, Environment, Survey, NGOs							
Monitor the population and distribution of large and exploited terrestrial and marine fauna	Status of exploited species	FBC, NUC, WCB, Marine							
Develop monitoring mechanisms for different threat levels to biodiversity in the different ecosystem types	Monitoring mechanisms established	University, Forestry, Marine, Environment							
Set up a database on the biodiversity of the country	National Biodiversity Database	NUC, FBC, NGOs, Forestry, WCB, Environment							
Identify biodiversity data sources and institutional capacities for collection, dissemination and managing biodiversity information	A plan for national biodiversity database management	NUC, FBC, NGOs, Forestry, WCB, Marine, Environment							

Sustainable use of Biodiversity Components

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Review current logging concessions to ensure future compliance	Certified logging operations	Forestry, NGOs, Development, Law Officers Department							
Promote the role of NTFPs in sustainable forestry	Increased supply of forest products	Forestry, NGOs, University							
Develop and promote timber certification programs	Sustainable forestry practices	Forestry, NGOs							
Develop criteria, guidelines and indicators for sustainable harvesting of NTFPs	Guidelines on harvesting NTFPs	Forestry, University							
Support and promote the domestication of preferred bushmeat species	Increased supply of meat	University, Livestock, WCB							
Support and promote the domestication/cultivation of important/exploited medicinal plant species	Income opportunities	University, Agriculture, Forestry							
Establish MSY for frequently exploited marine and freshwater species	MYS for different fish species	Fisheries/Marine, University							
Strengthen regulatory measures to minimize over-exploitation and by-catch	Strengthened regulatory system	Fisheries/Marine, private sector, NGOs, local communities,							

Promote mariculture and aquaculture	Fish farm development and increased supply of proteins	Fisheries/Marine, NGOs, Local communities, private sector							
Promote alternatives to slash-and-burn agriculture especially in the forest regions	Sustainable farming practices	Agriculture, Forestry, NGOs, University							
Promote organic farming methods and reduce reliance on agro-chemicals	Low-input cultural practices	Agriculture, NGOs, University							
Study and implement carrying capacities and guidelines for visitors to our protected areas	Reduced visitor impact	Tourism, University, WCB, NGOs							
Promote low-impact ecotourism and architectural infrastructure development in all protected areas	Sustainable resources	Tourism, University, private sector							
Promote the "no sale" of wildlife to tourists and visitors	Infection minimized and increased wildlife populations	NGOs, WCB, FD							
Promote educational awareness programs about human impact on our biodiversity	Informed public	NGOs, Marine, Forestry, WCB							

Incentive Measures

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Promote private sector investment in the sustainable exploitation of biodiversity	Private sector involvement	Forestry, University, WCB, Marine, Environment, Development							
Promote co-management arrangements with local communities and private sector	Community involvement	NUC, FBC, NGOs, Forestry, WCB, Environment							
Discourage unsustainable use of natural resources by strengthening existing laws, statutes and regulations	Tighter control on biodiversity exploitation	Forestry, WCB, NGOs, Development							
Promote the use of EIA prior to the conversion of natural areas into agro-pastoral lands	Institutionalized EIA	Environment, Forestry, Agriculture, WCB, University							
Promote policies that reduce the infrastructural development of mangroves, coastal areas and marine environment	Improved policy environment for sustainable development	Forestry, Environment, Lands, Development, University							
Promote low-input agriculture over high input agriculture through policy review and reforms	Low-input and sustainable cultural practices and favorable agricultural policy environment	Agriculture, University							

Study the impact of macro-economic factors arising from international trade, etc on biological diversity	Favorable macro-economic environment for biodiversity conservation	Development, Trade, Tourism, Forestry, Marine, NGOs							
Develop and support measures for the implementation of incentive measures	Legal and institutional framework for incentive planning	Judiciary, Development, NGOs, Marine, Forestry							
Target specific threats to biodiversity by providing targeted incentive measures	Well targeted incentive measures	Development, Forestry, Marine, NGOs							
Integrate both the economic and non-economic values of biodiversity into development plans and national accounting systems	An integrated methodology for evaluating biodiversity	Development, Forestry, Marine, NGOs, Trade, Tourism							
Promote taxation for private sector businesses that depend on biodiversity	Increased revenue base for biodiversity conservation	Development, Trade, Marine, Forestry, NGOs							
Provide tax breaks to businesses that promote programs to minimize their impact on biodiversity	Sustainable exploitation of biodiversity	Development, Trade, Marine, Forestry, NGOs							
Develop training programs for key planners, managers, NGOs and economists in the design and implementation of incentive measures	Training modules produced for planners, economists, NGOs, resource managers, students	University, IPAM, NGOs, Forestry, Development, Environment, Lands, Marine							

Develop compensation schemes for local communities whose access to protected areas has been curtailed	Compensation schemes for increased community compliance	WCB, Forestry, NGOs, Local communities, Marine							
Review and modify policies that create market distortions thereby leading to under-valuing and increased loss of biodiversity	Increased appreciation of biodiversity values	Development, Forestry, Trade, Tourism, Marine, WCB							

Research and Training

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Develop and implement policies on research and training	Institutionalized research and training programs	University							
Assess the impact of different forestry practices on the conservation of biodiversity	Information on the effects of forestry practices on biodiversity	University, WCB, Forestry							
Study the ecology of rare, endemic, threatened and endangered species	Information on the conservation biology of species	NUC, FBC, WCB, Marine, Forestry							
Conduct studies on the regeneration system of important timber and non-timber forest products	Increased supply of wood and non-wood products	University, Forestry							
Analyze the impact of different land uses on the maintenance of biodiversity	Information on land use effects on biodiversity	Lands, Environment, University, NGOs, Forestry, Development, Marine							
Determine the impact of alien/exotic species on local biodiversity	Information on the impact of exotic species on native species	University, Marine, WCB, Forestry							
Determine the impact of pollution on freshwater and marine ecosystems	Information on the effects of toxic pollutants on aquatic biodiversity	University, Marine/Fisheries							
Assess the impact of mining on biodiversity	Information on the impact of mining on biodiversity	University, Mineral resources							

Study successional processes in mined out areas	Guidelines for rehabilitating and restoring mined out areas	University, Mineral resources							
Study the consumption of NTFPs and recommend sustainable levels of exploitation	Information on consumption rates of NTFPs	University, Forestry							
Carry out research on the exploitation of sharks for the Asian fin soup market	Guidelines for sustainable exploitation	University, Marine							
Assess the impact of agro-chemicals on plant and animal life	Information on the effects of agro-chemicals on biodiversity	University, Agriculture							
Study the reproductive ecology of important non-timber forest products	Guidelines for managing NTFPs developed	University							

Public Education and Awareness

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Develop and promote a media campaign emphasizing the importance of biodiversity	Increased awareness of biodiversity	NGOs, Forestry, Environment, WCB, Tourism							
Develop and integrate biodiversity conservation and sustainable use of natural resources in school curriculum	Strengthened educational support services for biodiversity conservation	NGOs, University, Schools							
Provide support to local NGOs to engage in environmental awareness raising programs	Increased NGO capacity for extension services	NGOs, Forestry, Environment, Tourism, WCB, University							
Provide support for the production and dissemination of information materials on biodiversity	Diverse information materials produced	NGOs, University, FD							
Ensure teacher training institutions and colleges develop and implement appropriate courses in biodiversity	Trained and knowledgeable teachers on biodiversity issues	University, NGOs, FD							
Develop educational materials on endemic, rare, threatened and endangered species/resources	Increased knowledge of threatened species	University, FD NGOs, Marine, WCB							
Produce and disseminate educational materials like posters, newsletters, etc, on biodiversity	Increased awareness of biodiversity issues	NGOs, FD, University, printing presses							

Translate educational materials on endemic, rare, threatened and endangered species/resources into key local languages	Increased awareness among the public	NGOs, FD, Information, University, printing presses, local communities							
Encourage the print and broadcast media to cover biodiversity issues	Increased awareness of biodiversity issues	Information, NGOs, Ministries							

Access to Genetic Resources

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Analyze existing policy, legislative and administrative measures on genetic resources and benefit sharing	Report on legal, administrative and policy structure for genetic resources and benefit sharing	Agriculture, Judiciary, University, Marine, Forestry, NGOs, Development							
Assess the strengths and weaknesses of institutions and individuals addressing issues surrounding genetic resources and benefit sharing	Information on institutional adequacy and capacity levels	University, Forestry, Marine, WCB, Environment, Agriculture, Tourism, NGOs							
Conduct nation-wide awareness raising programs on the value of genetic resources, etc.	Informed public	University, Forestry, Marine, WCB, Environment, Agriculture, Tourism, NGOs							
Develop capacity of key individuals and officials through training in genetic resources and benefit sharing	National capacity built	University, Forestry, Marine, WCB, Environment, Agriculture, Tourism, NGOs							

Provide support for the development of entrepreneurial skills in bio-prospecting	Improved entrepreneurial capacity for bio-prospecting	University, Forestry, Marine, WCB, Health, Environment, Agriculture, Development, Trade, Tourism, NGOs							
Examine the impact on the status of genetic resources due to bio-prospecting	Information on genetic resources with potential for bioprospecting	University							
Develop a national policy measure to facilitate the equitable sharing of benefits arising from genetic resources	A manual on biodiversity benefit sharing	University, NGOs, Forestry, Agriculture, Marine, WCB							
Develop policy measures to regulate the exploitation and access to genetic resources	Controlled access and exploitation of genetic resources	University, Forestry, Marine, WCB, NGOs, Agriculture, Development, Trade, Tourism							

Indigenous Knowledge and Intellectual Property Rights

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Document past and existing resource management practices and knowledge in local communities	Information on indigenous knowledge for agriculture, forestry, fisheries and land use planning	University, Environment, Land, Forestry, Agriculture, WCB, Marine							
Examine the level of incorporation of indigenous knowledge and practices in current management and decision making processes	Information on knowledge utilization in management	University, NGOs, Environment, Land, Forestry, Agriculture, WCB, Marine							
Analyze existing laws and legislative policies that protect and promote indigenous knowledge and practices	Planning information on laws and policies protecting and promoting indigenous knowledge	University, Environment, Land, Forestry, Agriculture, WCB, Marine, NGOs, Local communities, Judiciary							
Ensure the protection of indigenous knowledge and practices relevant to biodiversity conservation	Planning information on laws and policies protecting and promoting indigenous knowledge	University, Environment, Land, Forestry, Agriculture, WCB, Marine, NGOs, Local communities, Judiciary							

Promote collaboration between government institutions and local communities in the use and adoption of indigenous knowledge and practices	Strengthened collaboration and cooperation between relevant government agencies and local communities	Forestry, WCB, Agriculture, WCB, Marine, NGOs, Local communities, Local Government							
Develop a national policy measure to facilitate the equitable sharing of benefits from the use of indigenous knowledge with particular reference to medicinal plants	Legal and policy environment for benefit sharing developed	Forestry, WCB, Agriculture, WCB, Marine, NGOs, Local communities							
Develop a national intellectual property rights system to safeguard the knowledge and innovations of local communities	A draft intellectual property rights system developed	Judiciary, NGOs, University, Marine, Forestry, private sector, Local communities, Agriculture							

Access to Technology and Handling of Biotechnology

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Assess and identify existing technologies relevant to the country	Checklist of relevant technologies identified	University, Education							
Promote the transfer of relevant technologies	Private sector involvement in technology transfer	University, Education, NGOs, Trade, Agriculture, Tourism							
Develop and enact patent laws to protect local inventions	Statutory framework for technology ownership	Judiciary, Trade, University, NGOs							
Design and implement measures to safeguard against the harmful introductions of genetically modified organisms	National Biosafety Authority constituted	Standards, Health, NGOs, University, Environment							
Develop standards and early warning measures against harmful introductions of genetically modified organisms	Control measures strengthened	Health, University, NGOs, Standards							
Support awareness raising programs on bio-safety and the associated risks with the mistreatment of biotechnology	Informed public about safety hazards of biotechnology	Education, NGOs, Health							

Information Exchange and Technical/Scientific Co-operation

ACTIONS	OUTPUT/SIGN	ACTORS	TIMEFRAME 2004-2010						
			04	05	06	07	08	09	10
Establish a National Biodiversity Database and Information Center	National biodiversity information Center	University, WCB, Forestry, Marine, NGOs, Lands, Environment							
Provide training in the collection, organization, updating and communication of biodiversity information	National human resource pool	University, private sector, NGOs							
Provide training to end-users to ensure full utilization of the information collected and stored	Increased public participation in using biodiversity information	University, NGOs, Education, Information							
Promote the development and implementation of joint initiatives with other countries on important biodiversity issues (e.g. trans-boundary protected areas for peace and co-operation)	Increased cooperation and experience sharing from other countries	Forestry, WCB, Foreign Affairs, NGOs, Development, Judiciary							
Encourage the exchange of experts and expertise with neighboring countries on biodiversity	Increased networking among experts	University, NGOs, Forestry, WCB, Agriculture, Tourism, Marine							
Promote and support regional co-operation in biodiversity conservation that border on trade in endangered species or genetic resources	Increased cooperation on anti-poaching measures	WCB, Marine, Trade, Judiciary, Police, Military, FD							

Support information exchange in remote and rural areas	Informal information exchange strengthened	Information, NGOs, Tourism, Local government							

Annex 2: PRIORITY PROJECTS & PROJECT CONCEPTS

Priority Project 1: Post-Conflict Reconstruction and Management of Protected Areas in Sierra Leone

Introduction

Sierra Leone is one of few countries in West Africa that lie within the Upper Guinean rainforest 'hotspots' in Africa. A diverse array of natural ecosystems supports a wealth of tropical biodiversity including several endemic plant and animal species. Prior to colonial rule, forest covered nearly 70% of the land area (Unwin 1925, Savill and Fox 1967). With the inception of timber trade in 1816, much of the forest was exploited to supply timber for the British shipbuilding industry. Subsequent invasion by slash-and-burn farmers, and little or no forest management thereafter reduced forest cover in the coastal areas, and increasingly in the interior to currently just under 5% (Gordon et al. 1979, CEPF Document 2001).

Exploitation of wildlife resources followed forest clearing. Traditional dependence on bushmeat has led to the depletion of wildlife resources in most areas in Sierra Leone. Ill-conceived and poorly implemented agricultural policies also encouraged bounty hunting, with the loss of an estimated 60,000 non-human primates between 1948 and 1950 (Jones 1951). With a booming population and an economy intricately linked to its biological and mineral resources, exploitation has severely reduced the quality of the biophysical environment and the loss of biodiversity continues at an alarming rate. Efforts to mitigate these threats are few, despite numerous recommendations from eminent conservationists regarding "priority actions" for conservation (Lowes 1970, Wilkinson 1974, Phillipson 1978, Merz 1986, Davies 1987, Bakarr 1992, Lebbie 2002d).

Progress has been largely constrained by lack of adequate technical and institutional capacities, as well as financial support for developing, and implementing effective conservation activities. Despite government intentions to set aside national parks, nature reserves, game reserves and sanctuaries, a full commitment to establishing protected areas has been slow. In terms of size, all proposed protected areas total just over 3% of the land area. Only 2 of the 18 protected areas have been gazetted as national park and wildlife sanctuary, with Outamba Kilimi and Tiwai, occupying these positions,

respectively. The 12 km^2 Tiwai Island Game Reserve was gazetted as a result of collaboration between two US universities (University of Miami and Hunter College) and Njala University College of Sierra Leone (Bakarr et al. 1999).

Ten years ago, Sierra Leone was engulfed in a civil conflict that not only destroyed its infrastructure, but also led to the over-exploitation of its biodiversity (Lebbie 1998, Garnett and Utas 2000). Future threats to biodiversity are envisaged, and it is prudent to assert that there is a need to support and implement changes in the way protected areas are managed and the institutions that are responsible for their management. Today, the war has come to an end with a new democratic government in place and a pledge to combat hunger. In accomplishing this pledge, natural resource management is a fundamental goal of the Ministry of Agriculture, Forestry and Food Security. The focus on biodiversity conservation, and in particular improving the management of protected areas is an important national strategy for reconstruction and sustainable development.

Objectives

In order to achieve the national strategy of biodiversity conservation, 4 key objectives have been identified to ensure that a representative number of protected areas across all ecosystem types get upgraded to the IUCN protected area categories (e.g., national parks, game sanctuaries, nature reserves, etc.). Adequate technical and financial support systems are crucial if the overall goal is to conserve Sierra Leone's biodiversity. The following objectives are proposed:

1. To establish and ensure management of 8 protected areas in representative ecosystems in Sierra Leone,
2. To establish and strengthen the system of managing the 8 protected areas across representative ecosystems,
3. To build local capacity for the effective management of the 8 protected areas in Sierra Leone, and
4. To establish a sustainable funding mechanism for the long-term management of all 8 protected areas.

Project Concepts

In order to achieve the four stated objectives, we are proposing four project portfolios with several activities as a national strategy for securing the future of Sierra Leone's protected areas and biodiversity. Almost 40 years of conservation assessments and recommendations for the establishment of protected areas in Sierra Leone have not led to any significant commitment to protected area management. Forest exploitation has taken precedence over management for the overall maintenance of biodiversity. The lack of trained personnel and financial support for protected area management and administration has hampered efforts in this direction.

The projects proposed are aimed at protecting approximately 80-90% of Sierra Leone's terrestrial biodiversity, by focusing on 8 priority sites. These sites include; (1) Outamba-Kilimi National Park, (2) Loma-Tingi Complex, (3) Western Area Forest Reserve, (4) Gola Forest Reserves, (5) Mamunta-Mayoso, (6) Yawri Bay, (7) Lakes Mape & Mabesi, and (8) Kangari Hills.

Advantages of the Projects

We envisage three major advantages of the proposed projects when properly implemented:

1. Jobs will be created for the multitude of Sierra Leoneans,
2. The environment and biodiversity of Sierra Leone will be safeguarded, and
3. Income will be generated in most local communities to alleviate poverty.

Project 1: Establish a system of 8 Protected Areas in representative ecosystems for the conservation of approximately 80-90% of Sierra Leone's biodiversity.

Activities:

1. Biodiversity assessment including the status of threatened and endangered species in all 8 protected areas,
2. Reviewing, updating and creating management plans for all 8 protected areas,
3. Establishing links with adjacent communities dependent on resources in protected areas, and
4. Reconstructing and equipping of park infrastructures.

Project 2: Establishing and strengthening the system of managing protected areas.

Activities:

1. Restructuring of Forestry Division to emphasize plantation forestry, reforestation and agro-forestry,
2. Involving local NGOs in the management of selected protected areas,
3. Elevating the status of the Wildlife Conservation Branch to a division/para-statal, and
4. Putting relevant policies in place to ensure all agencies and partners work together.

Project 3: Build capacity in the management of protected areas

Activities:

1. Training and recruiting graduates at the University of Sierra Leone, taking advantage of the BSc and MSc programs in Applied Ecology, Fisheries Biology & Wildlife Conservation and Forestry,
2. Training of rangers and guards at Mweka in Tanzania, and the South Africa College of Wildlife,
3. Building awareness among the public to support the management of protected areas

Project 4: Establish a sustainable funding mechanism for the long-term management of protected areas in Sierra Leone

Activities:

1. Set up a trust fund for long-term financial support and independence of protected areas,
2. Analyze the legal aspects of trust funds including its management, disbursement and use by institutional partners.

Time Frame for Implementation

Ten years starting 2004 and ending 2014.

Funding & Sources

A sum of $30 million is required. Approximately $15 million will be sought from the Global Environmental Facility (GEF). An additional $7 million will be secured from bilateral donors of Sierra Leone including DFID, USAID, DANIDA,

SIDA, Dutch Government, Government of Japan, etc. The government of Sierra Leone is expected to commit $7 million in kind or cash over the life of the project.

Approximately $3 million per year will be spent for the first 5 years, divided across protected areas and institutional partners. The trust fund will be started with $7 million. The remaining funds will be spread over the second five-year period. The first 5-years will involve the establishment of the protected areas, training and reconstruction. The second 5-years will involve consolidation of the first 5-years.

Proposed Implementing Partner

UNDP, Sierra Leone

Institutional Partners

Several institutional partners are envisaged, each with a crucial role in achieving the overall goal of establishing the different protected areas and ensuring the conservation of biodiversity. The different partners include:

Government Level

1. Ministry of Agriculture, Forestry & Food Security
2. Ministry of Lands, Housing & Environment
3. Ministry of Interior

4. Ministry of Tourism

Non-governmental Organizations

1. Environmental Foundation for Africa (EFA)
2. Conservation Society of Sierra Leone (CSSL)
3. Community Biodiversity Action Network (CBAN)
4. Birdlife International
5. Conservation International (CI)
6. Royal Society for the Protection of Birds (RSPB)
7. Green Scenery
8. Friends of the Earth
9. CHESIL

Academia and Research Organizations

1. Center for Biodiversity Research (CBR)
2. Njala University College (NUC)
3. Fourah Bay College (FBC)

Priority Project 2: Medicinal Plant Conservation in Sierra Leone

Introduction

Concern that medicinal plant knowledge is being lost has been eloquently phrased by the West African poet, Amadou Hampate Ba, who warns: "when an old man dies in Africa, an entire library burns"

In Sierra Leone, there is a great dependence on the use of medicinal plants in meeting the health care needs of people, a situation that is mirrored in other developing countries (Feierman 1981, Bichmann 1984, Farnsworth 1994). The reliance on medicinal plants is largely due to the prohibitive cost of commercial pharmaceuticals and the acute shortage of trained medical personnel. In developed countries like the US and Canada, secondary plant metabolites make up 25% of prescription drugs (Farnsworth 1984), while in Germany, it has been estimated that 80% of the physicians recommend some herbal products (Grunwald 1994). There is renewed interest in traditional medicine in both developed and developing countries because of its potential health benefits and economic contributions (Eisenberg et al. 1993, Grunwald 1994, Kuipers 1995). Brevoort (1995) has estimated the US herbal industry to be worth $1.6 billion.

Despite the growing recognition that medicinal plants are an important component of world trade (Lange and Schippmann 1997), concerns over the possible loss of this global resource are growing (Phiillipson 1997, Lambert et al. 1997). Forest clearance in tropical countries is progressing at an alarming rate, resulting in the loss of valuable medicinal resources (Abbiw 1994, Cole 1994). Increasing global demand for medicinal plant products has also led to the over-harvesting of wild plants. Nearly all medicinal plants exploited in developing countries come from the wild (Marshall 1998), where destructive harvesting practices coupled with high rates of exploitation jeopardize the continued existence of natural populations (Cunningham 1990, Pandit and Babu 1997).

In the urban areas of most African countries, demand for medicinal plants is rising, and continues to endanger already depleted species. For example, in the Durban area of South Africa, extensive exploitation of *Mondia whitei* has resulted in local extirpation (Cunningham 1988). In a preliminary assessment of medicinal plant use in the Freetown peninsula of Sierra Leone, Lebbie (2001) found the growing scarcity of preferred medicinal plants to be met by vendors collecting from provincial towns located at considerable distances from the capitol. Over-exploitation of plant resources in Nigeria is contributing to the extirpation of the most common medicinal plants (Gbile 1994). In Cameroon, market demands for *Prunus africana* has resulted in its over-exploitation and concerns over its possible extinction on Mount Cameroon have been underscored (Kay 1997). In the Central Himalayas of India, Farooquee and Saxena (1996) found that substantial economic returns from medicinal plant harvesting have led herdsmen and households that once collected for a short period (two months) to devote longer periods (five months) to collecting herbs. In the southwest state of Puebla, Mexico, Hersch-Martinez (1995) reported that increased demand and a lack of adherence to traditional gathering practices by new gatherers threaten the survival of *Calea zacatechichi*.

As many traditional cultures disappear together with their knowledge of plant identification, collection and use, Africa stands to lose because of its dependence on these resources. Marshall (1998) highlighted these concerns and called for action before "valuable species become rare or endangered". The prohibitive cost of most modern pharmaceuticals makes traditional knowledge about the efficacious use of medicinal plants a critical link for delivering cost-effective health care. Several studies have shown

that traditional herbal knowledge may be useful in detecting bioactive compounds in plants (Farnsworth and Kaas 1981, Vanden Berghe et al. 1986). For example, in Bolivia, Abdel-Malek et al. (1996) have shown that medicinal plants of the Kallaway Indians provided important leads to new anti-HIV drugs.

There is an urgent need to document and implement conservation actions to save this important resource and the indigenous knowledge associated with it. The Center for Biodiversity Research recognizes that very little is being done to protect this global resource in Sierra Leone, where numerous plants are over-exploited (Lebbie and Guries 1995, Lebbie 2001).

Objectives

The primary thrust of this project is twofold: (1) to protect and conserve medicinal plants, and (2) to prevent the erosion of indigenous medicinal plant knowledge in Sierra Leone.

The main objectives of this project are:

1. To create a medicinal plant database documenting the indigenous knowledge and use of such plants,
2. To determine the structure of markets and trade patterns associated with important medicinal plants in Sierra Leone,
3. To implement an agro-forestry/domestication program that involves income generation and restoration of depleted medicinal plants,

Proposed Activities

1. Documentation of indigenous medicinal knowledge,
2. Conduct market assessments,
3. Design and implement a medicinal plant database,
4. Identify medicinal plants with market potential and in danger of over-exploitation,
5. Develop cultivation techniques and field trials of medicinal plants,
6. Develop ex-situ conservation of medicinal plants in selected local communities
7. Conduct seminars and workshops on benefit sharing and intellectual property rights,
8. Develop educational programs on safe use of medicinal plants, extirpation and extinction of medicinal plants.

Implementing Partners

1. Research Organizations
2. Local Communities
3. College of Medicine
4. Forestry Division

Timeframe for Implementation

Three years starting 2005-2007

Total Cost

US$420,000

Priority Project 3: Development and Implementation of a Biodiversity Database System (Bioinformatics)

Introduction

Information on the distribution, current status, level of threats and endangerment for most plant and animal species in Sierra Leone is unknown. Species name, distribution, rarity, current threats, utilization and level of protection will be the major defining fields of Bioinformatics system. This system will form the thrust of our monitoring system, and will be updated periodically through inventories and repeat checks.

Scientific information on biodiversity is hard to come by, and is also costly to institutions in Sub-Saharan African countries due to the prohibitive cost of scientific journals and the limited availability of computer technology. Sierra Leone intends to play a leadership role in this niche, by launching a biodiversity dissemination mechanism, maintaining an active web site with free access for government and educational institutions, and the Sierra Leonean public.

Objectives of the Biodiversity Database System (Bioinformatics)

- To compile critical environmental variables such as soils, vegetation and topography for rapid assessment of the regional distribution and abundance of habitats, without the need for expensive and time-consuming field studies of species behaviour and habitat utilisation.

- to capture and map the distribution of cultural features such as settlements, roads, powerlines, mines and other human footprints that impact on the quantity and quality of local biodiversity
- To process and manipulate the database in order to identify spatial patterns and relationships; and monitor changes to the biological environment.
- For use in species richness mapping and to display selected attributes of the database as tables and graphs.
- For predictive modeling of the distribution and abundance of rare, endangered and threatened species.

As the biodiversity information is inherently spatial in nature, the database will be linked to a Geographic Information System (GIS). The GIS will be used as a data-gathering tool and a decision support system in the various components of the biodiversity project, including the EIA.

STRUCTURE OF THE PROJECT

The project will start with the development of a prototype for the environmental information system. It is the consensus of policy makers and NGOs that lack of ready access to valid, available environmental information is a cost constraint and a setback to improve use of environmental information in decision making in the country and throughout the sub-region. The Bioinformatics Unit will establish close collaboration with several environmental institutions in the developed and developing countries, and will seek technical advice and support from a number of international groups working in

the development of metadata standards and Internet communications in order to develop its prototype.

The prototype metadata project will include:

- Developing a design for the project database system;
- Establishing standards for certifying the quality of the environmental data;
- A process for mounting acquired data in a searchable form on the world wide web (www);
- Security consideration for providing secure, searchable access to electronically available data;
- A standard method for prioritizing data for conversion to digital format.

BENEFICIARIES

The primary beneficiaries of this project will be the Government of Sierra Leone, decision-makers, international research institutions and users of biodiversity environmental information. All Sierra Leonean and investors will be secondary beneficiaries from increased and appropriate use of reliable environmental information.

PROPOSED WORK PROGRAMME

A central database will be installed to hold baseline information. Information or data from subsidiary projects as they become available will be organized and stored for use. The Bioinformatics project in principle would involve:

i. **Data Policy**: Issues relating to data storage, maintenance, access and dissemination.

ii. **Data Management Plan**: Type of data to store (data integrity), project integration and long-term maintenance of data generated.

PROJECT STRATEGY, IMPLEMENTATION AND PLAN

1. This is a multi-faceted project, integrating information (data) from Biodiversity Coordinating Unit subsidiary projects.
2. The project will collaborate with the government, local agencies and NGO's, research and educational institutions, international institutions such as the world bank, UNEP, UNDP, UNESCO, ETI etc;
3. Specialist technical resources and expertise will be solicited from sources available to the Biodiversity Coordinating Unit.

ACTIVITIES, ORGANISATION AND IMPLEMENTATION

- System design and quality control;
- Personnel training;
- Data cataloguing services;
    - Data conversion services;

- Project management, monitoring and control;
- Coordination and reporting.

Timeframe

Five years

Total Cost

US$1,500,000

Priority Project 4: Environmental Education and Awareness Raising Program

Introduction

The formal education sector in Sierra Leone does not reflect the increasing biodiveristy crisis facing the country. On a broader scale, the general public is either ill-informed or unaware of these problems. The Biodiversity Coordinating Unit intends to launch an Environmental Education and Awareness Raising Program (EEARP) that is practical and problem-oriented. The EEARP is based on the belief that the current environmental and biodiversity problems arose from people's behaviour and actions, and therefore it is the people - with adequate support from trained environmentalists - who should find a solution to these problems. The EEARP will adopt a collaborative approach that involves all major stakeholders (government, industry, NGOs, educational institutions, community groups and individuals) as partners in the planning, management and implementation of the programme. While designed to promote the environmental objectives of the Biodiversity Coordinating Unit, the EEARP will also reflect the social and economic objectives of the nation and the respective communities.

Aims and Objectives of the Environmental Education programme

The ultimate ***goal*** of the EEARP of the NBSAP is to create and enhance community awareness and understanding of the environmental and biodiversity problems facing Sierra Leone. It will provide individuals and community groups the knowledge and skills that are required to better manage the environment and its resources. An

effective EEARP will engender a significant change in community attitudes and values and encourage a more responsible behavior towards the environment.

The specific objectives of the EE program are:

(i) to collect information on community knowledge, attitudes and perceptions of local changes in ecological and species diversity, as a foundation for designing practical and people-oriented environmental education program

(ii) to establish partnerships with agencies involved in EEARP in the country and to promote collaboration between major stakeholders, including scientists, non-governmental organizations (NGOs), industry, planners and decision makers and community groups, in matters relating to biodiversity.

(iii) to provide scientific information in a form understandable and useable by all stakeholders.

(iv) to launch a species awareness program to inform the consumers about the impact of the bushmeat trade.

Outcomes and outputs from the project will include:

- Increasing awareness of the impact of traditional land-use practices, intensive resource utilization and major development projects, on the environment and biodiversity
- Positive action by community groups and individuals to minimize environmental damage and to conserve biotic resources

- ♦ Evidence of increasing populations of rear, threatened and endangered species in the long term.
- ♦ Educational materials suitable for formal and informal education programs
- ♦ technical reports and articles published in journals and the web

Strategies/methods for implementing the EEARP

Given the low socioeconomic status and high levels of illiteracy among the target population, the Biodiversity Coordinating Unit will adopt the following strategies to achieve the project's objectives.

- Setting up a National Environmental Council, headed by the Minister of Lands, Housing, Country Planning and the Environment, and comprising experts in education, environmental science, community leaders and government administrators. The main functions of the council are to oversee and coordinate all EEARP and to identify priority issues for research and funding.
- Integration of principles of EEARP in Primary, Secondary and Tertiary education curricula to ensure that all students develop an understanding and concern for the natural environment by the time they complete their education.
- In-service training of teachers in principles of EEAR through short courses and workshops, as part of their professional development.
- Development and provision of environmental education resource materials such as audio-visual materials for public awareness campaigns, demonstration and extension.

- Use of mass media such as television, radio and newspapers as vehicle for disseminating EEARP and to get feedback and public opinion on environmental issues
- Setting up and maintaining an active internet website, as well as publishing and distributing a journal to institutions with the responsibilities for managing biodiversity in Sub-Saharan African countries.
- Setting up partnerships with NGOs and other organizations involved in EEAR activities.

Monitoring and evaluation of the EE programme

Both ***process*** and ***impact*** evaluation will be undertaken to assess the progress of the EEARP and measure achievement against the program objectives. This way it will be possible to identify strengths and weaknesses of the program, monitor performance and provide guidance for future directions**.** ***Process*** evaluation will involve focus group discussions, special audits, expert or peer reviews, and surveys on participation rates**.** ***Impact*** evaluation will be used to measure project impact over time.

Timeframe

Five years (2004-2008)

Total Cost

US$550,000

Priority Project 5: Resuscitation of the National Herbarium of Sierra Leone

Introduction

The Njala Herbarium or National Herbarium of Sierra Leone originated a little over 90 years ago. In 1906, C. W. Smythe, the curator of the Botanic Station in Sierra Leone began to collect plant and send them to Kew whilst retaining a collection of duplicates in the country. A large number of botanists followed his example with result that the Njala Herbarium became one of the largest and most important in West Africa. The humble beginnings of the National Herbarium began with the collection of Gardenia tricantha. During the early years of the century, all specimens in the herbarium were housed in the Forestry Department in Kenema but in 1920, the specimens were moved to Njala where they have remained ever since.

The importance of the collection of plants which is now housed at Njala University cannot be over-emphasized. Many of the descriptions of West African plants which are to be found in the definitive flora of the region that of Hutchison and Dalziel, refers to specific and numbered plants among the Njala Collection (re-TYPE SPECIMENS). This alone would be a sufficient justification for attempting to save the collection for the nation. A living and growing herbarium can, however, be seen as an essential part of the development of Sierra Leone.

With increased emphasis on agriculture the herbarium becomes a tool for research workers. Research on weeds and Germplasm cannot be successfully carried out without the herbarium. It may be foreseen that with increased agricultural development and research, the need for the herbarium would increase. It is a great advantage to be able to

identify plants with certainty in Sierra Leone; the alternative is to send specimens to botanic gardens in Europe, a long and costly venture. Requests are also frequently received from University Departments and drug companies for samples of plants of medicinal importance. A herbalist association has just been formed in Sierra Leone and attempts to record and preserve some of the secrets of local medicine before they are lost to posterity with the encroachment of western medicine, in which the herbarium could play a part.

There is growing and realistic appreciation of both the extent and pace at which man has been consuming, destroying, modifying and deteriorating our global our global environment, and in particular our plant resources which form the very base of the life-support systems of our planet. The most important recognition of the dangers facing plant life, and of the consequences for man if urgent steps are not taken, come from the United Nations Conference on the Human Environment dealing with plant and animal resources, their survey and conservation. When the main recommendations are considered, they cover survey of plant genetic resources, preparation of inventories, field exploration and collecting, in-situ and ex-situ conservation in botanic gardens and seed banks.

During the recent civil conflict, the campus of Njala University College was attached by rebels. Most of the college infrastructure was destroyed and with it the National Herbarium and several of the plant collections and the equipment. As Sierra Leone implements the NBSAP, it is expedient that the National Herbarium gets resuscitated to aid in the conservation of biodiversity.

Specific Objectives

1. To assess plant taxonomic needs and capacity at the national level,
2. To build and maintain the systems and infrastructure for obtaining, collating and curating plant specimens,
3. To provide for improved and effective infrastructure for accessing taxonomic information,
4. To provide training to young morphological taxonomists (systematists)

Activities and Outputs

1. To refurbish and equip the national herbarium,
2. To remount and reclassify the undamaged specimens,
3. To develop an accessible database system via the internet
4. Develop identification manuals and to update existing ones,
5. Survey, collect and identify and preserve plant specimens,
6. Build a reference collection of type specimens on the flora of Sierra Leone,
7. Set up a botanic garden attached to the national herbarium

Timeframe

Five years starting 2004-2008

Total Cost

US$935,000

Priority Project 6: Mapping and Documentation of the Flora and Fauna of Sacred Groves

Introduction

Outside of formal protected areas, small indigenous protected areas do occur in close proximity to villages (IUCN 1992) of certain ethnic groups such as the Kono, Mende, Temne and Limba. Termed sacred groves (Bakarr 1992, Lebbie and Freudenberger 1996), these areas are known to have existed long before British Colonial rule and the subsequent introduction of the protected areas system in Sierra Leone. Some sacred groves, locally referred to as poro bush (Parsons 1964) protect unique habitats and their constituent flora and fauna for use in ceremonies marking the passage of boys and girls to manhood. Such groves are not open to non-members and slash-and-burn agriculture are discouraged within their bounds. Occasionally, medicinal plants needed by the village community are collected from some of these groves and the surrounding landscape (Lebbie and Guries 1995). Other groves, which serve as ancestral worship sites and burial groves are open to the public but no form of encroachment is tolerated within them. Indigenous communities revere the groves, and violators are treated severely. Sanctions include the payment of livestock, a bag of rice and a drum of palm oil. Sometimes force is used to ensure compliance, and in an extreme case the individual is ostracized from the village community for persistent violations. Sacred groves also exist for women, but are smaller in size as compared to those for men.

Sacred groves represent fragments of original forests with most such areas between 1-12 ha in size. Though smaller in size, the numerous groves may constitute a

significant proportion of the remaining closed canopy forest outside the forest reserves in Sierra Leone. Their biological integrity appears questionable, especially for populations of larger vertebrates, but the groves are still large enough to contain populations of endemic species of invertebrates, smaller vertebrates, as well as valuable reservoirs of plant genetic resources. They have enormous potential as sources of seeds, invertebrates, or other biotic elements of value for any future ecological restoration work, especially in the areas now affected by diamond, rutile and bauxite mining. Since some these groves occur near forest reserves and parks, they may prove very valuable as ecological corridors for some groups of animals.

It is not clear how many such groves exist in Sierra Leone, nor is there information on the total land area occupied by the groves. No formal inventories or assessments of their potential for biodiversity conservation have undertaken because sacred groves were largely closed to European and North American scientists conducting biological surveys in the past. Bakarr (1992) hinted that such forest fragments could be major sources of endemism through Sierra Leone.

Objectives

1. To map the local of and area extent of sacred groves in Sierra Leone,
2. To inventory the biotic resources in sacred groves,
3. To identify cultural practices and knowledge that have aided in the protection and preservation of sacred groves in Sierra Leone

Activities and Outputs

1. A country-wide map of all sacred groves,
2. A list of plant and animal resources found in sacred groves,
3. Guidelines for the sustainable conservation of sacred groves,
4. A National legislation and policy on sacred groves

Timeframe

Three years starting 2005-2007

Total Cost

US$375,000

Priority Project 6: Inventorying the Non-Timber Forest Products (NTFPs) of Sierra Leone

Introduction

Non-Timber forest products (NTFP) are important resources exploited in the humid tropics of the world, both for subsistence and commercial uses. NTFP or secondary forest products, include plant and animal products, such as "bushmeat", fruits/seeds, poles, medicinal herbs, among others, that contribute to the economic welfare of a multitude of rural people in the humid tropics of West Africa (Falconer 1990). For much of this region, NTFP constitute neglected resources, and very few attempts have been made to inventory, value and conserve them (Wickens 1991, Lebbie 2001).

Objectives

1. To assess the relative distribution and abundance of NTFPs in the major forest reserves of Sierra Leone,
2. To document the value (socio-economic importance) of NTFPs to local communities and urban centers in Sierra Leone,
3. To examine gender differences in the exploitation and management of NTFPs,
4. To examine the impact of current harvest methods on the distribution and abundance of selected NTFPs,
5. To explore the potential for domestication of selected NTFPs.

Outputs and Activities

1. Conducting stock assessments for NTFPs
2. Assessing the socio-economic importance of NTFPs
3. Setting up of nurseries for the domestication of important NTFPs
4. Developing manual and guidelines on sustainable exploitation and marketing of NTFPs
5. Setting up pilot community plots on important NTFP cultivation

Timeframe

Five years starting 2005-2009

Total Cost

US$1,500,000

Priority Project 7: Post-Conflict Rapid Biodiversity Assessment of Large Mammals in Sierra Leone

Introduction

Biodiversity loss in tropical countries is a growing concern because these countries harbor approximately 50% of all life forms on earth. Biodiveristy loss stems from many causes including habitat loss, fragmentation, over-exploitation, exotic species introduction, chemical pollution and global climate change (Boyle and Boontawee 1995). In areas with exceptional concentrations of endemic species - so called "hotspots" - habitat loss is especially critical (Myers 1998, Pendergast et al. 1999). These hotspots comprise <2% of the earth's land area but harbor approximately 44% of the vascular plant species and 35% of the vertebrates (Myers et al. 2000). Unfortunately, virtually all hotspots exist in regions characterized by unregulated exploitation, contested land tenure, high levels of poverty, and little political will to conserve wild land and resources.

The Upper Guinean Rain Forest of West Africa, one of 25 hotspots around the world, has a rich mammalian diversity that is comparable to any 'biodiversity hotspot' in the world (Happold 1996, Bakarr et al 2000). This ecoregion is one of the most endangered hotspots due to habitat loss and a thriving commercial market in bushmeat. Recently, a primate subspecies, Piliocolobus badius waldroni (Miss Waldron's Monkey), was reported to have gone extinct in the forests of Ghana and Cote d'Ivoire as a result of habitat loss and hunting for bushmeat (McGraw 1998, Oates et al. 2000). This ecoregion has also been embroiled in a 10-year civil conflict, in which the impact on human lives

and biodiversity has been high (Richards 1997, Garnett and Utas 2000). Like in other African countries where civil conflicts have occurred, the depletion of wildlife by warring factions has been common. In the Casamance region of Senegal, reports of the disappearance of Tragelaphus spekei (Sitatunga), Trichechus senegalensis (Manatee), and reduced populations of Cercopithecus mona campbelli (Campbell's Monkey) and Bay colobus were confirmed (Burnham 1995). In the Parc National des Volcans of Rwanda, wildlife poaching increased substantially, with the consequent decrease in the numbers of black-fronted duikers (Plumptre et. al 1997).

Objectives

1. To conduct a nation wide rapid biodiversity assessment of mammals,
2. To determine the status of threatened & endangered mammalian species in the country,
3. To develop human resources in conservation and management of large mammals by providing field training to wildlife personnel and students at the University of Sierra Leone.

Activities and Outputs

1. Generate recent information on mammalian distribution and threat status
2. Develop guidelines on the conservation of threatened and endangered species
3. Provide training to students and wildlife personnel
4. Produce field identification guides

Timeframe

One year 2004-2005

Total Cost

US$320,000

Priority Project 8: National Reforestation and Rehabilitation of Degraded Forest Resources

Introduction

The most severe forms of deforestation took place during the decade old civil conflict especially alongside displaced camps and mining towns. The influx of displaced persons into major provincial headquarter towns necessitated massive deforestation as a means of survival. Almost 70% of the displaced communities became involved in deforestation activities: clearing land for farming, fuelwood cutting, charcoal burning, harvesting of poles and timber for domestic consumption and income generation. Most of the forest clearings were made in critical areas and if left unclaimed will result in landslides, destabilized water table and massive soil erosion and leaching of nutrients. This will have grave consequences for sustained food production and the maintenance of biodiversity.

Objectives

1. To ensure sound environmental management in war affected areas nation-wide,
2. To provide employment opportunities for youth groups,
3. To provide basic needs to resettled communities for firewood, charcoal, building materials and food through:
    (i) Agrogorestry practices thereby reducing pressure on the national forests
    (ii) To ensure community participation in environmental protection and management.

Project Outputs

A collaborative forest management team would be set up to tackle environmental problems in concert with the Forestry Division. Supplies of forest products (fuelwood, poles, charcoal, timber, etc) will be increased. Degraded forest areas will be restocked. Suitable agro-forestry techniques will be promoted to ensure food security.

Activities and Project Components

1. Rehabilitation of degraded areas around displaced camps. There is need to replant camp areas within the country that are devastated as a result of the war. It is estimated that about 10,000 acres will be reforested throughout the country.

2. Rehabilitation of the Northern Savanna Zones with Teak Plantation (*Tectona grandis*). Collaborative forest management involving the Forestry Division, the local communities and other institutions is needed to re-afforest the degraded savanna zone with high yielding teak plantations. Communities will not only benefit environmentally but will receive cash incentives for labor inputs. At present, there is a market for teak wood and small diameter poles are urgently needed from the tropics. Involving and sensitizing local communities to grow teak wood will provide incentives to embark on massive re-forestation programs. The main activity will involve establishing community nurseries, plantations and management practices geared towards thinning of plantations for small diameter poles to be exported to Asia.

3. Agroforestry development in the south and East of the Country. Agroforestry interventions will be urgently needed to resettle areas to alleviate food scarcity. Village and central nurseries will be established to raise tree seedlings in combination with

agricultural crops. Training of extension staff, field day training of farmers will be undertaken.

Timeframe

Five years starting 2004-2008

Total Cost

US$2,000,000

Priority Project 9: Nationwide Forest Inventory to Restore and Redefine the Forest Estate after the Civil Conflict

Introduction

In order to ensure the conservation of biological resources, its sustainable use and equitable sharing of benefits, there is need to take stock of the country's forest resources in the form of a comprehensive inventory. Past reports on the status of the forest resources are now obsolete and can no longer be used for planning management.

At present, there is a complete lack of data regarding the status of the forest estates. The last forest inventory was taken 30 years ago. Thus an inventory, and the re-establishment or degazetting of parts of the forest estate is a major priority for action. At present, forest reserve areas and boundaries are only estimated and in the light of widespread encroachment, there is need to reclassify reserve boundaries. Also, there are no management plans for high forest estates and most of the forest estates have never been inventoried for management purposes. The paucity of inventory data on forest estates makes management very difficult and result in poor management policy decisions.

Project Objectives

1. To provide baseline information on the total biomass production of the forest estates of Sierra Leone,
2. To provide information on yield estimates and annual allowable cuts prior to granting forest concessions,

3. To draw up management plans for the forest estates based on multiple use, ecosystem health and sustained yield production,

4. To collect data on threatened and endangered species in the forest estates to integrate into the management plan,

5. To train forestry personnel in the methodology and techniques needed in forest inventory.

Activities and Outputs

1. Management Plans

2. Data on forest resources of the forest estates

3. Satellite images and GIS map of the entire country

4. Delineation of vegetation types, logged and encroached areas, protected/community owned forests, woodlots and plantations and wildlife areas.

Timeframe

Two years starting 2004-2005.

Total Cost

US$2,000,000

Priority Project 10: Small Holder Domestication of Thryonomys swinderianus (Cutting Grass) as a preferred bushmeat species in Sierra Leone

Introduction

Most West African wildlife species are threatened by unregulated exploitation; habitat loss and hunting are cited as the premier causes of wildlife extinction (Davies 1987b, Starin 1989, Martin 1991, McGraw 1998, Fa et al. 2000). In West Africa, demand for wildlife as a source of protein (hereafter referred to as bushmeat) is high (Ajayi 1971, Asibey 1976, Jeffrey 1977, Martin 1983, Falconer and Koppell 1990, Njiforti 1996, Bowen-Jones and Pendry 1999). Such demand is an outcome of a rapid urban population growth, the high cost of alternative sources of meat, and an expanding corps of willing hunters (Wilkie et al. 1992).

Earlier surveys in Ghana, Nigeria, Senegal and Equatorial Guinea indicated that most households consume bushmeat on a regular basis, that bushmeat is an important source of protein in rural and urban areas, and that hunting and poaching bushmeat is a lucrative business (Cremoux 1963, Ajayi 1979, Martin 1983, Addo et al. 1994). Like other non-timber forest products (NTFPs) the trade tends to be segregated in terms of gender with men doing the hunting while women provide for processing and distribution (Addo et al. 1994, Ntiamoa-Baidu 1987). Trade in bushmeat is not well documented in Sierra Leone, but Bakarr and Turay (1996) present data on bushmeat trade for a four-month period in a small chiefdom. The trade centered on primates (Cercopithecus petaurista, Cercopithecus campbelli and Cercopithecus aethiops) and duikers (Cephalophus maxwelli and Tragelaphus scriptus), and household surveys indicated that

bushmeat exploitation was essentially a commercial enterprise and not for household consumption.

In Western, Central and Southern African sub-regions, the Cutting Grass is being developed to supply the protein needs of an ever increasing human population (Alexander 1992). In Ghana, it has been reported that the Cutting Grass or grasscutter is the most preferred bushmeat species, with trade in the species in excess of $59.7 million per annum (Ntiamoah-Baidu 1987). Domesticating the grasscutter will provide a source of revenue for local communities and small holder farmers, as well as alleviate the demand for more threatened mammal species like primates and antelopes.

Objectives

1. Develop techniques and methodologies for the profitable domestication of grasscutters in Sierra Leone,
2. Set up pilot projects in communities adjacent to protected areas for the domestication of grasscutters

Activities and Outputs

1. Collecting grasscutters from different parts of Sierra Leone,
2. Assessing the housing and feeding requirements,
3. Setting up small rearing schemes in local communities,
4. Producing a manual on the effective rearing and domestication of grasscutters,
5. Developing sex determination techniques

Timeframe

Five years starting 2004-2008

Total Cost

US$275,000

Priority Project 11:Co-management and Rehabilitation of Mangrove Ecosystem in Southwestern Sierra Leone

Introduction

Sierra Leone still has a large area of mangrove ecosystem but under immense pressure of over-exploitation and conversion to other uses. Mangroves are very important for the fisheries industry in Sierra Leone: as spawning grounds and as sources of firewood for smoking tons of fish. The growing demand for firewood is also taking a toll on the mangrove vegetation, and the lack of community participation in the management of these resources has created a *de facto* an open access regime.

Objectives

1. Involve key stakeholders in the management of mangrove ecosystem,
2. Develop an integrated management plan to be implemented by all key stakeholders,
3. Promote a process of legally designating chiefdom mangrove areas,

Activities and Outputs

1. Resource assessment
2. Establish chiefdom community mangrove management associations
3. Establish mangrove monitoring system
4. Prepare a management plan
5. Provide training to key stakeholders
6. Rehabilitate degraded mangrove sites

Timeframe

Five years starting 2005-2009

Total Cost

US$670,000

Priority Project 12: Control of Forest Fires in the Northern Savanna Region of Sierra Leone.

Introduction

Fires are common occurrences in the northern savanna region of Sierra Leone. Though fires play important role in the maintenance of the climax savanna vegetation, the frequency and intensity of annual fires coupled with human exploitation of the savanna trees for fuelwood, timber and charcoal are raising some concerns. Uncontrolled fires from slash-and-burn agriculture and the hunting of bushmeat have increased in recent times. Controlling the adverse effects of fires will serve to maintain the biodiversity of this important ecosystem.

Objectives

1. To reduce the uncontrolled setting of fires in the northern savanna zone

Activities and Outputs

1. Assess the extent of uncontrolled burning
2. Develop awareness raising programs about uncontrolled bushfires
3. Empower local authorities to take action against offenders
4. Develop measures to prevent uncontrolled fires

Timeframe

Two years starting 2004-2005

Total Cost

US$250,000

Priority Project 12: Capacity Building for Biodiversity Conservation in Sierra Leone

Introduction

The successful implementation and monitoring of the National Biodiversity Strategy and Action Plan will hinge on the setting up, staffing and equipping a National Biodiversity Coordinating Unit or Secretariat. The current activities in biodiversity conservation are not well coordinated, and cross-sectoral interactions in the implementation of biodiversity issues are non-existent in the relevant government ministries. A unit or secretariat responsible for biodiversity will serve to build the capacity of all relevant institutions by providing training, mobilizing and utilizing existing expertise and resources, and ensuring all the relevant institutions collaborate in the sustainable use and conservation of biodiversity.

Objectives

1. To establish, equip and adequately staff a National Biodiversity Coordinating Unit to implement and monitor the NBSAP,
2. To provide training programs for current professionals (government agencies and NGOs) in fields critical to the conservation and sustainable use of biodiversity,
3. To provide logistical support to key institutions and organizations addressing biodiversity issues in Sierra Leone.

Activities and Outputs

1. Set up, equip and staff a biodiversity coordinating unit/secretariat
2. Develop short term training programs
3. Provision of logistical support to relevant institutions and organizations

Timeframe

Two years starting 2004-2005

Total Cost

US$2,000,000

Priority Project 13: National Marine Biodiversity and Museum for Sierra Leone

Introduction

Sierra Leone has a coastline that is some 560 km long and the shelf covers (to 200m depth) an estimated area of 30,000 km2. The Exclusive Economic Zone (EEZ) is about 155,700 km2.

The first records of marine organisms of Sierra Lone is largely due to the work of Portuguese sailors in the 18th and 19th centuries. In Sierra Leone, coastal and marine biodiversity studies had earlier been undertaken only with respect to the fisheries resources (Hornell, 1928; Fowler, 1936; Stevens, 1945; Longhurst, 1957; 1963; 1965; 1971; FAO; 1990; 1992; Ssentengo and Ansa-Emuin, 1986; Coutin, 1989; IMBO, 2002).

The systematic study of the flora and fauna of Sierra Leone was a result of the conscious effort by the British Colonial Office to understand the nature of complex biotopes and later to exploit the resources. Some of the important studies include Aleem, 1979; Aleem and Chaytor, 1980; Bainbridge, 1960; Chaytor, 1979; Findlay, 1978; Lawson, 1954; 1957; Leigh, 1973; Longhurst, 1958; 1962; COMARAF, 1990; IMBO,, 1996).

The British Colonial Office established a regional centre for fisheries research (West African Fisheries Research Institute WAFRI) in Freetown in 1952. The complex housing WAFRI located at Kissy Dockyard was contained a collection of marine organisms which had been identified, categorized and meticulously recorded since the 1920s. In addition, some form of oceanographic work had also been going. The University of Sierra Leone and IMBO in particular had added considerable materials to what became the prototype of a Marine Biodiversity Museum.

The housing complex, the museum and laboratories were completely destroyed in a viscious arson attack during the rebel invasion of Freetown in January, 1999. The most impressive collection was lost forever with it some rare specimens. Ina time series the effect of human activities on biodiversity is now difficult to assess. The changes in composition are also not known. There is a need for the systematic collection, identification and preservation of materials for various purposes including:-

- teaching and demonstration

- monitoring of changes in composition
- assessment of interrelationship of organisms
- identification of organisms of economic importance
- as a source of tourist attraction

An early warning system on pollution and other changes could be set up to monitor to change in abundance of certain indicator species. As Sierra Leone implements the NBSAP a unique opportunity is presented for the creation of a Marine and Coastal National Biodiversity Museum as a National Monument.

Objectives:

1. To preserve and present a permanent record of marine and coastal flora and fauna.
2. To compare the present biodiversity with past records or records from adjacent regions that have remained relatively undistributed.
3. To assess the influence of human activities on the changes in marine and coastal biodiversity.
4. To serve as a teaching aid for scientists, researchers and students.
5. To serve as a source of information for Government on the best management measures to be adopted for our coastal environment.

Activities and Outputs

1. The construction of a museum with the appropriate support facilities including laboratories and libraries.
2. To train scientists including taxonomists, ecologists and curators.
3. To collect as many specimen as possible using local facilities.
4. To assess changes in levels of exploitation of commercial species.
5. To prepare a permanent data-base and manuals for the use by present and future generations.

Time frame

Five years starting 2004-2008

Total Cost

US$ 1.5 million

Priority Project 14: Assessment of the Marine Finfish and Shellfish Stocks of the Inshore Coastal Waters of the continental Shelf of Sierra Leone.

Introduction

The 560 km long coastline as an estimated area of 30,000 km2 (to 200m depth). The continental shelf is about 100 km wide in the North at Yeliboya and tapers to only 13 km wide at Sulima in the South.

Over 200 species of finfish belonging to 79 families have been identified. Some 80 species have been shown to occur more frequently than the others. Finfish can be classified into two broad categories:- (i) Pelagic and (ii) Demersal.

Small pelagics are dominated by clupeids (sardinella of and Ethmalosa fimbriata. Large pelagics are dominated by the tunas, bonitos and barracudas. The demersals are dominated by two categories of fauna (Sciaenid and sparid) dominated by croaker and snappers respectively (Longhurst,1968; Fager and Longhurst, 1968; Coutin, 1989). The shellfish consists of shrimps, lobsters, crabs, cephalopods, gastropods, bivalve and crabs.

The most reliable estimates of fishery Resources biomass are based on dome 40 survey's between 1968 and 1990. They were intensive surveys conducted by the Soviet Union between 1976 and 1989. From the various estimates it is reasonable to assume that the true stock size lies between 500,000 – 750,000mt. The stock sizes and MSY respectively for major categories are as follows:- Shrimps (15,000mt, 3000mt); Pelagics (360,00mt, 140,000mt); Demersals (110,000mt, 50,000mt); Cephalopods (30,000mt, 10,000mt,) (Ndomahina, 2002).

From a management point of view there are two types of Fishery (Industrial and Artisanal) sectors. Trends in fleet composition indicates that shrimp trawlers have not shown any rapid decline since 1980 whilst the demersal trawlers and purse seiners have reduced their activities significantly.

Production figures (total annual landings) indicate that there has been dramatic drop from 230,000mt in 1990 to a mere 62,000mt in 1996. The industrial fleet contributed about 180,000mt in 1990 and 15,000mt in 1996 respectively to the annual total landings largely due to the withdrawal of the Soviet Purse Seiners. Between 1990 and 1992 there was a further drop in numbers of all categories of demersal vessels largely due to the effective patrols mounted by a private survelliance firm and the navy.

The fleet composition of the artisanal fishery sector remained remarkably constant between 1970 and 1990. About 20,000 fulltime fishermen were registered in this sector operating some 6000 canoes. In 1990, 22% of the fish harvested came from the artisanal sector. Nowadays, (2003) the artisanal sector accounts for 75% of all fish harvested annually. In real terms 50,000mt (1990), 46,0000mt (1996) and 46,000mt (2002). The rebel war hit the fishery sector very hard working to an overall reduction in productivity.

In Sierra Leone there is evidence of over exploitation of certain categories of target species including snappers (Dentex angolensis, D. congensis, D. canarensuis, pagellus belloti), sciaenid fauna (Pseudotolithus senegalensis, Drepane africana, Galeiodes decadactylus, Ilisha africana latiscutatus). The artisanal fishermen have recorded very low levels of catch in recent times which they blame largely on the activities of the trawlers which make persistent incursion into the IEZ the latter being an important breeding and nursery ground for many important aquatic organisms.

There is an increase in various violations of the fisheries laws especially those relating to mesh-sizes and generally to poor observances of the code of conduct for responsible fishing among both the industrial and artisanal fisheries sector. There is also an unusually high incidence of conflict and confrontation between the industrial fisheries and artisanal fisheries sector especially in the IEZ.

In order to rationally manage the fishery resources of our coastal and marine resources, an accurate assessment of stock levels is required.
The lost survey by the FAO tool place in 1990.

Objectives

1. To assess the present state of biomass levels of the important finfish and shellfish stocks
   and their distribution in the coastal waters of Sierra Leone.
2. To determine the exploitation rate of important stocks.
3. To assess the degree of compliance with the present fisheries laws in both the industrial and fisheries sector.
4. To establish a proper framework for the monitoring of the distribution patterns and stocks levels of major resource categories of finfish and shellfish.

5. To provide a sound scientific basis for a lalistic and integrated approach to the management of our coastal resources.

Activities

1. To train scientists and field staff in stock assessment and biological techniques.
2. To Refurbish and equip institutions with the requisite capacity for carrying out scientific work.
3. Survey and sampling at sea using ships of opportunity.
4. Analyse the data to establish stock levels, distribution and exploitation rate.
5. Review Fisheries Policies and introducing of new management in line with the results of scientific investigations.
6. Awareness raising exercises among stakeholders on the adoption of the code of conduct responsible fishing.

Timeframe

Five years starting 2004-2008

Total Cost

US$ 1.0 million

Priority Project 15: Studies on the Biodiversity of Major Estuarine Systems of Sierra Leone

Introduction

There are three (3) major estuarine systems in Sierra Leone (Scarcies, Sierra Leone River, Sherbro River). The scarcies estuary consists of two rivers (Great and Little Scarcies) located in the North which merge towards their mouth before emptying into the Eastern Atlantic through a shallow coastal plain estuary.

The Sierra Leone River Estuary is a drowned river estuary that is formed from three(3) main rivers (Port Loko River, Rokel River and Bunce River), many creeks and streams.

The Sherbro River Estuary is an estuarine complex located in the Southern part of the country. It receives discharge from various rivers and streams among which are the Kittam, Jong and Wange. The Kittam forms a common estuarine channel with the Sewa and Wange rivers.

Apart from the Sierra Leone. River Estuary that has been extensively studied, not much is known about the Scarcies and Sherbro River Estuaries. The estuaries share some common features. Both the Sierra Leone River Estuary are navigable for long stretches (over 100km) and have extensive. Coastal artisanal transportation systems. The estuaries are stratified and fringed by mangroves with extensive sandy and muddy flats. Apart from coastal transportation, mangroves are exploitated as a source of fuel wood, timber and cleared for rice production and salt manufacture. There are also coastal infrastructural development and waste disposal. Almost all the coastal village situated along rivers and estuaries are places of extensive fishing activities.

Estuaries are fragile and under pressure especially during the period of reconstruction. A systematic study of the estuaries is therefore a necessity f the biodiversity of these important systems.

The studies should relate to the water quality analysis including salinity, pH, oxygen and nutrient analysis. The sediment types and distribution should be studied. The biota to studied include Plankton (Phytoplankton and Zooplankton), Benthos, Fish, Reptiles, Birds and Mammals. Mangrove flora and fauna types and distribution needs to

be understood. With the war now over, the NBSAP affords us the opportunity of assessing the impact of anthropogenic activities on estuarine biodiversity.

Objectives

1. To build capacity at various institution for estuarine biodiversity research in various fields.
2. To build and maintain the systems and infrastructure for effective surveys, collating and dissemination of information.
3. To assess the impact of various anthropogenic activities on the estuarine biodiversity.
4. To raise awareness among stakeholders on the rational and sustainable use of resources.
5. To establish a system of monitoring of biodiversity changes within the estuarine systems.

Activities and Outputs

1. To introduce curricula into institutions of higher learning with focus on biodiversity, including estuarine environment.
2. Design and carryout surveys on each of the major estuaries.
3. Identify the major biotopes of estuaries (sand and mudflats, mangroves hydrographics or overlying water).
4. Investigate the hydrographic condition (Physical and Chemical).
5. Investigate the biota (Plankton, Benthos, Nekton).
6. Undertake an investigation into the various activities that may adversely affect the estuarine biodiversity.
7. To institute mitigation measures including restoration whenever necessary.

Time frame

Five years starting 2004-2008

Total Cost

US$ 1.5 million

Priority Project No.16: Small Ruminants Restocking Program

Introduction

The livestock industry in Sierra Leone has a lot of untapped potential. Before the outbreak of the civil conflict, livestock contributed approximately 3% to the GDP. This sector is now at its lowest ebb after the decade-long civil conflict, which affected every livestock producing areas in the country. Anecdotal evidence suggests that 85% of the national herds of the country were destroyed during the civil war. Most cattle presently slaughtered in the country originate from Guinea.

The civil conflict impacted negatively on the performance of the private sector. Besides the destruction of livestock populations, the commercial rearing and processing facilities were destroyed also. Commercial piggery and poultry production in most towns and rural areas have been reduced in capacity.

The traditional livestock in Sierra Leone consists of cattle, small ruminants and pigs. Although there is no data available on animal population in the country, but the 1979 census data showed the following population figures: 333,200 cattle, 264,000 sheep, 145,000 goats, 17,000 pigs and 3 million poultry (Shaw and Hoste 1987). Recent estimates after the civil war put the figures at: 102,000 cattle, 79,200 sheep, 43,500 goats, 5,100 pigs and 900,000 poultry.

Objectives

1. To reactivate a dependable income generating activity for the resettled farm families by restocking,

2. Provide a source of breeding animals for the resettled farm families in several chiefdoms,

3. Promote improved animal husbandry practices in rural and urban communities,

4. Provide extension services to communities participating in the restocking program

Implementation and Activities

1. A total of 400 farm families in five districts (Bombali, Kambia, Kono, Moyamba and Tonkolili) will be targeted,

2. Training in improved animal husbandry,

3. Setting up of project team,

4. Purchase of animals and veterinary drugs,

5. Pre-treatment of animals against common diseases.

Time Frame

Three years starting 2004-2006

Total Cost

US$ 5-10 Million

Priority Project No.17: Gola Conservation Concession Development Project

Introduction

Since 1990, the Conservation Society of Sierra Leone (CSSL), the Forestry Division, and the Royal Society for the Protection of Birds (RSPB) have been collaborating in programs for the conservation of the globally important Gola Forests in eastern Sierra Leone. These forests represent the largest remnant of the humid forest that once covered much of Sierra Leone, and one of the best examples of Upper Guinea Forest in all of West Africa. The forests are home to a number of rare and threatened plant and animal species.

With the restoration of peace and increased stability in Sierra Leone, CSSL and its partners agreed to work together on a new program for the Gola Forests. As part of this process, studies were carried out in 2003 on the condition of the forest and the needs and perceptions of adjacent forest communities. Meetings were also held with chiefdom representatives, at which there was substantial agreement on the approach to forest conservation. In July 2003, a Participatory Planning Workshop was organized in Kenema involving the Government of Sierra Leone, representatives of the seven chiefdoms around the forest, CSSL, RSPB, Conservation International and other interested stakeholders. This workshop reached broad consensus on the need to conserve the Gola Forests for biodiversity and sustainable use. The workshop also agreed on a strategy based on a conservation concession as the most promising approach to secure the long-term conservation of the forests. Further, it was agreed that a three-year

development phase is needed to put in place all the conditions for a successful launching of a functional conservation concession and supporting activities.

In an effort to secure the future of protected areas in Sierra Leone, the Gola Forest Conservation Concession is being promoted as an off-shoot of Priority Project No.1 above.

Objectives

1. To develop a conservation concession agreement on the Gola Forests between Government of Sierra Leone, Conservation NGOs and adjacent local communities,
2. To develop the capacity of Forestry Division, CSSL and local communities to ensure proper management of the Gola Forests,
3. To promote sustainable use of the forest resources and generate income from such activities that will enhance the conservation of the forest,
4. To increase awareness among the Sierra Leone population about the value of conserving Gola forests, and
5. To set up a funding mechanism to support the long-term conservation of the Gola Forests.

Activities

Several activities are envisaged with some listed below:

1. Submit a formal application to the Government of Sierra Leone for a logging concession,

2. Develop an agreement on the area of the concession, the amount of compensation for logging rights and benefit sharing by the Government and communities,
3. Develop and finalize the overall conservation concession agreement,
4. Provide logistic support to the Forestry Division to play a more active role in forest management,
5. Support the Paramount Chiefs to disseminate information on the program to the broader population,
6. Identify other priority capacity-building needs of the Forestry Division and communities necessary for the success of the conservation program,
7. Provide material support to priority infrastructure projects in each chiefdom, with local materials and unskilled labor provided by communities,
8. Coordinate with other agencies and donors, and encourage them to undertake complementary development oriented activities in the Gola communities,
9. Encourage and support community leaders and Forestry Division to stop illegal logging by power saw operators,
10. Formally apply to the Government for a moratorium on logging concessions in Gola during the three-year development phase of the conservation concession,
11. Support the Forestry Division to clear and mark the forest boundary in critical areas where illegal activities are going on, using local labor,
12. Together with stakeholders, identify the key target groups having influence on forest conservation.
13. Identify the most cost-effective methods of conveying information to the priority target groups.

14. Initiate an education program based on the priority target groups and methods.

15. Identify funding needs and amounts for the long-term concession program.

16. Identify and set up trust fund mechanism in consultation with partners.

17. Raise funds for the trust fund.

18. Raise funds for complementary development activities.

Timeframe

Three years starting 2004-2006

Total Cost

US$5-10 Million

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