

**LIBERIA'S NATIONAL BIODIVERSITY
STRATEGY AND ACTION PLAN**

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FOREWORD

Biological Diversity involves every facet of our lives. Economic development, health and well being, cultural and social benefits, which are the foundations of sustainable development, all depend on biological diversity. Activities of man over the centuries have re-shaped the diversity of species, genes and ecosystems, to the extent that it is generally agreed the earth has lost tremendous amount of biological diversity over time. For Liberia, biological diversity has declined significantly over the years, and the country has lost many species, while most of its ecosystems have been degraded significantly. Liberia being a forest dependent country, lost over 60% of its forest cover during the last two centuries, resulting to the loss of gene pools, species and ecosystems.

The biological richness of planet earth has declined due to over 3.5 billion years of evolutionary history. Roughly only about 7% of an estimated 13 million species on the planet have so far been identified. The Rio Conference therefore acknowledged the importance of biological diversity, which is the genetic differences of species and the various ecosystems for the health of people and the planet.

Biodiversity loss is of serious concern because of the threats this poses to human well-being and the seemingly disservice to the future generations whose interest is being compromised by actions of the present. Some of the threats come from unchecked population growth, ignorance, lack of public education and awareness, unplanned human settlements, inappropriate agricultural practices, insufficient knowledge of the impacts of the extinction or decimation of one species on another, and attended consequences on human health and well-being, unregulated timber extraction, commercial hunting and industrial expansion.

Liberia subscribes to the World Summit on Sustainable Development and its Johannesburg Plan of Implementation, which calls for significant reduction in the rate of biodiversity loss and eradication of acute poverty by 2010. But this can only be realized through holistic, participatory approach to biodiversity conservation.

Liberia ratified the United Nations Convention on Biological Diversity on 8 November 2000 with the realization that it is the best international instrument to address conservation of biological diversity and sustainable use of its components. As a further reaffirmation of how much we recognize the intrinsic value of biodiversity and the importance it holds for sustenance of all life support systems, the Government of Liberia created the Environmental Protection Agency (EPA) in 2003 in order to institutionalize environmental management of which biodiversity conservation is an integral part.

The achievement of biodiversity conservation must be fully participatory. And therefore, I call on everyone, including all citizens of Liberia, foreigners within our borders, United Nations and other development partners and the private sector to work in concert to conserve Liberia's rich biodiversity. Let us bear in mind that the rate at which we achieve this will depend on the conduct of human activities towards the environment, by ensuring that our actions are environmental friendly, and we must mitigate adverse effects on our dwindling biodiversity and fragile ecosystems.

I have no doubt that Liberia will follow the path on which nations seen as good examples of friends of the environment walk, and that we will not be found relenting on this course. However, I wish to stress that the situation is urgent, and the time to take action is now, as tomorrow will be too late. Just as we sing the “LONE STAR FOREVER”, let us shout, “DEPLETION OF BIODIVERSITY NEVER.”

H.E. Charles Gyude Bryant
Head of State
&
Chairman, National Transitional Government
REPUBLIC OF LIBERIA

ACKNOWLEDGMENTS

The NBSAP process was fully participatory, and we recognize the efforts of all those who participated in this endeavor. National and international NGOs, academic institutions, women groups, the youth, student clubs, the private sector, the press, civil society organizations, contributed through workshop participation, giving voluntary information and/or sharing of literature with the consultants.

Many institutions agreed to nominate staff members to serve on the steering committee and planning team. These institutions also cooperated with the stocktaking exercise by giving their representatives on the steering committee and planning team access to information for the consultants.

The consultants are grateful to several workshop organizers, production staff and rapporteurs for securing all the deliberations from workshops. Particular thanks go to Arthur Tucker, Jonathan Davis, J. Wesley Washington, John Jeh, J. Grody Dorbor and Jemima Garneo.

Participants from the fifteen (15) counties had to come to Monrovia on short notice for workshops intended for their regions. The discussions were transferred to Monrovia due to security reasons, county delegates agreed to attend their various regional workshops in Monrovia under challenging conditions. The county delegates were also instrumental in shaping the actions you see today in the document.

The project acknowledges the role played by the Executive Director and staff of NECOLIB, particularly the office attendants and clerical staff. The Executive Director granted a leave of absence to the Lead National Consultant who was seconded to the project.

The regular host of our workshops was the Catholic Archdiocesan Pastoral Center at the St. Theresa Convent and the regular caterer was Mich-Ali Restaurant. Rebecca Moore catered during meetings of the steering committee. Their wonderful services kept the participants together on all occasions.

The Ministry of Planning and Economic Affairs served as Chair of the Steering Committee and hosted all meetings of the committee free of charge. FAO and WHO allowed the use of their respective conference rooms for a three-day consultants retreat and a one-day steering committee workshop, respectively.

The strategy and action plan was drafted under the guidance of Dr. Trinto Mugangu, the international consultant, assisted by Mr. Sormongar S. Zwuen, national consultant for strategy development. Messrs. Benjamin Karmorh and Jerome Nyenka (he replaced Mr. Joseph K. Boiwu who resigned in order to take a new assignment at the FAO) worked very well with Mr. Zwuen under the supervision of the Lead National Consultant, Mr. Ben Turtur Donnie. The maps were prepared at the GIS Laboratory of Fauna and Flora International.

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For those who are not mentioned, you are not less important. Every one of you played a meaningful role.

UNDP provided overall guidance and direction for the project as implementing agency for Global Environment Facility (GEF), and provided administrative and technical support to the staff. Facilities at UNDP including office space, pouch, internet and telephone were at the disposal of the project. UNDP later hosted the national and international consultants

LIST OF ACRONYMS

ACDB	Agricultural Cooperative Development Bank
ACL	Alliance for Conservation in Liberia
ACS	American Colonization Society
AEL	Association of Environmental Lawyers (Green Advocates)
AFELL	Association of Female Lawyers of Liberia
AGRHA	Action for Greater Harvest
BMA	Bureau of Maritime Affairs
BSAP	Biodiversity Strategy and Action Plan
CARDA	Clan Agriculture and Rural Development Association
CARI	Central Agricultural Research Institute
CBD	Convention on Biological Diversity
CEEB	Concerned Environmentalists for the Enhancement of Biodiversity
CEEP	Center for Environmental Education and Protection
CI	Conservation International
COP	Conference of the Parties
CRS	Catholic Relief Services
CUC	Cuttington University College
DBP	Don Bosco Polytechnic
ECOMIL	Economic Community Mission in Liberia
ECOMOG	Economic Community Monitoring Group
ECOWAS	Economic Community of West African States
EIA	Environmental Impact Assessment
EIS	Environmental Impact Studies
EPA	Environmental Protection Agency
ERADRO	Environmental Relief and Development Research Organization
EU	European Union
FACE	Farmers Associated to Conserve the Environment
FAO	Food and Agriculture Organization of the United Nations
FAWE	Forum for African Women Educationalist
FDA	Forestry Development Authority
FFI	Fauna and Flora International
FGM	Female Genital Mutilation
GDP	Gross Domestic Product
GECOMSA	Grand Gedeh Community Servant Association
GEF	Global Environment Facility
GNP	Gross National Product
GOL	Government of Liberia
IBA	Important Bird Area
IGNU	Interim Government of National Unity
IMF	International Monetary Fund
ITTO	International Tropical Timber Organization
IUCN	International Union for the Conservation of Nature and Natural Resources
LAC	Liberia Agriculture Company
LCD	Least Developed Countries
LCDF	Liberia Community Development Foundation

LEC	Liberia Electricity Corporation
LIFE	Liberia Indigenous Forum for the Environment
LIFZA	Liberia Industrial Free Zone Authority
LIMINCO	Liberia Mining Company
LINACIE	Liberia National Christian Institute for Epilepsy
LMBD	Land Area Protected to Maintain Biological diversity
LNP	Liberia National Police
LPMC	Liberia Produce Marketing Corporation
LPRC	Liberia Petroleum Refining Company
LRRRC	Liberia Refugee Repatriation and Resettlement Commission
LTA	Liberia Timber Association
LURD	Liberia United for Reconstruction and Democracy
LWI	Liberia Women Initiatives
LWSC	Liberia Water and Sewer Corporation
LWS/LW	Lutheran World Service/World Federation
MARWOPNET	Mano River Women Peace Network
MCC	Monrovia City Corporation
MDG	Millennium Development Goals
MDA	Mineral Development Agreement
MFA	Ministry of Foreign Affairs
MIA	Ministry of International Affairs
MICAT	Ministry of Information, Culture and Tourism
MLME	Ministry of Lands, Mines and Energy
MOA	Ministry of Agriculture
MODEL	Movement for Democracy in Liberia
MOD	Ministry of Defense
MOE	Ministry of Education
MOHSW	Ministry of Health and Social Welfare
MOJ	Ministry of Justice
MPW	Ministry of Public Works
MRD	Ministry of Rural Development
NAWOCOL	National Women Commission of Liberia
NBSAP	National Biodiversity Strategy and Action Plan
NEAP	National Environmental Action Plan
NECOLIB	National Environmental Commission of Liberia
NGO	Non-governmental Organization
NHSB	National Housing and Savings Bank
NIC	National Investment Commission
NPA	National Port Authority
NPFL	National Patriotic Front of Liberia
NPRAG	National Patriotic Reconstruction Assembly Government
OTC	Oriental Timber Company
PEA	Periodic Environmental Audit
POCAL	Pollution Control Association of Liberia
POP	Persistent Organic Pollutants
PRC	People's Redemption Council

SAED	Society Against Environmental Degradation
SAMFU	Save My Future Foundation
SCNL	Society for the Conservation of Nature of Liberia
S.E. Asia	South East Asia
S.E. Liberia	South East Liberia
SNP	Sapo National Park
SPFS	Special Programme for Food Security
SOLF	Society of Liberian Foresters
SRPS	Small Holder Rice Seed Project
UK	United Kingdom
UL	University of Liberia
ULIMO	United Liberation Movement in Liberia
UMCAP	United Methodist Church Agriculture Programme
UMCOR	United Methodist Commission on Relief
UMU	United Methodist University
UNCED	United Nations Conference on Environment and Development
UNMIL	United Nations Mission in Liberia
URFA	Union of Rural Farmers Association
VILAB II	Virology Laboratory of the New York Blood Center
WARDA	West Africa Rice Development Association
WIPNET	Women in Peace Building Network
WVL	World Vision Liberia
WWF	World Wide Fund for Nature

GLOSSARY

Agrochemicals:

Substances or mixtures of substances intended for preparing, destroying or controlling plants and animal diseases, including vectors of plants or animal diseases causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal foodstuffs or which may be administered to animals for the control of insects, arachnids or other pest in or their bodies.

The term includes chemical fertilizers, agricultural limes and substances intended for use as plant growth regulators, defoliant, desiccants, or agents for thinning fruits or agents preventing the premature fall of fruits, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport.

Agro-forestry

Is defined as a dynamic ecologically based, natural resource management practice that, through the integration of trees and other tall woody plants on farms and in agricultural landscape, diversifies production for increased social, economic and environmental benefits. One of the benefits of agro-forestry is its contribution to the conservation of biodiversity, especially in the tropics, by reducing the pressure to deforest remaining forest land and degrade forest through the unsustainable extraction of forest resources; providing suitable habitat for forest-dependent plant and animal species; and by creating a biodiversity-friendly matrix to facilitate movements among existing patches of natural habitat and buffer them against more hostile uses.

Agro-biodiversity (agriculture biodiversity)

includes all components of biological diversity of relevance to food and agriculture and all components of biological diversity that contribute to sustaining the key functions of agro-ecosystems. It follows that agro-biodiversity has two levels: (1) genetic resources for food and agriculture-this encompasses all cultivated and domesticated species, including their wild relatives and managed stocks of wild animals and plants; (2) components of agro-biodiversity that provide ecological services. This includes, for instance, beneficial organisms that control pests, soil organisms that process nutrients for crop plants, pollinators, and plants that contribute to controlling erosion or stabilizing water balance. Agro-biodiversity is the outcome of thousands of years of effort by farmers in selection and breeding, in developing appropriate production systems and methods.

Biodiversity

is defined by the convention on biological diversity (CBD) as “the variability among living organisms from all sources including, inter-alia, terrestrial, marine and other aquatic ecosystems and the ecological processes of which they are part;

There are three levels of biodiversity.

- a) **Biodiversity at the genes level:** this is genetic biodiversity, and this refers to the hereditary variation within species, that is the genetic differences among

populations of a single species and among individuals within a population. Genes are the principal units of heredity, passed from an organism to its offspring.

- b) **Biodiversity at the species level:** this is the variation within and among taxonomically distinguished species, whether wild or domesticated. Species are given distinct scientific names and the number of species varies among taxonomic groups, such as families or classes and from one geographic area to the next.
- c) **Biodiversity at the ecosystems level:** this is the variation between and among different ecosystems. The composition, structure and functions of an ecosystem affect biodiversity greatly. Ecosystem diversity describes the multiplicity of interactions among living things.

Indicators

are measures designed to monitor systemic changes resulting from policy decisions, or to monitor progress in meeting project objectives. Indicators are also designed to highlight trends and detect changing conditions in the economic, social or environmental systems in a given jurisdiction. Indicators must be measured consistently through time and should be linked to the impacts of project activities.

Participatory monitoring and evaluation

involves key actors; that is, the stakeholders and beneficiaries, in the collective examination and assessment of progress made in a biodiversity project. A participatory evaluation places more emphasis on the process than the final report. The purpose of a participatory monitoring and evaluation is not only to fulfil a bureaucratic requirement, but also to develop the capacity of stakeholders to assess their biodiversity and be responsible for its sustainability.

Traditional Knowledge

is used to describe any knowledge, innovation, or custom of indigenous, tradition-based local communities that is of relevance in ensuring the conservation and sustainable use of biodiversity. Knowledge developed over centuries is a collective good of the communities in question and is passed on from generation to generation in the form of stories, songs, cultural values, traditional laws, social languages, rituals, healing arts and agricultural practices. Indigenous peoples and traditional communities often have a deep understanding of their environment and its ecology through traditional knowledge. Reference is made to indigenous and local communities in the preamble to the CBD and in four of its articles. In Article 8(j), it urges respect for, and the preservation and maintenance of, traditional knowledge of indigenous and local communities that is of relevance to the conservation and sustainable use of biodiversity.

EXECUTIVE SUMMARY

The Republic of Liberia is situated on the southwest corner of the West Coast of Africa between longitude 7^o30' and 11^o30' west and latitude 4^o18' and 8^o30' north. It covers a surface of about 111,370 km² (about 43,506 square miles). The dry land extent is 96,160 sq. km or 37,570 sq. miles. Liberia is limited on the west by Sierra Leone, on the north by Guinea, on the east by Côte d'Ivoire and on the south by the Atlantic Ocean. Total land boundaries extend to 1,585 kilometers (990 miles)- Guinea, 563 kilometers (352 miles), Cote d'Ivoire, 716 kilometers (446 miles), Sierra Leone, 306 kilometers (191 miles).

There are four topographical regions with each having its own distinct physical features and height above sea level. Along the Sea Coast is the Coastal Plain of 350 miles (560 km), an almost unbroken sand strip, which starts from the lowest elevation up to 30 meters above sea level. Next to the Coastal Plain is the Belt of inundated plateaux followed by the Belt of high lands and rolling hills in the north and northwest. The highest elevation is the Northern Highlands, which includes mount wutivi (1350 meter), the maximum elevation in Liberia.

The population was estimated at 2.7 million inhabitants by 2001, with annual birth rate of 3%. The population density is about 28 persons per square kilometer or 71 persons per square mile, the lowest compared to the immediate neighbors. According to the 1974 census, 29.1% of the population lived in urban areas and 70.9% were rural dwellers. By 1984 more people lived in urban communities (1981 it was 37.1%). Migration from the rural areas to the capital city and other large urban centers is a characteristic of Liberia's population dynamics especially throughout the civil strife. In 1984, it was estimated that 44% of the population composed of people under 15 years of age. The female population (51%) is higher than the male counterpart (49%), but there are more literate males than females.

Liberia lies about six degrees above the equator, and this equatorial position puts the sun almost overhead at noon throughout the year, giving rise to intensive insolation in all parts of the country, a consequence of high temperature with little monthly variation. Notwithstanding the temperature would have been much higher had it not been for the effect of the degree of cloud cover, air, humidity and rainfall, which is influenced by the luxurious vegetation cover of the country. The Atlantic Ocean also has an additional ameliorating effect on the temperature along the coast with maximum annual and daily variations.

Average annual rainfall along the coastal belt is over 4000 mm and declines to 1300 mm at the forest-savanna boundary in the north (Bongers, F et al, 1999). Relative humidity is generally high throughout the country; on the coastal belt it does not drop below 80% and on the average is above 90%. There is a wider variation in the interior; it may fall below 20% during the harmattan period, which runs from December to February. A relative air humidity of 90% to 100% is common during the rainy season. During the dry season it decreases between 80% and 85%.

Liberia's economy is largely dependent on extractive industries, and thus, foreign exchange earnings are derived largely from sales of timber, rubber, gold and diamond. Iron ore is another mineral on which the country's economy depended in the past, but all the mines have been closed down for more than a decade due to the war.

Despite the small size of Liberia, it is a biodiversity significant country. There are over 2000 flowering plants (225 timber species), 600 bird species, 150 mammals and 75 reptiles. By the end of the 2nd millennium Liberia contained 42% of the Upper Guinea Forest of West Africa; the largest portion possessed by a single country in the region as Guinea has 8%, Ivory Coast 28%, Ghana 16%, Sierra Leone 5% and Togo 1%.

The once continuous tracts of forests in Liberia are now isolated from each other and fragmented into blocks largely due to shifting cultivation and human settlements. Logging and road infrastructure have also contributed to the fragmentation. There are two distinct blocks of forest remaining in Liberia, and these blocks represent the only forest blocks within the Upper Guinea Forest Region. They are the evergreen forest block in the southeast and the semi-deciduous block in the north. There is a distinct transitional zone of disturbed forest vegetation mostly along the Nimba-Monrovia corridor, which is becoming further dissected by the advances of shifting cultivation.

There has been very slow progress in the establishment of protected areas in Liberia. The first protected area, Sapo National Park, was proclaimed in 1983, and two additional areas (Mount Nimba Nature Reserve and East Nimba National Park) were declared by the Government in October, 2003.

Conservation of Biodiversity in Liberia is increasingly hampered by several threats to the very biodiversity. The threat to Liberia's biodiversity is due to several factors, such as the absence of some basic data. There has been no comprehensive taxonomic survey and no land-use feasibility study. Consequently, there is no land-use planning.

The threats include population pressure, especially due to the movement of displaced people and refugees, who use biological resources for food, shelter and energy. The age-old method of farming (shifting cultivation), poaching and hunting, in association with unregulated timber extraction continue to threaten biodiversity. Other threats include soil erosion, mining, firewood gathering, charcoal production (due largely to the absence of public electricity over a long period of time), invasive species, inappropriate use of agrochemicals, ignorance, lack of or insufficient public education and awareness and inadequate law enforcement.

In recent years there has been growing realization of the need to conserve biodiversity in Liberia. People have spoken out on ills to biodiversity and there have been many forums to address concerns for biodiversity conservation. The Government of Liberia has cooperated by taking several positive measures aimed at addressing the issues. In 1999 the Government, with the assistance of UNDP, established the National Environmental Commission of Liberia (NECOLIB) and mandated that body to oversee all environmental activities in the country and serve as the coordinating institution for the environment and come up with policy and legislative arrangements for the environment. NECOLIB

drafted the National Environmental Policy of Liberia, the Environment Protection and Management Law and the Environment Protection Agency Act. The three legal documents were enacted by the national legislature and approved by the President. As a consequence of this the Government of Liberia created the Environmental Protection Agency (EPA) in December 2003. A State of the Environment (SOE) Report is in progress also.

National environmental NGOs, with assistance from Conservation International, organized themselves into a body named and styled Alliance for Conservation in Liberia (ACL). The intention of that arrangement is to ensure that all local NGOs get involved in conservation of biodiversity without overlapping of functions.

The Government of Liberia faces some major challenges in its drive to cooperate with environmentalists and conservationists. One of the major challenges is to ensure that environmental plans and policies, such as the NBSAP are integrated into the overall national development plan. This would require Government exerting political will at all levels of environmental management. Another challenge facing the Government is to ensure that there are concerted efforts from academic institutions, the private sector, NGOs, CBOs, PVOs and the public in general.

Considering the threats to Liberia's biodiversity, coupled with challenges facing the Government, and desire of the people to conserve what is remaining of our fragile ecosystems, it is very imperative that strategies, plans and programmes be instituted as part of the national development plan, aimed at conserving Liberia's incredible biodiversity from a regional perspective. There is a need for complete information on what is happening to biodiversity in the country, and this is illustrated by the gaps in the country report.

Finally, there is a strategy and action plan, which comprises two components: the vision statement, the guiding principles, the goals and objectives on one hand and the Actions for Biodiversity conservation, sustainable use and benefit sharing on the other. The goals and objectives are developed in consonance with the guiding principles. Six goals are developed upon which all the actions are based. Priority areas for immediate actions are Land Rehabilitation, Forestry Sector Reform, Timber Management, Poverty Alleviation, Food Security, Addressing Bushmeat Crisis, Restoration of Electricity, Environmental Impact Assessment, Addressing Coastal Erosion and Mangrove Destruction and providing alternative sources of Protein.

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1. INTRODUCTION

The need for a biodiversity strategy and action Plan for Liberia is overwhelming. The ever increasing population, with more than 70% being rural dwellers who depend principally on biological resources for their livelihood and the lack of land use planning, coupled with minimum coordination among relevant institutions illustrates the dire need of a plan that can address the attending consequences of the above.

1.1 The United Nations Convention on Biological Diversity

Cognizant of the catastrophic consequences of biodiversity loss, the international community in the late 1980s negotiated a Treaty, the United Nations Convention on Biological Diversity (CBD). The CBD text was agreed on 22 May 1992 in a UNEP organized conference in Nairobi, and the Convention entered into force at the end of 1993. It was not until 1999 that work began in earnest to operationalize these provisions. The result is the Bonn Guidelines on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising out of their Utilization. The guidelines are so named because of the location of the intergovernmental meeting in October 2001 that prepared the first draft, which was eventually adopted, with some changes, by the Conference of the Parties to the Convention at its sixth meeting, held in The Hague, The Netherlands in April 2002. The three objectives of the Convention are:

- a) The conservation of biological diversity;
- a) The sustainable use of its components; and
- b) The fair and equitable sharing of benefits arising from the utilization of genetic resources.

The Convention was adopted and opened for signature on 5 June 1992 at the Earth Summit, formally known as the UN Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil. The Convention on Biological Diversity provides a comprehensive framework for stopping biodiversity loss. It is a carefully balanced, legally binding international treaty that commits Parties to the triple objective outlined above. The last objective is of particular importance to developing countries like Liberia, as they hold most of the world's biodiversity but feel that, in general, they do not obtain a fair share of the benefits derived from the use of their resources for the development of products such as high yielding varieties, pharmaceuticals and cosmetics. Such a system reduces the incentive for the world's biologically richer but economically poorer countries to conserve and sustainably use their resources for the ultimate benefit of everyone. The Convention sets out commitments for national and international measures aimed at preserving the vital ecosystems and biological resources on which we all depend.

Article 15 of the Convention addresses the terms and conditions for access to genetic resources and benefit sharing. It recognizes the sovereignty of states over their natural resources and provides that access to these resources shall be subject to the prior informed consent of the Contracting Party providing such resources. It also provides that access shall be based on mutually agreed terms in order to ensure the sharing of benefits arising from the commercial or other utilization of these genetic resources with the Contracting Party providing such resources.

Article 8 of the Convention, IN-SITU CONSERVATION, mandates each contracting party to:

- a) Establish a system of protected areas where special measures need to be taken to conserve biological diversity – 8(a)
- b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity – 8(b)
- c) Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, inter alia, through the development and implementation of plans or other management strategies –8(f)
- d) Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats and species – 8(h)
- e) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity – 8(j)

The third meeting of a working group on traditional knowledge was convened in Montreal, Canada 8-12 December 2003, and delegates developed guidelines for the social, cultural and environmental impact assessment for the respect, maintenance and protection of traditional knowledge, practices and innovations.

Article 8(j) addresses knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant to the conservation and sustainable use of biological diversity. The Conference of the Parties (COP) has established that participation by indigenous groups cannot be achieved simply by issuing invitations. Parties must accept that this involves capacity-building and incentive measures, which require financial outlay and considerable political will. The Conference has called for the establishment of baseline indicators for the state of retention of traditional, local and indigenous knowledge.

The Government of Liberia signed the Convention on 12 June 1992 and ratified it on 8 November 2000 as the 179th party.

The World Summit on Sustainable Development held in Johannesburg, South Africa in 2002, in its plan of implementation, calls for significant reduction in biodiversity loss by the year 2010. This is referred to as the 2010 target for reversing biodiversity loss. Liberia participated in that Summit and subscribes to the 2010 target. As a commitment to that ideal, development of a national biodiversity strategy and action plan is a way forward. Some key obligations of contracting parties under Article 6 of the Convention stipulate that each contracting party shall, in accordance with its particular conditions and capabilities:

- Develop national strategies, plans or programs for the conservation and sustainable use of biological diversity or adopt for this purpose existing strategies, plans or programs, which shall reflect, inter alia, the measures set out in the Convention relevant to the contracting party concerned; and
- Integrate as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programmes and policies.

The Conference of the Parties (COP) to the Convention on Biodiversity directed the Global Environment Facility (GEF) to provide funds for the preparation of National Biodiversity Strategy and Action Plans (NBSAPs). The principle of NBSAP preparation is that national Governments are fully responsible for NBSAP formulation in adherence to Article 6 of CBD. Liberia Biodiversity Strategy and Action Plan is also derived from growing realization that conservation and sustainable use of biological resources would be amenable to sustainable development.

Liberia's biodiversity is under severe threat with rapid loss and decimation of species and habitats that are jeopardizing future development of the country. Biodiversity loss in Liberia is of regional concern because Liberia still holds the last remaining two blocks of the Upper Guinea Forest Ecosystem of West Africa. As we well know, most of the biodiversity in this region is held by the forest. Therefore, further significant loss of biodiversity in Liberia would have adverse consequences for conservation of biodiversity in West Africa.

1.2 Institutional Arrangements

The National Environmental Commission of Liberia (NECOLIB) was created in 1999 with the mandate to co-ordinate environmental management activities, including conservation of biological diversity. NECOLIB also oversees the activities of environmental NGOs for a better coordination of efforts and to avoid duplication.

Before the establishment of NECOLIB the Government of Liberia had several ministries and agencies sharing national responsibilities relating to the environment. They include the Ministry of Lands, Mines and Energy (MLME), the Ministry of Agriculture (MOA), the Ministry of Health and Social Welfare (MOHSW), the Ministry of Internal Affairs, the Monrovia City Corporation, and the Forestry Development Authority (FDA).

NECOLIB is the focal institution for the Convention on Biological Diversity, the Cartagena Protocol on Biosafety, United Nations Framework Convention on Climate Change and its Kyoto Protocol, and the Stockholm Convention on Persistent Organic Pollutants (POPs). To implement the Convention on Biological Diversity, NECOLIB requested and obtained financial support from the Global Environment Facility (GEF) to implement the project, Liberia's National Biodiversity Strategy And Action Plan (Liberia's NBSAP).

Under the guidance of the Ministry of Planning and Economic Affairs, NECOLIB established a steering committee of 25 members and a planning team of 10 members drawn from relevant ministries and agencies of Government, academic institutions, local and international non-governmental organizations and other stakeholders. They supervised the work of a national project coordinator, who was recruited as a full time national lead consultant. The formulation of the NBSAP was monitored by the steering committee, which was chaired by the representative of the Ministry of Planning and Economic Affairs. The NBSAP received technical support from several long-term and short-term national consultants and one international consultant.

1.3 Methodology for the Development of the NBSAP

1.3.1 General Principles and Guidelines

Following the guidance by CBD and COP the NBSAP process needs to be participatory, adaptive and cyclical. First BSAP needs to involve country stakeholders and interest groups to become participatory. Also it needs to be adaptive; that is to meet current and evolving challenges in the country and following rising new opportunities and advancement of science. Finally, it needs to be cyclical; that is to go through an iterative process to be improved at all times whenever needed, and to repeat the whole strategic planning process often to adapt it to evolving situations.

Hence, for its formulation, biodiversity strategy needs to get from current bad situation, created by threats to biodiversity, to a better-desired situation depicted through a vision to be achieved in a prospective future. So it needs to initially make a current picture of the bad situation also known as stocktaking. Then the strategy devises a cost effective manner to fill the gap between current bad situation and the desired future vision. A strategy will need to meet threats and their root causes through use of available resources and opportunities, including human, institutional and systemic resources, given cultural, socio-economic constraints and opportunities.

The Country's stakeholders need to commonly agree on a biodiversity vision where they need to be in a given timeframe. A biodiversity vision will need to cover conservation, sustainable use and benefit sharing elements. Also the vision needs to be stated in operational terms; that is, with benchmarks for monitoring and evaluating progress throughout implementation of a biodiversity strategy and its action plan.

1.3.2 Formulation of the NBSAP

The formulation of the NBSAP was the result of concerted efforts by many actors from June 2002 to February 2004. These actors were drawn from various sectors of society involved in the management and use of biological resources. They included representatives of the public and private sectors, NGOs, professional experts, academics, farmers and researchers. Major institutions represented were the Forestry Development Authority (FDA), the Ministry of Agriculture (MOA), Liberia electricity Corporation (LEC), the Ministry of Rural Development, the Ministry of Foreign Affairs, the Ministry of State for Presidential Affairs and Liberia Mining Corporation (LIMINCO).

The formulation of the NBSAP went through several stages, namely:

1. Official launching of the project;
2. Stocktaking and inventory of biodiversity information;
3. Analysis of the data and identification of options;
4. Introduction and training of planning team members, national consultants and workshop organizers in the techniques of strategic planning in biodiversity management;
5. A three-day participatory national workshop held 17-19 February 2003;
6. Three participatory regional workshops to discuss regional and county plans for the conservation and management of biodiversity; the process was the same as the national workshop;
7. Drafting of the national biodiversity strategy and action plan;
8. A one-day discussion forum involving members of the steering committee and planning team to review the draft strategy and action plan;
9. A second three-day participatory national workshop discussed the draft strategy and action plan 18-20 December 2003; and
10. Submission of the strategy and action plan to the Government of Liberia for adoption.

Throughout these stages the NBSAP was formulated in a participatory manner. Collection and analysis of biodiversity information and stakeholders consultation were key components of this participatory process. First, stocktaking information was collected from various sources, including local institutions such as public and university libraries, field tours and access to the Internet. For local institutions, the project management made contacts and formal requests and the requested information was made available to the national and short-term consultants. Also field tours were undertaken to collect and verify the information on the ground. Consultants visited Firestone Plantations Company, Liberia Agriculture Company (LAC), OTC, Nimba, Sinoe, Rivercess, Grand Bassa Counties, Mangrove Swamps, and beaches. Information available outside the country was accessed through the use of Internet.

Secondly, for stakeholder consultation, the national and short-term consultants summarized the collected information into working documents that were submitted to two national and three regional workshops for deliberations and improvement. The first national workshop took place in Monrovia from 17 to 19 February 2003 and assembled 150 stakeholders and representatives of different segments of society. The workshop took a retrospective account of Liberia's biodiversity and threats to it with a view to design an integrated and collaborative approach for an overall strategic plan of action to respond to threats following national opportunities and constraints. Three regional workshops were also organized for the counties between 2 to 8 May 2003, and they regrouped stakeholders from the 15 political sub-divisions of Liberia. The second national workshop took place in Monrovia from 18 to 20 December 2003. To ensure participation, the workshops were organized as follows: (i) opening ceremony and plenary sessions; (ii) group discussions and resolutions; and (iii) presentation and adoption of resolutions in a closing plenary session.

2. PRESENTATION OF LIBERIA

Liberia is a 'garden of Eden' in West Africa: It has the largest fraction of the tropical rainforest in the region and is traversed by several rivers. The variation in daily temperature is very minimal, and there is some rain every month of the year. Its altitude ranges from 0m at sea level to more than 1400m on Mount Wutivi in the northwestern highlands.

2.1 Geographical Context

2.1.1 Situation and Delimitation

The Republic of Liberia is situated on the southwest corner of the West Coast of Africa between longitude $7^{\circ}30'$ and $11^{\circ}30'$ west and latitude $4^{\circ}18'$ and $8^{\circ}30'$ north. It covers a surface of about 111,370 km² (about 43,506 square miles). The dry land extent is 96,160 sq. km or 37,570 sq. miles. Liberia is limited on the west by Sierra Leone, on the north by Guinea, on the east by Côte d'Ivoire and on the south by the Atlantic Ocean. Total land boundaries extend to 1,585 kilometers (990 miles)- Guinea, 563 kilometers (352 miles), Cote d'Ivoire, 716 kilometers (446 miles), Sierra Leone, 306 kilometers (191 miles).



There are four topographical regions with each having its own distinct physical features and height above sea level. Along the Sea Coast is the Coastal Plain of 350 miles (560 km), an almost unbroken sand strip, which starts from the lowest elevation up to 30 meters above sea level. Next to the Coastal Plain is the Belt of inundated plateaux followed by the Belt of high lands and rolling hills in the north and northwest. The highest elevation is the northern highlands, which includes Mount Wutivi (1350 meter), the maximum elevation in Liberia.

Figure+ 1: Topographical Regions of Liberia

2.1.2 Climate and Hydrology

Liberia's equatorial position puts the sun almost overhead at noon throughout the year giving rise to intensive insolation in all parts of the country, a consequence of high temperature with little monthly variations. Notwithstanding the temperature would have been much higher had it not been for the effect of the degree of cloud cover, air, humidity and rainfall, which is influenced by the luxurious vegetation cover of the country. The Atlantic Ocean also has an additional ameliorating effect on the temperature along the coast with maximum annual and daily variations. As a whole, the temperature over the country ranges from 27°C to 32°C during the day and from 21°C to 24°C at night. High altitude explains a pleasant climate near the Guinean border.

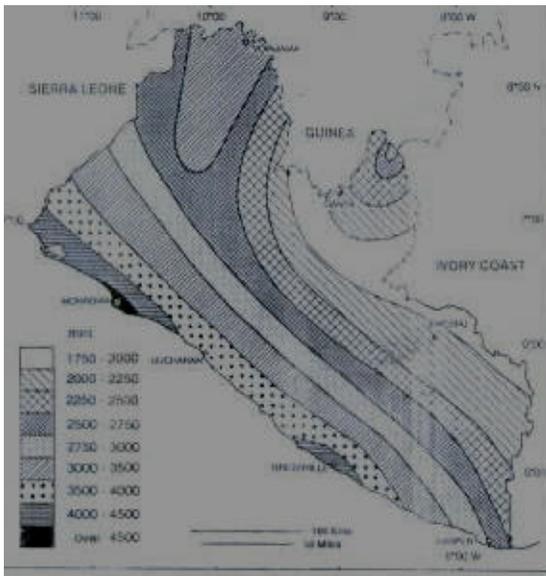


Figure 2: Annual rainfall distribution across Liberia

The Country has two seasons: raining and dry seasons. The dry season lasts from mid-November to mid-April; raining season from mid- April to late October. Average annual rainfall along the coastal belt is over 4000 mm and declines to 1300 mm at the forest-savanna boundary in the north (Bongers, F et al, 1999). Relative humidity is generally high throughout the country; on the coastal belt it does not drop below 80% and on the average is above 90%. There is a wider variation in the interior; it may fall below 20% during the harmattan period.

A relative air humidity of 90% to 100% is common during the rainy season. During the dry season it decreases between 80% and

85%. In March and February the driest period of the year, relative air humidity decreases to as low as 65%.

Total wind speed is greatest in the rainy season and lowest in the dry season. However, there are local variations, with the coastal area having much more wind than the interior of the country. The low wind speed in the interior can be attributed to the vegetation cover. The largest recorded wind speed (45 miles/hour) has been in Buchanan, a coastal city.

The inter-tropical Front, which is the boundary of the air masses, moves south. Also Harmattan influences the climate of much of West Africa, it blows from the Sahara Desert, and reaches Liberia at the end of December with low relative humidity percentage. It brings along a considerable amount of dust and low and chilly temperatures during the night.

The equatorial position and the distribution of high and low pressure belts over the African continent and the Atlantic Ocean influence the climate of Liberia. Rainy and dry seasons with a transitional period can be distinguished. The months of heaviest rainfall are June, July and September. Notwithstanding the rainy season lasts from late April to October. The dry season begins in November and ends early April.

It does not rain continuously during the rainy season. It is common to have sunny days during the months when the rain is heaviest. This is also true for the dry season; there are some rainy days during the dry season. The rainfall ranges from 2000 to 4000 mm/year with an average of 2,372mm.

The internally produced renewable water resource is estimated at 200km². This amount of water is drained into the Atlantic Ocean by two-river systems. The major basins drain the territory in a general northeast –southwest direction. There are six major rivers, which drain the country with north-south pattern: Mano, St. Paul, Lofa, St. John, Cestos and Cavalla. They drain 66% of the country. The short coastal watercourses drain about 3% of the country and include by not limited to the Po, Du, the Timbo, the Farmington, and Sinoe rivers (see map, rivers of Liberia).



Figure 3: Mouth of the Sinoe River near the Coast in Greenville

2.1.3 Geology

The rocks of northern Liberia generally form part of the West Africa Craton, recognized by its stability and general absence of tectonic activity during the last 2.5 billion years. This old and stable base was subsequently penetrated by younger rocks and then covered by metasedimentary and metavolcanic rocks of at least two younger tectonic events

Table 1: General Stratigraphy of Rocks

Tectonic Period	Type of Rock	Age (million years)
Liberian Age	Metamorphic and Igneous Rocks	2,500-3,000
Eburnean Age	Metamorphic and Igneous Rocks	2,150+ 100
Pan-African Age	Metamorphic and Igneous Rocks	600+100
Post Pre-Cambrian	Unmetamorphosed Sedimentary Rocks and Igneous Intrusives	Less than 600

The rocks of Liberian Age extend into neighboring Sierra Leone, Guinea, and Ivory Coast and predominately are highly foliated granitic gneisses exhibiting a regional foliation and structural alignment in a northeasterly direction.

Major faults along sections of the Lofa and the St John River are parallel to regional lithological units and have significantly influenced present topography. Massive unfoliated to weakly foliated granitic rocks exist over large areas in the extreme north of the country. Within the Liberian Age Province are Metasedimentary rocks, such as quartzites, amphibolites, pelitic schists and banded ironstones technically called itabarite. Granitic gneisses and the metasedimentary rocks have been intruded by numerous northwest trending diabase dikes. These are parallel to the coast and represent intrusive activity associated with the onset of continental break-up in Jurassic time.

Rocks of Eburnean Age are restricted to southeast Liberia where they extend into the Ivory Coast. Their structural trend is similar to those of the Liberian Age Province but is more biotite rich. A major tectonic feature within rocks of the Eburnean Age province is the Dube shear zone. It intersects the coastline about 40km west of Harper and strikes a NNE direction into the Ivory Coast. It is 2 to 3km wide and has been delineated on the basis of outcrops, topography and magnetic data.

Rocks of the Pan-African Age are found along the coast from northwest of Greenville in the southeast to Sierra Leone. Unlike the northeastern regional trends of both the Liberian and Eburnean Age Provinces, structural trends within the Pan-African Province generally are northwesterly and parallel to the coastline. The rock types in this province range from basic igneous to pelitic rock metamorphosed to the granulite and amphibolite grades.

The Post Pre-Cambrian rocks in Liberia outcrop principally along the low-lying coastal area between Monrovia and Buchanan. Two onshore, sediment-filled basins also are located along this section of the coastline: the Roberts Basin filled with sediments of the Farmington River formation and Paynesville sandstone, and the Bassa Basin filled with material from the St John River Formation.

Rocks found in Liberia have been of economic importance and should continue to be in the future. Crystalline Rocks (igneous and metamorphic) are used locally in the construction industry as roadbed materials in building construction and as foundation stones in building construction. Post Pre-Cambrian rocks are used in the building industry where beach and river sands form the major constituents in the manufacture of concrete blocks.

2.1.4 Coastline and Maritime Claims

The Liberian coast is pounded by powerful surf, which has produced a relatively straight coastline with many lagoons. The coastline is 350 miles long (560 km), characterized by an unbroken sand strip. The width of the coastal plain varies from 16-40 km and most of its land mass has an elevation of 9-30m. Most rivers flow slowly over the plain in large meanders and then widen near their estuaries. The territorial water is about 159,200 sq. km. (70,000 Sq. miles), larger than the land area of the country.

2.1.5 Relief and Soils

Several physiographical zones that roughly run parallel to the coastline characterize the relief of Liberia, which gains altitude gradually north away from the coast. These are respectively: the coastal plains, the rolling hills; the plateaux and mountain ranges and the northern highlands.

The coastal plain is characterized by a relatively straight coastline with sand bars and long beaches (with a near unbroken sand strip), salt and fresh water lagoons and a few promontories like Cape Mount, Cape Mesurado and Cape Palmas. These promontories and beaches together with Lake Piso and Lake Shepherd are points of high attraction and could play an important role in future tourist promotion program of the country. The belt of rolling hills parallel to the coastal zone has elevation in the order of 90m. There are numerous hills, valleys and watercourses in this zone. It is forest covered in Grand Cape Mount County and in the eastern part of the country. Most of the private agricultural concessions are located in this belt where both agriculture and forestry are favored by the prevailing topographical and climatic conditions.

The plateaux and mountain ranges are behind the rolling hills. The plateaux reach heights up to 300m and the mountain ranges up to 600m. Important ranges are the Mano River Mountain, the Bea, Bong, Gibi, Kpo, Putu and Tienpo ranges. The greatest width of this zone is about 130km between the Lofa and St. Paul Rivers. Within this area farming dominates the different forms of causes for biodiversity loss. Logging is but slightly hindered by relief in the eastern part of the country. Exploitation of forest is more difficult in central and Upper Lofa County, however, because of topographic conditions. The northern highland zone is situated in Upper Lofa and Nimba Counties and comprises Wologisi range with a height of 1,350m and Nimba range with an elevation of 1,385 meters on the Liberian side, as the mountain is shared by Cote d'Ivoire, Guinea and Liberia.

Generally, three types of soil types can be distinguished in Liberia, the Lateritic soils or latosols, Sand soils or Regosols and Swamp soils. The Lateritic soils cover about 75% of the country. They are reddish-brown in color and quite hard. The high temperature and rainfalls dissolve aluminum, iron and nitrates which are subsequently washed down into the lower layers; in the dry season the water is drawn to the surface by capillary attraction, taking with it oxides of iron and aluminum. When the water evaporates these are left on the surface where they harden. The soils have been classified into seven types, named after places of occurrence, such as Kakata, Suakoko and Voinjama. They are very acidic and lacking in nitrogen. Thus continuous farming requires the constant use of fertilizers. However, Latosols are more productive for agriculture purposes than most

other soils in the country. Normally, latosols are not very well suited for agriculture due to their low humus contents on one hand; on the other they provide valuable materials for road construction.

Sandy soils or regosols consist of more than 60% coarse and fine sand and contain a small amount of clay. The white to gray color of the sand which predominates on the coastal plain and up to about 16km from the sea contains little humus and mineral nutrients, they are porous and also do not retain moisture, hence they are not fertile and only suitable for pastures, oil and coconut palms.

Swamp soils are found along the coast and in the interior; they account for about 4% of all soils. The most frequent are the water logged gray hydromorphic soils in the floors of the valley, which are flooded in the rainy season. Swamp soils also include a so-called half-bog soil. These occur in swampy areas where drainage is poor and the level of water in the upper layer of the soil is high. Consequently, the decay of plant materials is slow and thick dark layer of loamy-peaty organic materials develop which has high humus content. This type of soil, when properly drained, provides good condition for the cultivation of swamp rice and similar crops. This is also true of the mangrove swamp soils that occur in the lagoons, near the mouths of rivers and in the coastal low lands. These soils consist of a series of layers of decaying plant materials, salt, mud, gravel, sand and peat, they could be adapted to large-scale paddy rice production.

In general, Liberian soils are characterized by a shallow layer of humus, a low humus content and high acidity as a result of deficiency in magnesium and calcium.

2.2 Cultural and Socio-Economic Data

2.2.1 Demography and Cultural Settings

2.2.1.1 Demography

The Ministry of Planning and Economic Affairs puts the population in 2002 at 2.7 million with 6.7% fertility rate and average annual growth rate at 2.4%. Human mortality per annum is caused mainly by Malaria 16.5%, Anemia 12.6%, Respiratory infection 12.5%, Diarrhea 5.6%, Hypertension 4.6%, Malnutrition 4.4% and other causes.

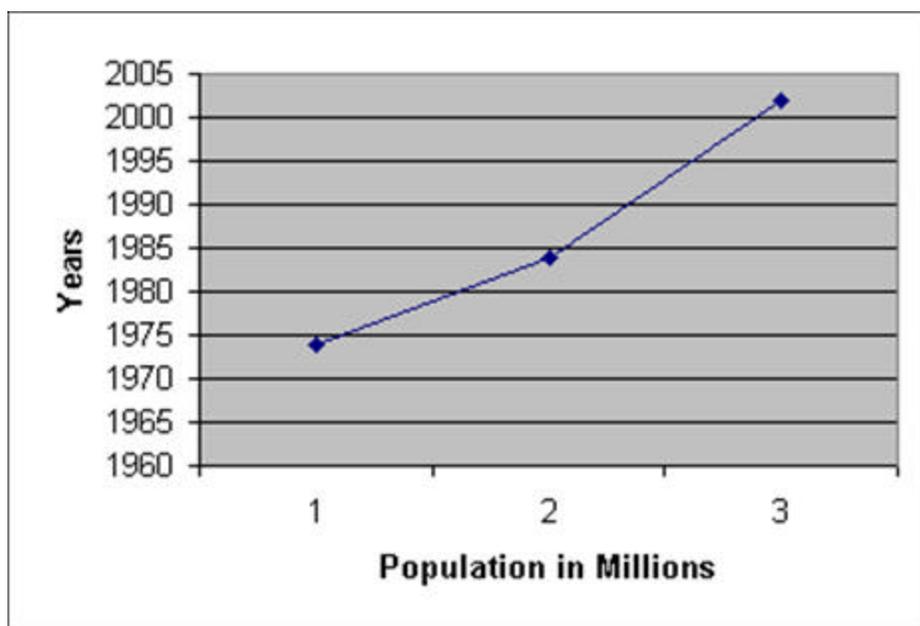


Figure 4: Population Growth over 45 Years

Since 1970 the population of Liberia has been growing at a rate of 3%. Liberia's population in 1974 was at 1.55 million; that is a density of 41 persons per square mile. It rose to 2.15 million in 1984, which equals the density of 57 persons per square mile. In 2002 Liberia's population reached 2.70 million with a density of 71. That density remains lower than those of neighboring states on the West African Coast.

According to the 1974 census, 29.1% of the population lived in urban areas and 70.9% were rural dwellers. By 1984 more people lived in urban communities (1981 it was 37.1%). Migration from the rural areas to the capital city and other large urban centers is a characteristic of Liberia's population dynamics especially throughout the civil strife. Most of the urban people are found in cities along the Atlantic coastline. Monrovia is the largest city with a pre-war population of about 250,000 people. Due to increasing insecurity in many parts of the country, exodus of people into Monrovia has swelled the population to more than one million people.

The population of Liberia is young. In 1984, it was estimated that 44% of the population comprise people less than 15 years of age. The female population is higher than the male counterpart, but there are more literate males than females.

Table 2: Demographic, Social, and Health Indicators

Population	2.7 million
Male Population	- 49%
Female Population	- 51%
Population Growth Rate	- 2.4%
Population Under 5 years	- 54%
Life Expectancy at Birth	- 42 (2002), 36 years (1979)
Total Fertility Rate	- 6.7%
Crude Death Rate	- 17/1000
Infant Mortality Rate	- 134/1000
Maternal Mortality	- 560/100,000
Literacy Rate/% male/Female	- 1995 _ 62/28

Source: Ministry of Planning and Economic Affairs

The population dynamics in Liberia have been a result of a mix of factors. The high rate of natural increase, which is a function of continuing high fertility and a declining mortality rate are due to successful control of endemic diseases. At the same time, there has been high child mortality due to the very diseases and added to the fact that health care delivery has been on the decline.

Rural- to- urban population movements, as well as a high rate of population increase, will continue to have adverse consequences on sustainable use and conservation of biological diversity. During mass movements, the people clear large areas for agriculture and settlements. This movement of the population also results to disease outbreak time and again.

Twenty-one diseases and health conditions are reported monthly from health facilities in Liberia. Eight of them (marked * in Table 3) accounted for 80% of the outpatient morbidity consultation in 1998 (MOHSW Annual Report 1998).

Human mortality in Liberia, causes, number and percentage in 2001 / 2002 are shown in Table-3 below. The 2,493 deaths in 2002/2002 is relatively close to 2,251 in 1983, a difference of 242 deaths.

Table 3: Human Mortality and Causes, 2001/2002

<u>Diseases</u>	<u>Total death</u>	<u>Percentage</u>
1. Malaria *-----	412 -----	16.5%
2. Diarrhea *-----	139 -----	5.6
3. Cholera -----	2 -----	0.08
4. AIDS -----	14 -----	0.6
5. Anemia *-----	314 -----	12.6
6. Respiratory Infection * -----	312 -----	12.5
7. Urinary * -----	11 -----	0.4
8. Pelvic Inflammatory Disease *--	2 -----	0.08
9. Measles -----	22 -----	0.8
10. Neonatal Tetanus -----	59 -----	2.3
11. Tuberculosis -----	31 -----	1.2
12. Pertusis -----	0 -----	0
13. Meningitis -----	42 -----	1.6
14. Hepatitis -----	35 -----	1.4
15. Hypertension -----	116 -----	4.6
16. Injuries *-----	54 -----	2.2
17. Schistosomiasis -----	0 -----	0
18. Orchocercuosis -----	0 -----	0
19. Malnutrition *-----	108 -----	4.4
20. Eye Conditions -----	23 -----	0.9
21. Other -----	797 -----	31.9
Total -----	2,493 -----	100%

Source: Ministry of Health and Social Welfare

2.2.1.2 Cultural Settings

The formation of the Liberian society in the 19th century was characterized by a conspicuous cultural gulf between the settlers who were descendants of slaves and indigenous people. By 1945, that cultural divide was reduced by the emergence of the modern economic sector, thereby breaking down the barriers that had isolated the two groups for long. After this time, new social categories based on occupation, education, and income rather than ethnicity emerged. However, a relatively small group of settlers continued to constitute the elite, but its dominance ended abruptly by a military coup in 1980, which brought into power the indigenous.

Although Liberians inhabiting remote rural areas had been exposed to economic modernization, the traditions of tribal society appeared to have continuing significance for them. At the same time, the American influence is everywhere in Liberia.

There are 16 major ethnic groups. The largest ones are Kpelle in the center, the Kru and Bassa on the coast, the Krahn and Grebo in the southeast and the Lorma in the north. The smaller ethnic groups include Belle, Sapo, Mende, Gbandi, Vai, Mandingo, Gio, Mano, Kissi and Gola. These tribes constitute 97% of the population and the re-settlers are about 3% of the population. English is Liberia's official language, but each ethnic group has its own language.

Animist traditional religion is still practiced by some of the people; Liberia is said to be founded on Christian Principles, however, many other religions have emerged over the years. Islam is now becoming very wide spread, but visible religious activities are mostly among Christians as Liberians are good churchgoers. There is a special handshake, where the right hand's middle fingers are held together between the thumbs and third fingers. This is called the 'snapshake', a sign of freedom, popularized by the re-settlers and is a custom dating back to the independence of the country.

The crafts are carving, particularly from wood of ebony and mahogany. Also there are ritual masks, batik and embroidered clothing as well as metalworkings and basket weavings.

Rice is Liberia's staple food. Cassava, eddoes, sweet potatoes, hot red peppers and bananas also constitute the Liberian diet. There is no national food, but each traditional setting has its local food served to welcome guests. Palm butter is the traditional food of Southeastern Liberia, people in the Northwest traditionally eat cassava leaf and Togborgee is popular among northerners.

2.2.2 Economy of the Country

Liberia's economy is largely dependent on extractive industries primarily rubber, timber, gold, diamond and agricultural crops. About two decades ago, the economy was comparable to other high income earning countries when world market prices of the commodities were considerably high. Besides, there was a flurry of industries, which contributed to the strength of the economy. That situation has changed dramatically due to world recession, and the civil war.

The country is now a low-income nation, with a per capita GNP of US\$188 in 1999 and an annual inflation rate of 14%. In 1999, agriculture and forestry accounted for 61.3% and 13.4% of the GDP, respectively; while mining, services and manufacturing contributed 2.1%, 2.4% and 4.7% to the GDP, respectively (MPEA & IMF, 2003). The primary sector is dominated by agriculture, which comprises rubber, cocoa and coffee, fishery, forestry and other food crops; and mining. The secondary sector is composed mainly of manufacturing, while the tertiary sector comprises electricity, water, transportation, communications, maritime ship licensing registry and services. As indicated in table 10, biological resources especially agriculture and forestry contributed 74.7% of the GDP in 1999.

Rubber is one of Liberia's main export cash crops. It contributes more than US\$57 million annually to export earnings. Production grew in 1999 to 62,705 metric tons (valued at US\$33.3 million) from 48,916 metric tons (valued at US\$28.9 million in 1998) – an increase of 28.2% over 1998. During the year 2000, production of rubber rose to 102,412 metric tons (valued at US\$53.2 million) 63.3% increase over 1999 production. Major rubber concessions include the Firestone Plantations Company, Liberia Agricultural Company, Cocopa Rubber Company, Wealah Rubber Corporation and the Cavalla Rubber Corporation. Besides these concessions there are communal, family and individual production activities wide spread around the country.

Rubber is tapped from *Hevea brasiliensis*, an exotic from Brazil, but over the years there has been some advancement in biotechnology to produce various clones. Many clones were imported into the country, and recently, Firestone and LAC developed their clones in Liberia. Development of clones adds economic value to rubber.

RUBBER CLONES IN LIBERIA

RUBBER CLONES IN FIRESTONE

Developed in Harbel after 1990

Harbel 1
Harbel 10
Harbel 43
Harbel 101
Harbel 115
Harbel 134
Harbel 330
Harbel 1114

Developed in Malaysia prior to 1990

RRIM 600
RRIM 701
RRIM 703
PB 217
PB 235
PB 261
PB 267
PB 551
AV 2037

PR 107

GT 1

RUBBER CLONES IN LAC

GG-3

GG-4

GG-5

GG-6

GT-1

Harbel – 10

RRIM – 600 (from Malaysia) – high yielding and wind resistant

RRIM – 628 (from Malaysia) – high yielding and wind resistant

BP – 28/59 (from the Philippines) – high yielding and wind resistant

BP – 5/51 (from the Philippines)

PR – 107 (from the Philippines)

RRIM – 701 (from Malaysia)

BP – 5 (this is the worst clone developed in LAC, with low quality and production level)

LCB – 1030

BP – 217 high yielding and wind resistant

RRIM - 501

RRIM – 628 high yielding and wind resistant

RRIM – 518 high yielding and wind resistant

RRIM – 513

RRIC – 100 (from Cote D'Ivoire)

IRRIM – 703 (from Cote D'Ivoire)

IRCA – 18 (from India)

PR – 261 (abandoned)

Harbel – 112

PB - 86

IRRIM – 526 (from Cote D'Ivoire)

IRRIM – 527 (from Cote D'Ivoire)

IRRIM – 528 (from Cote D'Ivoire)

AVROS (from Cote D'Ivoire)

Cocoa and coffee are traditional export commodities of Liberia. They contribute significantly to household and domestic income. According to the Central Bank of Liberia (2000) production has been on the increase since 1998. A total of 2,040 metric tons and 358 metric tons of cocoa and coffee valued at US\$1.6 million and US\$0.24 million, respectively were exported in 1998. In 1999, a total of 2,591 metric tons of cocoa was produced, an increase of 27% over 1998 production. Coffee production in 1999 was 808 metric tons, representing 125.7% increase over 1998 production figure.

Fishery is an important economic activity for a significant proportion of the Liberian population, mainly for those who live along the coast. Besides the five (5) fishing enterprises, only four (4) companies are reporting fish production statistics. Fishing is also done by artisan fishermen, whose harvest is predominantly subsistence-oriented. The fishing resources off the Liberian coast in 1984 were believed to be considerable and included such well-known food fish as croaker, grunter, sea bream, mackerel, snapper, sole, graper, tuna, and various sardines. Shrimps, rock lobsters, crabs, and oysters were also caught. Inland subsistence fishing is carried out on the lagoons, swamps, streams,

and rivers throughout the country. In 1988, a total of 1.3 million kilograms of fish was produced. Production declined drastically in 1999 to 449,400 kilograms, representing 65.4% when compared to 1988. The total reported catch in 2000 increased by 19.7% to 537,870 kilograms, but fell below the production of 1998 by 58.6%.

Table-4: Annual Marine and Freshwater Fish Production (Metric Tons)

Year	Marine Catch	Freshwater Catch	Total
1986	11,986	4,073	16,059
1987	14,613	4,122	18,734
1988	11,944	4,111	16,055
1989	10,582	4,223	14,805
1990	2,314	4,121	6,463
1991	5,586	4,033	9,619
1992	4,784	4,104	8,888
1993	3,734	4,044	7,778
1994	3,685	4,036	7,721
1995	5,226	4,006	9,232
1996	3,108	4,128	9,232
1997	4,554	4,026	8,580
1998	NA	NA	10,830
1999	NA	NA	15,742

Source: National Bureau of Fisheries, Ministry of Agriculture

Livestock production in Liberia has always been the least prioritized as compared to crops. The industry plays a minimal role in agricultural development. This is indicative by the high annual importation of livestock as well as livestock products. Cattle, goat, sheep, pig, rabbit, Guinea pig, chicken, duck and Guinea fowl are used in Liberian agriculture. Although the local breeds are well adapted to the local conditions, their productive capacity is lower than the exotic breeds. They have stunted babies and the maturity period is longer than that of the exotic breeds. Research in animal husbandry is weak. Feeding, housing and health are major problems in the sector. Aggregate livestock population for eight counties (Montserrado, Margibi, Nimba, Sinoe, Bong, Rivercess, Grand Bassa, and Grand Gedeh) are shown in Table 5 for both pre-war and post-war Liberia.

Table-5: Livestock Population for eight (8) Counties.

Livestock	Pre-war	Post- War
Cattle	3,192	139
Goat	1,5641	4,187
Sheep	10,190	1,340
Pig	12,838	7,212
Rabbit	187	96
Guinea Pig	48	24
Chicken	34,903	16,987
Duck	7,063	4,825
Guinea Fowl	542	290
TOTAL	84,604	35,100

Source: FAO 2002

Nimba County is recorded to have the highest livestock production in both pre-war (55,096) and postwar (24,362) followed by Montserrado, Grand Bassa and Bong Counties, respectively.

Forestry resources remain one of the most important economic assets of Liberia. In 2002, timber was the main export item contributing more than US\$85 million to Liberia's foreign exchange earnings. Besides sawn timber, round logs and charcoal are valued forest products. In 1998 round log export totaled US\$12.3 million and rose to US\$23.4 million in 1999, and increased to US\$59.5 million in 2000. The absence of public electricity in the country for more than a decade has made wood the major source of energy, as only few affluent people can afford electric and gas cookers. In 1998, a total of 14,807 kilograms of charcoal was produced; this rose to 255,624 kilograms in 1999 and totaled 258,934 kilograms in 2000.

Mining, especially iron ore, was the mainstay of the Liberian economy during and up to 1989. But with the closure of iron ore mines due to the civil war (1989-2003), gold and diamond became the major activity in the sector. A significant amount is mined in the country by artisanal miners using crude production techniques. In 1998, a total of 7,741 carats of diamond and 2,318 ounces of gold were produced; gold production reduced to 550 ounces in 1999 and fell further to 482 ounces in 2000. Diamond production on the other hand gained momentum in 1999 with 8,437 carats and further increased to 22,112 carats in 2000.

The secondary sector comprises, mainly manufacturing, which is dominated by such key activities as food processing, wood-based products, and chemicals, cement, building materials and brewing of beverages. During 1998, a total of 5.2 million liters of non-alcoholic and 3.5 million liters of alcoholic beverages totaling 8.7 million liters were produced. The output of beverages declined significantly in 1999 to 5.6 million liters and fell further to 4.9 million liters in 2000. Paint output totaled 85,000 gallons in 1998 and 42,767 gallons in 1999; but fell to 37,366 gallons in 2000.

The Tertiary Sector, which comprises electricity and water utilities, transportation, communication, and services contributes less to GDP than the other two sectors. Table 10 below presents the breakdown of the GDP by the sectors of the economy.

Liberia is the second largest maritime registry in the world with more than 1,800 vessels registered under its flag, including 35% of the world's tanker fleet, and earned more than US\$13 million in 2002.

The informal sector also contributes significantly to the national economy, though national income accounts do not record their performances.

Table 6: Sectoral Contribution to GDP (1988 – 2002)

SECTOR	1988	1998	1999	2000	2001	2002
Agriculture	212.3	229.4	277.0	289.5	301.1	311.3
Rubber	86.6	37.6	61.7	64.8	68	69.4
Coffee	2.2	0.5	0.7	0.8	0.9	1.1
Cocoa	11.4	1.6	2	2.5	3.1	3.9

Rice	9.9	64.2	72.5	76.1	78.4	80.7
Cassava	33.4	44	48.4	50.8	53.4	56
Others	68.8	81.5	91.7	94.5	97.3	100.2
Forestry	82.3	53.4	60.7	63.7	66.9	68.3
Logs and Timber	62.2	13	19.3	23.2	27.8	32
Charcoal and Wood	20.1	40.4	41.4	40.5	39.1	36.3
Mining	121.5	8.6	9.8	9.9	10.1	10.1
Iron Ore	108.4	0	0	0	0	0
Others	13.1	8.6	9.8	9.9	10.1	10.1
Manufacturing	78	17.3	21.4	24.1	26.5	28.3
Tertiary Sector	475.5	85.5	82.6	97.1	90.0	119.9
Electricity & Water	12.4	1.5	2.3	2.3	2.3	2.5
Construction	45.4	5.6	6.9	8.5	10.3	11.8
Trade, Hotels, etc.	89.6	11	17	18	19	20.1
Transportation & Communication	136.9	16.8	21.6	27.8	13.6	37.4
Financial Institute	88.8	10.8	13.3	15.3	17.6	19.3
Government - Services	50.4	6.2	11.2	12.3	13.6	14.4
Others	51.9	6.4	10.3	12.9	13.6	14.4
Imputed Bank Charges	27.1	2.3	3.2	3.7	5	7.8
GDP	942.5	391.9	448.3	480.6	489.6	530.1

Source: **Ministry of Planning & Economic Affairs, 2003**

In 2003, Liberia imported more than it exported and the national debt amounts to US\$3 billion. The unemployment rate is 70% with 80% of the population living below the poverty line.

2.2.3 Value and Potentials for Biodiversity in Liberia

Liberia derives immense economic, ecological and socio-cultural benefits from biodiversity. Biological resources represent one of Liberia's most abundant raw material resources. Foreign exchange earnings were dependent principally on agriculture and forestry between 1996 and 2003 for up to 75%. Also about 70% of the population lives in the rural areas and depend on the products and services of agricultural, forestry and other extractive industries for their livelihood. Their traditions and culture are built around the use of the resources found in their immediate environment. The essential role of biodiversity in both satisfying material needs and sustaining life support systems cannot be overemphasized. Biodiversity contains ecological, economic, and socio-cultural values that justify the need for conservation and sustainable use.

Ecological Values: Biological diversity is essential for the functioning of natural processes that in turn ensure human survival on earth. Through biodiversity, nutrients are recycled, and as such the soils are improved and conserved; the climate ameliorated; water supply is regulated leading to the improvement of agricultural systems.

Economic Values: The fruits, seeds and leaves of large number of plants and vegetables serve as source of human food and income. Wild animals and livestock serve as source of protein; game ranching; and animals as pets when commercialized may accrue substantial financial returns both for the general and household economies.

Socio-cultural values: Biological resources afford such amenities as recreation, aesthetics, scientific studies, strategic use and employment opportunities. Plant parts, including tannins, waxes, oils and resins have medicinal values and form the bases of most traditional and modern medicines and treatments. Certain traditional cultures contribute to the maintenance of ecosystem diversity. A large number of fauna and flora species possess sociological, cultural and religious values.

2.3 Country History and Political Setting

2.3.1 History of the Country

At the founding of Liberia in the thirteenth century, the country was densely forested. The country was almost entirely covered with forest except for about 1000 square miles in the north, which now form part of the Guinea Savanna. The first explorers to come in contact with Liberia were the Portuguese. It was early as 1461 and named the area Grain Coast because of the abundance of grains of Malagueta Pepper. The British later in 1663 installed trading posts on the Grain Coast but the Dutch destroyed these posts a year later. In the 1800s, there were reports of European settlements along the Grain Coast.

Freed Negro slaves backed by the philanthropic organization, the American Colonization Society (ACS) of the United States of America, founded Liberia in 1822. The word Liberia, which comes from a Latin word, libre, means free. Liberia is considered to be the “land of the free”. Upon arrival, the repatriating slaves established a settlement in Christopolis now Monrovia. Monrovia was named after the fifth president of the United States of America, James Monroe, on February 6, 1820.

The first batch of free slaves that arrived in the country comprised 86 immigrants. They first landed on Shebro Island, Sierra Leone. Due to unfavorable climatic condition at Shebro, they migrated to Providence Island. Upon arrival the settlers clashed with the aborigines and later forged a social contract in 1822. During the arrival of the settlers, the Common wealth of Liberia was established and governed by the ACS. The first Governor was Thomas Buchanan, and Joseph Jenkins Roberts became the second Governor. Under Roberts the country gained independence on July 26, 1847. Roberts, born in Norfolk, Virginia, United States of America, became the first president. Due to the influence of Roberts and other members of the American Colonization Society, the constitution, flag, language and administrative structure are modeled after those of the United States of America

At Independence, the settlers experienced tough resistance from the indigenous people who thwarted the expansion of the settlers into the interior. Most of this resistance resulted into bloody battles. On the other hand, Liberia experienced encroachment of her territory on the west by Britain, and on the north and east by the French. These colonial powers took over much of the original territory of the newly independent Liberia.

In 1922, the American businessmen Harvey Firestone and Charles Goodyear found Liberia as an ideal location for the cultivation of rubber. In 1926 an agreement was signed between the Government of Liberia and Firestone Plantations Company. The agreement culminated in the leasing of 1,000,000 acres (400,000 hectares) for 99 years by the government during the leadership of President Charles D.B. King to Firestone for

the establishment of what is now the world's single largest rubber plantation. Later, in 1929 the League of Nations reported the existence of forced labour and involuntary servitude in Liberia. This created extreme social distress that led to the resignation of President King. Edwin J. Barclay succeeded President King.

In 1944, William V.S. Tubman was elected President of Liberia. During his era, he introduced the Unification Policy in order to bridge the gap between the Americo-Liberians and the indigenes. Suffrage, for the first time in the history of Liberia, was extended to the Liberian women and the indigenous population. Tubman assumed the leadership of Liberia during World War II. The war brought an increased demand for rubber and heightened U.S. interest in the construction of the Port of Monrovia and Roberts International Airport. Roberts International Airport was used as US air based during the war.

William R. Tolbert succeeded William Tubman who died of natural causes in 1971. President Tolbert brought Liberia into the centerfold of the comity of nations. His administration is credited as the 'golden age' for Liberia. Many businessmen from all over Africa and some parts of the Middle East flocked into Liberia. Tolbert re-introduced multi-party democracy, which was abolished by Tubman, making the True Whig Party the only party for several decades.

In 1980 the True Whig Party Government was violently overthrown in a military coup d'état led by junior non-commission officers of the Armed Forces of Liberia. The Government was named "People's Redemption Council (PRC)", led by the Master Sergeant, Samuel K. Doe. President William R. Tolbert and mostly senior members of the Americo-Liberian descent were executed during the coup. The coming to power of the PRC marked the end of the first Republic.

Doe ruled for a little over ten years, and was assassinated in 1990 during the rebel incursion launched by Charles Taylor's National Patriotic Front of Liberia (NPFL).

In October 1990 the Economic Community of West African States convened a meeting in the Gambia and invited the Liberian Government, political parties, National Patriotic Front of Liberia, Independent National Patriotic Front of Liberia and the Interfaith Mediation Committee of Liberia to form an interim government that would be acceptable by the people of Liberia. Dr. Amos C. Sawyer was selected as head of the Interim Government of National Unity (IGNU), and Charles Taylor was selected as Speaker of the Assembly.

Taylor refused to work with the government on the grounds that he should head the Government since he controlled a greater portion of Liberia. He later formed his government and named it the National Patriotic Reconstruction Assembly Government (NPRAG) with headquarters in the central administrative city of Gbarnga, Bong County. Taylor's refusal to become part of the interim government and the continued prosecution of the war led to the formation of several warring factions, namely: United Liberation Movement of Liberia (ULIMO J and K), Liberia Peace Council and Lofa Defense Force. After series of battles with the newly created warring factions, Taylor finally bowed down to a peace agreement, which was carved in the Nigerian capital of Abuja in 1996. The Peace Agreement led to the formation of six-man Council of State, with Taylor as part of the collective presidency.

In July 1997, a hastily arranged election was organized by the Economic Community of West African States (ECOWAS) with assistance from the United Nations, United States Government and Organization of African Unity (now the African Union). This was done in order to carry out disarmament and demobilization of the warring factions. Thirteen political parties participated in the elections. They are The Liberian Action Party, Unity Party, Reformation Alliance Party, Liberia National Union, All Liberian Coalition Party, United People's Party, Liberia People's Party, National Patriotic Party, Liberia Unification Party, National Democratic Party of Liberia, People's Progressive Party and True Whig Party. Charles Taylor's National Patriotic Party won the election.

In 2000 a new wave of rebellion started along the border with neighboring Guinea, led by the Liberians United for Reconstruction and Democracy (LURD) mainly comprising members of nearly all the groups that fought with the various warring factions before the election. LURD's rebellion, which started in Lofa County, gradually escalated to other counties. As the war escalated, the United Nations Security Council in May 2001 imposed sanctions on the Taylor led government for what the UN called Liberia's role in supporting the war in neighboring Sierra Leone thru the Revolutionary United Front (RUF). The UN Resolution demanded additional sanctions on Liberia including a ban on the direct or indirect export of all rough diamonds from Liberia, and also measures to prevent travel by senior members of the country's government or their spouses.

In early 2003, another rebel group, the Movement for Democracy in Liberia (MODEL) launched another rebellion from the Cote d'Ivoire border. This amounted to two fronts being created by LURD and MODEL in a bid to oust the Taylor regime.

The conflict came to a lead way on August 4, 2003 when a vanguard ECOWAS Force, ECOMIL arrived to secure the capital, Monrovia, for a peaceful transition of power from Taylor to Moses Blah amidst international pressures coupled with rebels demand that he should step down. With a hurriedly arranged program attended by some African leaders, he stepped down and went into exile in Nigeria. Moses Blah, the number two man in Taylor government, took over the mantle of leadership in a transitional power sharing peace agreement that was reached by the Government of Liberia, Movement for Democracy in Liberia (MODEL), Liberia United for Reconciliation and Democracy (LURD), political parties and civil society leaders in the Ghanaian capital Accra on the 18th August 2003. On October 1, 2003, ECOMIL was replaced with a UN peacekeeping force, UNMIL, with the mandate to support the transitional government implement the A.

On October 14, 2003, Blah handed over authority to Charles Gyude Bryant, a Liberian Business man, as Chairman of the National Transitional Government of Liberia (NTGL), to oversee the country towards elections in 2005.

2.3.2 Country Administrative Divisions

Government Ministries

There are twenty-two (22) government ministries. The President who happens to be the head of state and government appoints cabinet ministers. The ministries are:

- **Ministry of Foreign Affairs** - Administers the foreign policy of the country
- **Ministry of Justice**- Prosecutes offenders of the law of the land.
- **Ministry of Finance** – Administrates the fiscal and financial activities of the country
- **Ministry of State for Presidential Affairs**- Administers presidential activities of the country
- **Ministry of State without Portfolio** – Administers designated activities as requested by the President.
- **Ministry of National Defense** – Protects and defends the nation’s territorial sovereignty.
- **Ministry of Health and Social Welfare** – Coordinates and administers the general health services of the country; ensures the availability of drugs; collects health statistics and monitors events and conditions affecting the general public. The Ministry is in charge of preventive and curative services, and vital statistics for the registration of deaths and births.
- **Ministry of Labor** – Supervises the enforcement of the labour laws; settles labour disputes’ ensures payment of minimum wages; processes work permits and recruits personnel for professional vacancies.
- **Ministry of Agriculture** – Plans, executes, administers, manages and supervises agricultural programs, with extension as it major component; works with local farmers to encourage improved varieties for food security.
- **Ministry of Education** – Plans, executes, administers, manages and supervises educational activities for primary, junior and secondary schools; responsible for accreditation of all academic institutions.
- **Ministry of Post and Telecommunication** – Plans, executes, administers, manages and supervises post and telecommunication activities in the country.
- **Ministry of Public Works** – Responsible for construction and maintenance of public roads and highways; responsible for zoning and regulating building construction; approves designs for any construction.

- **Ministry of Youth and Sports** – Plans, executes, administers, manages and supervises youth programmes and vocational schools and in charge of sporting activities.
- **Ministry of Gender and Development** – Plans, executes, administers, manages and supervises gender and development activities with special emphasis on women, youth and the elderly.
- **Ministry of Information, Cultural and Tourism** – Plans, executes, administers, manages and supervises information, cultural and tourism. Serves as official spokesman of the Government; responsible to disseminate information about programmes of the Government; in charge of promoting tourism and culture.
- **Ministry of Rural Development** – Integrates developmental of rural activities; in charge of the development of farm to market roads and feeder roads; provides safe drinking water to rural communities; in charge of rural planning, low-cost housing projects and the acceleration of rural development; in charge of rural energy generating activities.
- **Ministry of Planning and Economic Affairs** – Defines standards for regional planning systems; sets up country information systems; advise on simple planning techniques; coordinates planning between counties.
- **Ministry of Commerce and Industry** – Regularizes all businesses in the country; ensures that selling prices do not exceed the government fixed maximum prices; participates in the Price Control Committee Board; review complaints by the population against businesses; issues monthly or quarterly reports and keeps records of registered businesses.
- **Ministry of Transport** – Plans, executes, administers, manages and supervises transport activities of the country, including road and civil aviation.
- **Ministry of National Security** – Plans, executes, administers, manages and supervises security of national concern.
- **Ministry of Internal Affairs** – Administers the affairs of all Government functionaries ‘within local and urban areas; oversees the activities of local Government bodies such as the chiefdoms and clans; guarded by the revised interior regulations, has custodianship over all private and public properties within the territorial confines of the country.
- **Ministry of Lands, Mines and Energy** - It has the statutory responsibility for the development of mineral, water and energy resources of the country and the administration of its lands.

Autonomous Bureaux

There are other autonomous agencies and public corporations besides government ministries. These autonomous agencies and corporations have specific mandates. They are:

Liberia Produce Marketing Corporation – Operates nurseries and distributes seedlings to farmers for increased cash crop production. Sets prices of commodities.

Liberia Electricity Corporation – Created by an Act of the National Legislature in 1973 with the mandate to generate, transmit, distribute and sell electricity at an economically reasonable tariff throughout the length and breadth of the country; plans, executes, administers, manages and supervises the generation and distribution of electricity.

Liberia Water and Sewer Corporation – Responsible to Plan, execute, administer, manage and supervise the generation and distribution of water to the public. It is also responsible for the supply of safe drinking water and provides services concerning the sanitary disposal of waste and maintains the water sewerage facilities. The Corporation produces, transmits and distributes pipe-borne water. They rehabilitate water and sewer facilities throughout Liberia and improve and expand services to meet the water needs of all residents.

Liberia Petroleum Refining Corporation – Plans, executes, administers, manages and processes crude oil into finished petroleum products for the Liberian market and also ensures that petroleum products are always available.

Liberia Refugee, Repatriation and Resettlement Commission – Plans, executes, administers and manages Programmes for refugees and internally displaced people; responsible for the repatriation and resettlement of externally displaced people.

Forestry Development Authority

Responsible to sustainably manage the forest and its related resources. Provides long and medium-term planning in the forestry sector as well as prepares forestry policy, law and responsible for the administration; supervises adherence to forest legislation and concession agreements; calculates and determines forestry fees; evaluates investment proposals, executes reforestation and forest research and training; monitors activities of timber companies and executes protected area programmes and administers wildlife and national parks.

National Environmental Commission of Liberia - Creates and promotes environmental awareness; develop a national environmental policy, environmental protection and management law. Coordinates the activities of environmental related organizations, including NGOs and oversees international environment related conventions.

Roberts International Airport – Provides airport administration and management for entry into and exit out of Liberia.

National Social Security and Welfare Corporation – Administers social security and welfare services for employees nationwide

Liberia Rubber Development Unit - Furnishes extension services; provide financial assistance for replanting with improved seedlings; rehabilitates old trees that have tapping potentials; improves on farm processing; and trains workers in modern techniques

Liberia Free Zone Authority – Promotes free zone enterprise for national investment

Monrovia City Corporation – Monrovia City Corporation was first created as a Commonwealth District in 1833 by the Commonwealth of Liberia. A legislative Act of 1973 abolished the Commonwealth District and created the Monrovia City Corporation, giving it all municipal rights, powers and authorities, including enforcement of city ordinances, management of municipal wastes, recreation, public education and awareness and provision of services in environmental health and sanitation.

Bureau of Maritime Affairs - In charge of Liberia’s maritime programme, with much of its work directed at ship registry.

National Port Authority – Manages and administers all seaports in the country.

Political Subdivisions

Liberia is divided into 15 political sub-divisions, called counties.
The fifteen counties are:

<u>County</u>	<u>Administrative Headquarters</u>
1. Lofa	Voinjama
2. Bong	Gbarnga
3. Gbarpolu	Gbarma
4. Grand Cape Mount	Robertsport
5. Montserrado	Bensonville
6. Nimba	Sanniquellie
7. Grand Gedeh	Zwedru
8. River Gee	Fish Town
9. Maryland	Harper City
10. Sinoe	Greenville
11. Grand Kru	Barclayville
12. Bomi	Tubmanburg
13. Grand Bassa	Buchanan
14. Margibi	Kakata
15. Rivercess	Cestos City

Each county is headed by a Superintendent, with sub-administrative divisions in each county as Districts, Chiefdoms, Clans and Townships. The Districts and Townships are headed by commissioners and the chiefdoms and clans are headed by chiefs.

2.3.3 Millennium Development Goals of Liberia

The current report on the Millennium Development Goal of Liberia stipulated the broad based national participation and ownership of the Government of Liberia providing a leadership role. The MDG gives account of the following information of a country:

1. Poverty reduction and human development
2. The country's present position in achieving the Millennium Development Goals/Targets
3. Development challenges that the country is going through
4. The achievement of human development in terms of needed policies, plans, programs and strategies
5. The critical need of development assistance to a country
6. The availability of data that is either lacking or needs to be collected

One of the goals of the Millennium Development Goal Report of Liberia is to ensure environmental sustainability. In order to ensure environmental sustainability, there are three targets that have been earmarked. They are:

TARGET 9: Integrate the principle of sustainable development into country policies and programmes and reverse the loss of environmental resources

TARGET 10: Reduce by half the proportion of population without access to sustainable safe drinking water by 2015.

TARGET 11: Achieve significant improvement in life of at least 1.5 million slum dwellers, including displaced persons.

Of the three targets, Target 9 is more applicable to the National Biodiversity Strategy and Action Plan (NBSAP). The NBSAP complements Target 9 in ensuring the mitigation of threats to the biological resources of Liberia. Some of these efforts are the establishment of the National Environmental Commission of Liberia (NECOLIB) in 1999; the yearly observance of World Environment Day; ratification of some international environmental conventions and the passage into laws the National Environment Policy of Liberia, Environment Protection and Management Law, the Environmental Protection Agency Act and of recent the Protected Areas Act.

In ensuring environmental sustainability for 2015 under the Millennium Development Goals, it was recommended that the proportion of Land Area under protection be increased to a total of 3.7 million acres. In October 2003, additional 49,655 hectares were added to the previous 130,845 hectares of the Sapo National Park totaling 180,500 hectares. This represents an increase of 38% (see CI and GOL MOU and the legislative Act for the extension of Sapo National Park).

The MDG indicated that 26% of Liberian households were using improved water source such as pipe borne, hand pump as water supplies as earlier reported by the 1999/2000 Liberian Demography Health Survey. This figure as compared to the rural and urban areas indicates a significant difference on the provision of drinking water. It further indicated that about 4% of households in rural areas have access to safe drinking water as compared to 25% of urban households, which have access to safe drinking water.

The MDG accounts that the current status of the Government of Liberia in supporting environmental activities is weak, but little efforts are being made on the part of the government to achieve the national targets.

The MDG identified the following environmental problems that the country is encountering due to uncontrolled exploitation of the natural resources and other human activities for the sustenance and survival of the population in recent past. They are as follows:

1. Deforestation due to logging, shifting cultivation, firewood and charcoal production and the associated destruction of biodiversity through illegal hunting and harvesting of protected species;
2. Pollution of surrounding rivers and streams, destruction of vegetation, habitats and forests through uncontrolled mining operations;
3. Marine and air pollution;
4. Problems associated with natural causes such as coastal erosion particularly around Monrovia, Buchanan and Greenville;

To ensure environmental sustainability, greater challenges are noticeable for the implementation of a sustainable development strategy: They are:

- Lack of advocacy and public information campaign on the need for environmental sustainability;
- Lack of legislation or clear cut policy on environmental sustainability and enhancement of adequate coordination among agencies dealing with the environment;
- Lack of integrated policy – environment issues into economic policy reforms and poverty social impact analysis approaches;
- Lack of resources for sustainable campaign against environmental degradation;
- Lack of regulation for firewood or charcoal production;
- Lack of capacity for environmental impact assessment and biodiversity;
- Heavy dependence on donor assistance for environmental sustainability programmes;
- Lack of expanded access to environmentally sound and locally appropriate technology for production of crops that conserve soil, water and agro-biodiversity.

As a matter of priority for environmental developmental assistance, the MDG recommends strengthening the capacity of NECOLIB, which has been transformed in, to an Environmental Protection Agency for advocacy, data collection, analysis and monitoring and evaluation. Much needed resources are being proposed for sound management of the environment and natural resources. Also, the need for environmental awareness has been proposed, thru the active participation of local NGOs and local communities in developing environment protection and management programmes combined with building linkages with poverty reducing activities.

Consequently, no document on Vision 2024 addresses the issue of biodiversity. Therefore, MDG is the only comprehensive national document that fulfills the conservation and protection of the natural resources of Liberia including biodiversity.

2.3.3.2 Eradicate Extreme Poverty

Liberia is considered to be among the Least Developed Countries (LDCs) with 76.2% of the population living below the national poverty line and 52% in severe poverty. Children and women are majority of the people affected by poverty. Their lives are endangered by lack of food, health services, water and sanitation, street living and trading, recruitment into prostitution and the consumption of narcotic drugs. The underlying factors of poverty are: the protracted fourteen years civil war, insecurity, brain drain and public sector corruption and mismanagement.

According to the UNDP Poverty Profile of Liberia in 2001, female-headed households appeared to do better on the poverty scale as compared to those headed by men. Male-headed household living below the poverty line recorded 78.3% while the female-headed households living in poverty was 68.8%. The low level of poverty in female-headed households could be attributed to the following reasons:

- (a) In the informal marketing sector, more women worked and earned higher income,
- (b) Property inheritance from husbands and kins;
- (c) Vocational and higher education levels of female –headed households; and
- (d) Independent sources of income are higher among women heading household, e.g. nurses, school teachers, social workers and marketing traders

Despite the absence of a national institution and programme to execute poverty reduction programmes in Liberia, the issue has become of great concern to all, involving the public and private sectors. Table 7 reviews the level of public expenditure in the national and GDP contribution involvement to reduce poverty during the period of 1998 and 1999. The public expenditures cover social services such as education, health, agriculture, rural development and public works. Agriculture and health account for drop in the national budget while defence and security continues to be significantly higher. With the low level of expenditures in agriculture and health, more budgetary allocations would be needed to combat poverty in Liberia.

Table 7 : Percentage Share of Expenditures in Budget and GDP

Services	1998 % of National Budget	% of GDP	1999 % of National budget	% of GDP
Education	5.75	0.8	4.4	0.78
Health	2.78	0.4	3.2	3.28
Agriculture	0.44	0.06	0.3	0.05
Rural Development	0.20	0.03	0.6	0.10
Defense/Security	8.7	1.2	6.1	1.09
Others	80.24	11.85	85.1	11.14

Source: Ministry of Finance, Budget Bureau, 2000

The private sector is involved in the Liberia Chamber of Commerce, and has been proactive since the early 1990s. Additionally, non-formal banking financial institutions, susu and cooperative societies are working assiduously to alleviate poverty. Other institutions such as the National Housing and Savings Bank (NHSB), Liberia Produce Marketing Corporation (LPMC) and Agricultural Cooperative Development Bank (ACDB) still remain inactive due to the fourteen years civil war. These institutions, when revitalized and expanded, could help in combating poverty.

With the protracted fourteen years war, non-governmental organizations have usurped some responsibilities of the government by providing services such as health, education, agriculture previously provided by Government.

Community-based organizations (CBOs) are not directly engaged in poverty issues, rather, village developed associations, and religious groups are striving to improve the living condition of the poor.

The MDG Report on Liberia 2003 indicates that there are more challenges and constraints than opportunities for poverty reduction in Liberia, including:

- High level of unemployment (85%)- is due to the civil conflict. Major industries that provided job opportunities closed. These industries were massively looted and destroyed during the 1990 civil war. For instance, Bong Mines, LIMINCO, EXCHEM, etc.
- Fragile political environment and insecurity, poor environment for private sector development and poor infrastructure – With the restoration of normalcy in 1997, the political situation became still fragile due to the continuous threat of war from the other disbanded warring factions and the constant human right abuses being perpetuated by the Taylor’s government which served as a recipe of another civil conflict.
- Reduced external assistance, poor macro-economic and sectoral policies, and high level of economic inequality

2.3.3.3 Eradicate Hunger and Promote Food Security

Rice is Liberia's staple food. Other major foods are cassava, plantain and sweet potatoes. The main source of food gathering is the markets (51%) and farm/garden (48%). Out of the 2.7 million population of Liberia, the agriculture sector accounts for 75%. The present population based on a daily per capita cereal consumption of 110 kilograms requires an estimated 286,000 metric tons of rice annually.

Food security system is deficient both at the national and household levels despite the adoption of the Clan Agriculture and Rural Development Association (CARDA), Special Programme for Food Security (SPFS) and the School Agriculture Program Initiative (SPI). The adoption of these programmes and associations are intended to achieve satisfactory level of food production. The deficiency is due to national insecurity that led to massive migration of the rural dwellers, which constitutes 75% of the national population. Domestic production, commercial imports and food aid are the main sources of food. The 2000 rice paddy domestic production accounts for 144,000 tonnes, compared with the pre-war (1988) figure of 259,000 tonnes. The level of production in 2000 is attributed to the end of the civil conflict because of the 1997 special election.

The pre-war level of processed rice production was 150,000 tons within the country as compared to the FAO/WFP 2003 of 144,243. Bong and Nimba counties are considered to be the two most productive counties with 600 kg as production per household as shown in Table 8 The markets account for 51%, while the farm/garden (48%).

Table 8: Estimated Production of Rice in 2000

County	1/Number of Households Growing Rice	2/Production per Household (kg)	Total Rice Production (tonnes)
Grand Bassa	27 95	500	13 993
Bomi	16 714	500	8 357
Bong	38 965	600	23 379
Grand Cape Mount	17 565	500	8 783
Grand Gedeh	12 281	500	6 141
Grand Kru	3 807	500	1 904
Lofa	45 680	500	22 840
Maryland	8 187	500	4 094
Margibi	21 387	500	10 694
Montserrado	13 360	500	6 680
Nimba	49 547	600	29 728
Rivercess	3 720	500	1 860
Sinoe	11 585	500	5 793
TOTAL	270 784		144 243

Source: FAO/WFP Crop and Food Supply Assessment Mission to Liberia, 2000

Commercial imports contribute to food security with an estimated 160, 000 tons while food aid for rice import met 40,000 tonnes as an uncovered deficit during 2001.

Despite the level of improvement in food security after the 1997 elections, the situation deteriorated again with the new wave of war that started in Lofa County along the Guinean border in early 1999. By 2002– 2003, the war escalated firstly to counties in the southwest and steadily progressed to the southeast and then northeast of the country. In mid 2003, farming activities throughout the country even, the urban and peri-urban areas, ceased due to intense escalation of the war. This round of fighting exacerbated the food crisis in the country once more. Presently, the food security situation is deficient again at the household and national levels. With the intervention of ECOMIL (August 2003) and subsequently UNMIL (October 2003) to separate, demobilize, disarm and reintegrate the three warring parties (GOL, LURD and MODEL) into civility as agreed under the Accra Peace Accord, farming activities could intensify. In December 2003, the United Nations Food and Agriculture Organization approved two major agriculture projects. These projects will cater to the farm families in the southeast counties as well as the peri-urban communities within Monrovia and its environs. This accounts for a major step by FAO to improve the food security situation in post-war Liberia. An estimated 2,512 calories as the energy supply per day has been reduced to 1,726 calories. This indicates a deficit of 30% with very poor nutritional supply to the average person. Therefore, growth and development of children will continue to be hampered as reported in the MDG Report of Liberia 2003. Accordingly, most inhabitants of Monrovia fall below the poverty line of US\$1 per capita daily expenditure. At such, they cannot afford the price of available food. A 50Kg of rice is sold at US\$21. In Monrovia 21.9% of households live in severe poverty, while in the rural areas is 64.8%. However, the urban communities are much better in terms of food because they attract diverse food from all parts of the country because of greater demand. Hence, food is available in the urban communities throughout the year, while seasonal in the rural areas.

In Liberia, children and the elderly are considered more vulnerable in terms of hunger. This culminates in a stressful food security situation for them since they often eat less nutritional food especially leftovers, while the head of the household eats the most nutritious parts of the family food. In some localities, it is a taboo for the child to eat egg.

According to MDGR 2003, it is very unlikely for Liberia to meet the target, that is, “Halve, between 1990 and 2015, the proportion of people who suffer from hunger” as indicated by the prevalence of underweight children under-five years of age (14.8%) and proportion of population below minimum level of dietary energy consumption (0.7%). The status of support from government is weak characterized by numerous challenges to reduce hunger, e.g. fragile peace and security, lack of agricultural policy, lack of adequate farm-to-market roads, lack of transport, rural to urban migration, especially by the productive young men/women, etc.

2.3.3.4 Promote Gender Equality and Empower Women

In Liberia, the conservation of biodiversity requires the involvement of the promotion of gender equality and the empowerment of women. Both sexes stand to gain especially in formulating strategy and action plan that is gender sensitive in nature. A good NBSAP will be beneficial to men, women and children and preference will be given to the most vulnerable groups. Issues to be considered include how different threats to biodiversity will affect women and men differently and how aggravating it will influence their livelihoods. However, in the case of Liberia, one of the major challenges is to ensure that women are not deprived of their crucial role in conserving biodiversity, even though, they are often perceived as unproductive members of society.

Gender equity can be promoted through education as one fundamental way of mainstreaming. It provides opportunity for equal participation in decision-making as well as to compete in the markets.

While there are gender imbalances, for example, in terms of access to land for agricultural activity, women are victims of such. Ironically, women produce over 60% of food crops in Liberia despite the inaccessibility to farmland, low level of training in improved farm technologies and the lack of financial assistance. The agriculture labour force continues to record increasing number of women due to mass migration of men to plantations and urban areas.

Additionally, girls in Liberia continue to have unequal access to formal education as compared to boys. It has dampened their chances as adults to participate effectively in decision-making process and to take-up high profile positions in government and industry. They are often found at the rear of society. It is even reflected in the non-agricultural sector where the share of women in wage earning is 11.4%.

Gender disparities exist, leaving girls and women to be the more vulnerable groups. At the primary and secondary levels, there are more boys in schools than girls as compared to the preschool level, girls out number boys. Gender socialization, boys preference in families and teenage pregnancy are some predisposing factors that give rise to gender disparities. Traditionally, women married under the civil law can inherit land and property while under the traditional law, they are not entitled to inherit from their husbands or retain custody of their children if their husbands die. Cognizant of the disparities under traditional marriage, a coalition of women's organization, under the banner of the Association of Female Lawyers of Liberia, has been advocating in support of legislation that would provide women inheritance right.

Female Genital Mutilation (FGM) is widespread among young girls hailing from the northern, western and central region more especially in the rural areas. This practice is carried out in the female traditional school, *the sande*. Lately, due to the fourteen years civil war, it has gained some grounds in urban communities especially the environs of Monrovia due to insecurity in the rural areas. It is estimated that 50% of women in rural areas between the ages of 8 and 18 have been subjected to FGM. Infibulations, another form of FGM, is not practised. Violence against women has increased rapidly, but little effort has been made to curtail the act. Programs of domestic violence against women and girls and increase awareness of their rights continue to be conducted by several non-governmental organizations in cities around the country.

The establishment of the Ministry of Gender and Development is one major institutional framework in promoting gender equity and women empowerment. The Forum for African Women Educationalist (FAWE) provides also greater opportunity to stimulate enrolment of girls in schools as a mainstreaming approach to reduce drop out rates among girls. Such programme will help to empower women in being literate. Thus, the gender imbalances that affect them can be addressed constructively. This programme will enhance their decision-making and capacity of women to compete effectively in the job markets.

The end of the 1990s records the establishment of women organizations. These groups continue to advocate for women's rights and empowerment. The evolution of women groups could be attributed to the psychological trauma that women were exposed to such as rape, other forms of physical and sexual abuse and other gender bias prior to and even during the fourteen years of civil war. Lately, women groups have been advocating for peace in the Mano River Union Basin during the peak of the crisis between GOL, LURD, and MODEL. The Basin comprises Liberia, Guinea and Sierra Leone. These women groups are:

- (a) The Mano River Women Peace Network (MARWOPNET), (b) National Women Commission of Liberia (NAWOCOL), (c) Association of Female Lawyers of Liberia (AFELL), (d) Liberian Women Initiative (LWI), (d) The Liberian Federation of Women Organizations (e) Women in Peace Building Network (WIPNET).

With the growing number of women groups advocating gender equity and women empowerment, the MDG indicated that gender parity in school enrolment at the primary, secondary and even tertiary levels is unlikely to be achieved by the year 2005 and 2015 due to weak status of supportive environment. The overall level of progress of the target to eliminate gender disparity in primary and secondary education preferably by 2005 at all levels of education and not later than 2015 is at a very slow pace. At such, many challenges will continue to engulf them in mainstreaming and the assistance of development partners would be paramount.

Finally, the Liberia National Bio-diversity Strategy and Action Plan addresses women empowerment indirectly or directly through the formulation of appropriate strategy and action plan that addresses gender imbalances. Such effort is geared toward promoting gender equality and women empowerment.

3. STATUS OF BIODIVERSITY IN LIBERIA

There are two components of biodiversity. The terrestrial biodiversity includes the forest ecosystem, and the mountain ecosystem. The aquatic biodiversity comprise the Wetland and mangroves, freshwater, and coastal and marine ecosystems. These natural systems, even though have great potential for human and industrial development, are under continual threats of destruction as a result of neglect and mismanagement

3.1 Natural Ecosystems and Landscapes

3.1.1 Forest Ecosystems

3.1.1.1 Forest Cover

It is believed that Liberia is the only country in West Africa that once was covered entirely with rain forest. The forest of Liberia is being reduced at the rate of 1-2% per annum. More than 50% of the forests have been destroyed over the years. The two remaining dense forest areas are now found in the northwest and southeast of the country separated and isolated from each other by a corridor extending from Monrovia to Nimba County. These two forest blocks are further fragmented and dissected by the advances of shifting cultivation along existing roads and by the construction of logging roads.

By the end of the second millennium Liberia contained 42% of the Upper Guinea Forest of West Africa, the largest portion possessed by a single country in the region; Guinea has 8%, Ivory Coast 28%; Ghana, 16%; Sierra Leone 5%; and Togo, 1%.

Cooper and Record (1931) classified the forests of Liberia as follows: coastal mangrove swamp, tropical evergreen forest, fringing forest and deciduous forest. Mayer (1951) made a slight modification by suggesting that the fringing forest be called a transitional forest. A. G. Voorhoeve (1979) distinguished only two forest types: the evergreen forest and the moist semi-deciduous forest. According to him, very little true deciduous forest exists in Liberia; the deciduous forest found is actually a transitional forest between the evergreen and the semi-deciduous forest.

Liberia's forest ecosystem can today be divided into four classes: primary dense forest, climax secondary forest, secondary forest, which has not reached climax, and other mixed vegetation. This forest ecosystem is a major component of one of the 25-biodiversity hotspots identified globally by Conservation International. The Mount Nimba, Cestos- Senkwen River Shed, Lofa-Mano, and Sapo National Park areas contain many endemic species. These four areas are among the 14 centers of plant endemism within the upper Guinea hotspot.

3.1.1.2 Production Forestry

The most extensive inventory of the forests of Liberia was undertaken from 1960- 1967, the conclusion of which marked the beginning of official commercial logging in Liberia. The inventory put the extractive potential of mature timber at 80,000,000 cubic meters, and recommended a 25-year felling cycle for concession areas. Consequently, the annual allowable timber cut was estimated at 3.2 million cubic meters.

Sixty forest tree species are frequently harvested in Liberia, and (ten) 10 of them accounted for 67% of the total harvested volume in 2001; *Herritiera utilis* (Niangon) alone constituted 12% of the total production.

The extent of forest cover removal does not match replacement. Up to about 480,000 acres (192,000 hectares) of forestland is lost annually due to logging, shifting cultivation and other activities, while government has replanted less than 27,000 acres (10,927 hectares) since the inception of its reforestation programme in 1971.

3.1.1.3 Birds of Liberia

A total of 600 species have been recorded from Liberia, of which some 125 are Palearctic Migrants. Amongst these are 21 species of global conservation concern, only three of which are not resident. *Circus macrourus*, *Falco naumanni* and *Gallinago media* are all rare or uncommon migrants from the Palearctic. The remainder, *Agelastes meleagrides*, *Scotopelia ussheri*, *Ceratogymna cylindricus*, *C. elata*, *Melignomon eisentrauti*, *Campephaga lobara*, *Phyllastrephus baumanni*, *P. leucolepis*, *Bleda eximia*, *Criniger olivaceus*, *Malaconotus lagdeni*, *Illadopsis rufescens*, *Picathartes gymnocephalus*, *Prinia leontica*, *Bathmocercus cerviniventris*, *Melaenornis annamarulae*, *Malimbus ballmanni* and *Lamprotornis cupreocauda*, are all species of forest habitats. Fourteen of these are also species of restricted-range; almost the whole of Liberia falls within the Upper Guinea forests Endemic Bird Area (EBA 0840) and all of its 15 species occur. Liberia also lies entirely within the Guinea-Congo Forests biome (A05) and 184 species characteristic of the biome have been recorded. *Phyllastrephus leucolepis*, discovered in 1981, has only ever been recorded from a limited area in the east of the country, while western Cote d'Ivoire and eastern Sierra Leone. All of this underlines the ornithological importance of Liberia's forests.



Figure 5: White-breasted guinea fowl (Agelastes Meleagrides)

Figure 6:
Rock Fowl



**Yellow-headed
Picatbartes
gymnocephalus
gymnocephalus**

Table 9: Summary of Important Bird Areas (IBA) in Liberia

IBA Code	Site Name	Adm. Region	Area in hectares
LR001	Wologizi Mountains	Lofa County	20,000
LR002	Wenegizi Mountains	Lofa County	20,235
LR003	Lofa-Mano	Lofa and Grand Cape Mount Counties	210,650
LR004	Nimba Mountains	Nimba County	20,240
LR005	Cape Mount	Grand Cape Mount County	4,560
LR006	Zwedru	Grand Gedeh County	15,000
LR007	Cestos-Senkwehn	Rivercess and Sinoe Counties	146,800
LR008	Sapo	Sinoe County	130,747
LR009	Cavalla River	Grand Gedeh County	12,150

3.1.1.4 Chimpanzees of the Liberian Forests

Pan troglodytes or the common chimpanzee (called baboon in Liberia) belongs to the Order *Primates* and the class *Mammalia*. *Pan troglodytes* has a wide but discontinuous distribution in Equatorial Africa, in about 21 countries extending from Senegal in the west to Tanzania in the east. Four distinct subspecies of this common chimpanzee have been recognized which include *Pan troglodytes troglodytes*, *Pan troglodytes verus*, *Pan troglodytes vellerosus* and *Pan troglodytes schweinfurthi*. Subspecies *Pan troglodytes verus* and *Pan troglodytes vellerosus* are the two that occur in Liberia. Its range in Liberia has reduced due to poaching. The species is now found mostly in Nimba, Sinoe, Grand Gedeh, River Gee and Lofa Counties. Large concentrations are in Nimba and Sinoe Counties.

The Western subspecies is called *Pan troglodytes verus*. It once occurred in 10-12 countries from southern Senegal east to Togo, Ghana, Burkina Faso, Guinea Bissau, Mali, Guinea, Sierra Leone and Liberia to the Niger River in Central Nigeria but has had the range greatly reduced.

- The Central subspecies, *Pan troglodytes troglodytes*, occurs from Northern Cameroon to Central African Republic to Ubanghi River in Democratic Republic of Congo, Angola, Gabon, Equatorial Guinea and south to the Congo River.
- *Pan troglodytes schweinfurthi* is the eastern subspecies, which occurs from the confluence of the Ubanghi and Congo Rivers in Western DR Congo east to Lake Tanganyika in Tanzania and from the northwards to Burundi, Rwanda, Sudan, Uganda and DR Congo.



- The East Nigeria – West Cameroon chimpanzees, *Pan troglodytes vellerosus* forms the population between the Niger River in Nigeria and the Sanaga River in Cameroon.

The survival of the chimpanzees is threatened by several factors, among which are the following:

Figure 7: Chimpanzee (*Pan troglodytes*)

1. The commercial bush meat trade is the greatest threat posed to the survival of the chimpanzees. The females have very slow reproductive rate. Females are said to give birth every 5.5 years. Subsistence hunting increases with logging and mining as the bush meat may serve as food for the large labor force.
2. Progressive habitat loss as a result of commercial logging compounds the problems as the habitats are converted for cash crops production, subsistence farming, forest fires, mineral prospecting and mining. These activities leave small-unconnected patches in which the chimpanzee populations are isolated and therefore become vulnerable.
3. Deforestation, as a result of logging, creates remnant track of primary rainforest where the eastern and western subspecies are located. In these areas, unauthorized hunting, logging, mining and even farming occur thereby putting the subspecies at risk.
4. The problem is further increased during civil wars when there is proliferation of guns, displacement of people and reduced agricultural output, all of which increase the hunting levels for livelihood.
5. Trade in live animals, including killing of adults and capture of infants for pet trade and entertainment industry as well as the international biomedical trade are additional pressures that have negative impact on the survival of the subspecies.

It has been extremely difficult to assess comprehensive and precise numerical population data of *Pan troglodytes* in its habitats. Two such estimates in the late 1980s indicated a total population size of between 145,000 and 230,000. However, recent estimates suggest that fewer than 12,000 of *Pan troglodytes verus*_, with the largest number in Ivory Coast, possibly 80,000 of *Pan troglodytes troglodytes* and 13,000 of *Pan troglodytes schweinfurthi*_remain. Excluding *Pan troglodytes vellerosus*_, this gives a total population size of 105,000.

Central Africa (mainly Gabon, DR Congo and Cameroon) has the largest remaining populations while Senegal, Mali, Sudan, Equatorial Guinea and the Cabinda enclave of Angola contain only small and dispersed remnant population whereas population in Ghana, Guinea Bissau, Nigeria, Burundi and Rwanda are extremely depleted. Chimpanzee populations are considered extinct in Gambia, Burkina Faso, Togo and Benin.

Many other primates are threatened besides the chimpanzees. Those restricted to or dependent on the shrinking areas of high forest have been classified as vulnerable.



Figure 8: Red Colobus Monkey (*Procolobus badius*)

Table 10: Conservation Priority Ratings of Liberian Primate Species

	A	B	C	Total
Potto	1	3	1	5
Dwarf Galago	1	2	1	4
Scooty Mangabey	2?(1)	2	2?(1)	6(4)
Diana Monkey	4	2	2	8
Putty-Nose guenon	2?(3)	2	2	6(7)
Campbell's Monkey	1	1	1	3
Spot-Nose guenon	1	1	2?(1)14(3)	
Green Monkey	1	2	1	4
Red Colobus	3	1	2	6
Olive Colobus	3	2	2	7
Black and White Colobus	3	1	2	6
Chimpanzee	3	3	1	7

A = degree of threat 1-6, B = taxonomic uniqueness 1-3, C = association with other Threatened forms

Source: Oates 1985

3.1.2 Mountain Ecosystems

There is very limited and scanty data on mountain ecosystems in Liberia. The concept of conservation and sustainable use of mountain biological diversity is recent and has not been extensive. Except for the rapid assessment of Mount Nimba for the Tri-National Planning Meeting on Mount Nimba in January 2002, no assessment has been done specifically for the management of mountain ecosystems. The National Committee for the International Year of Mountains submitted a proposal to the FAO in 2003 for awareness and conservation of mountains in Liberia.

Despite this, some of the mountains are known to possess mineral resources. Four of these mountains have been exploited for iron ore. They are Bong Range, Mount Nimba, Mano Mountain and Bomi Mountain.

Table 11: Important Mountains in Liberia

Mountain	Description	Location
Nimba Mountain	Second highest in Liberia; Exploited for iron ore; source of St. John, Cestos & Cavalla Rivers	Nimba County, Northern Liberia
Wologisi Mountain	Unexploited	Lofa County, Northern Liberia
Bong Range	Exploited for iron ore	Margibi County, Southern Liberia
Gibi Mountain	Unexploited	Margibi County, Southern Liberia
Putu Mountain	Unexploited	Grand Gedeh County, Northern Liberia
Bomi Mountain	Exploited for iron ore	Bomi County, Northwestern Liberia
Wutivi Mountain	Highest in Liberia Unexploited	Lofa County, Liberia
Mano Mountain	Exploited	Cape Mount County, Western Liberia
Bea Mountain	Unexploited	Cape Mount County
Kpo Range	Unexploited	Gbarpolu, Northwestern Liberia
Wenegissi	Unexploited	Lofa County

Source: Field Survey by LIMINCO, 2002

Liberia's Mountain Ecosystems contain outstanding resources, both biological and non-biological. There exist valuable plants and animal species, which are representatives of biodiversity species found in the tropical rainforest regions of the world. The fauna species include mammals, reptiles, amphibians, birds, and insects. The flora species include high plants of the deciduous, semi-deciduous and savanna woodland species, riverine plant species, shrubs and herbs. Both indigenous plants and animals were in abundance about sixty years ago. Their status began to change for the worse in mountain

communities when mining, shifting agriculture, commercial logging and uncontrolled burning intensified.

Several valuable non-biological resources are also found in mountain communities, including iron ore, diamonds and gold. Thus far, only the first three of these minerals have claimed the interest of the mining industry in Liberia, with iron ore being the most intensively mined.

3.1.3 Wetlands and Mangroves

Wetlands are areas that are permanent or temporary, with water that is static or flowing, fresh, brackish including areas of marine water the depth of which at low tide does not exceed six (6) meters. They are transitional zones between terrestrial systems and open water systems, and are highly productive areas rich in flora and fauna. Their economic and ecological functions attract human activities that eventually impact on biodiversity. Liberia has a few wetlands that provide both subsistence and economic benefits to its many inhabitants. Like wetlands all over the world, they have become stressed by human induced activities. There are four (4) wetland types: Inland Riverine, Inland Swamp, Coastal and Coastal Lacustrine. Presently only eight (8) wetlands have been identified, three (3) of which have been proposed for conservation status.

Table 12: Wetlands of Liberia

S/n	Wetland	Type	Size (acres)	Conservation Status
1	Lake Piso	Coastal Lacustrine	76,091	Proposed Nature Reserve
2	Marshall	Inland Riverine	n/a	Proposed Nature Reserve
3	Mesurado	Coastal	n/a	None
4	Lake Shepherd	Coastal	n/a	None
5	Bafu Bay	Coastal	n/a	None
6	Cestos-Senkwehn	Inland Riverine	n/a	Proposed Nature Reserve
7	Gbedin	Inland Swamp	n/a	None
8	Kpatawee	Inland Riverine	n/a	None

Kromah, F (2002, Wetlands in Liberia)

Mangroves characterize the wetlands of Liberia and cover a small area along the coast, from Cape Mesurado to Cape Palmas, at the edges of lagoons, riverbanks, and river estuaries and in widespread areas of swamps. According to Gatter (1988), mangroves cover 0.5% of the land surface of Liberia, which is equivalent to a 500 km-wide belt extending along the total length of the coastline.



Figure 9: Mangroves of the Mesurado Wetlands near Monrovia

The most common mangrove species is *Rhizophora racemosa*, but six (6) other species occur in the country. Mature mangroves, reaching heights up to 30m were found along the lower Sehnekweh and some neighboring rivers, where species such as *Rhizophora harrisonii*, *Rhizophora mangle* and *Avicennia Africana* occur together with impressive tracts of *Pandanus*.

Except for few places in the central part of the country, primary mangrove forest has been replaced by secondary ones. Much of the mangrove destruction appears to be concentrated along the edges of creeks, and particularly more widespread around the larger towns and cities, such as Monrovia, Buchanan, Greenville, and Harper. Mangroves are degraded due to urban expansion, collection of firewood and construction of makeshift structures.



Figure 10: Wetlands with Water Hyacinth along Benson River near Buchanan City

The mangroves are vital coastal ecosystem; they provide habitat for fish, invertebrates and epiphytic plants; and are considered more efficient photo synthesizer than most plants. Besides, Mangrove forests provide:

- Spawning grounds for many fish species, crabs, shrimps, mollusks and other forms of sea life;
- Habitats for many endangered species of manatees, crocodiles, turtles, migratory birds;
- Flood regulation and protection from violent storms;
- Protection of shorelines from erosion; and
- Water recharge and water quality.

3.1.4 Aquatic Systems

3.1.4.1 Freshwater Biodiversity

Thirteen and a half (13.5) percent of the nation's total area is covered with water. There are six (6) major rivers, which flow from mountains in the north and empty into the Atlantic Ocean. They are Cavalla, St. John, Mano, Lofa, Cestos and St. Paul; but their potential for navigation is yet to be fully explored. However, most of the rivers are navigable up to 20 miles from the coast, except for Cavalla, which is navigable up to 50 miles.

The ecosystem has great potential for fishing, but the potential is yet to be fully developed. These waters contain plant species (mangroves, raphia palm, etc.) and animal species (fish, crabs, shrimps, water snail, etc.), which are harvested and used by local dwellers and artisanal fisherman for both food and commerce. The aquatic ecosystem, freshwater as well as coastal wetlands and near-shore marine communities are clearly affected by upstream changes in terrestrial environments. The fishery sub-sector provides about 65% of the protein needs of the country and contributes about 10% to the GDP. There are about 166 species of freshwater fish in Liberia, and of this number, one species, *Barbus trispiloides* is endemic, and another species, *Oreochromis macrochir* was introduced; the remaining 162 are native. Average Annual Capture (Aquaculture Production) is 22 metric tons.

3.1.4.2 Coastal and Marine Biodiversity

The coastline of Liberia is 560 km (350 miles) long and about 58% of the population lives along this coast. With a continental shelf of 14,894 sq. km, and Territorial sea of up to 159,200 sq. km, it produces annually 7,616 metric tons of fish and 126 metric tons of marine invertebrates, including Mollusks and Crustaceans. The Marine/Brackish fish species are all native species. Fishing effort, both freshwater and marine employed 5,143 people, and between 1995 and 1998, the number of docked fishery vessels recorded was 14. Five of the seven species of turtles worldwide are found in Liberia. They are *Dermochelys coriacea*, *Chelonia mydas*, *Lepidochelys olivacea*, *Eretmochelys imbricate* and *Caretta caretta*. The *Chelonia mydas* and the *Dermochelys coriacea* are endangered.

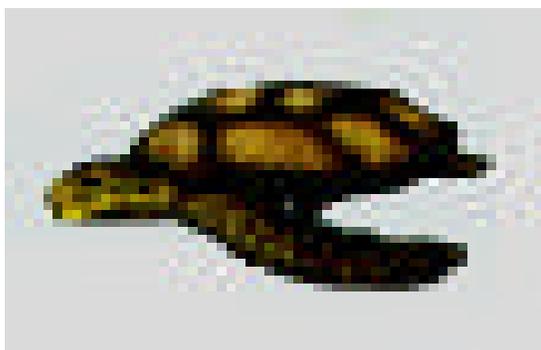


Figure11: Sea Turtle



Figure12: Manate

Table 13: Marine invertebrates of ELWA, Banjor, Marshall and West Point

No.	PHYLUM	FAMILY NAME	SCIENTIFIC NAME	COMMON NAME	HABITAT
1.	Cnidaria		Physalia pelagica	Portugese man of war	Pelagic
2.	Cnidaria		Chironex fleckeri	Sea wasp (Jelly fish)	Pelagic
3.	Cnidaria		Metridium senile	Sea anemone	Benthic
4.	Mollusca	Haliotidae	Haliotis tuberculata	Abalone	Benthic
5.	Mollusca	Scaphandridae	Scaphander punctostriatus	Sea snail	Moderately deep water
6.	Mollusca	Tonnidae	Tonna galea	Tuna shell	Moderately deep water
7.	Mollusca	Cassididae	Phalium granulatum	Scotch bonnet	Moderately shallow water
8.	Mollusca	Muricidae	Murex tryoni	Rock /dye shell	Deep water
9.	Mollusca	Muricidae	Purpura patula	Rock shell/dog winkle	Intertidal
10.	Mollusca	Veneridae	Ventricolaria	Marine/venus clam	Shallow water
11.	Mollusca	Ostreidae	Crassostreaa virginica	Sea oyster	Moderately shallow water
12.	Mollusca	Petinidae	Pecten raveneli	Scallop	Moderately shallow water
13.	Mollusca		Liogo pealii	Squid	Pelagic
14.	Mollusca		Octopus vulgaris	Octopus	Benthic
15.	Annelida	Nereidae	Neantes (Nereis) virens	Clam worm	Benthic
16.	Arthropoda		Panulirus argus	Spiny lobster	Bentic
17.	Arthropoda		Scyllarides	Shovel-nose lobster	Benthic
18.	Arthropoda	Portuidae	Callinectes sapidus	Blue crab	Benthic
19.	Arthropoda		Callappa flammea	Box crab	Benthic
20.	Arthropoda	Ocypodidae	Ocypode quadrata	Ghost crab	Sandy beach (near sea water)
21.	Arthropoda		Eupagurus bernhardus	Hermit crab	Benthic
22.	Arthropoda		Squilla mantis	Mantis shrimp	Benthic
23.	Arthropoda		Balanus balanoides	Bernacle	Benthic

24.	Echinodermata		Astropecten irregularis	Starfish/sea star	Benthic
25.	Echinodermata		Arabica punctulata	Sea urchin	Benthic



Figure 13: Forest Elephant (*Loxodonta africana*)

3.1.5 Upper Guinea Biodiversity Hotspots

The Upper Guinea Forest is what remains of the fragmented forest along the Gulf of Guinea in West Africa. The Upper Guinea Forest extends from Eastern Sierra Leone to Eastern Togo, and is separated from the Lower Guinea Forest by the Dahomey Gap, now the Republic of Benin. Lower Guinea Forest begins from Western Nigeria to Eastern Cameroon. Most of what remains of the Upper Guinea Forest is in Liberia and contains the protected and proposed protected areas.

3.1.6 Protected Areas of Liberia

3.1.6.1 Sapo National Park

The Sapo National Park (SNP), created in 1983, was the only protected area in Liberia up to 2003. By October 2003, one additional protected area (Mount Nimba Nature Reserve), was declared, thus bringing to a total two protected areas in Liberia. The two areas were among seven areas recommended for strict nature conservation in a joint Government of Liberia/IUCN/WWF survey carried out from 1978 to 1979. During the initial stages of the civil war (1989-96), nearly all management activities ceased at the park, and no new conservation initiatives were undertaken elsewhere in the country. In March 1998, an assessment of community development needs around SNP was carried out; it took a forward-looking perspective, identifying the park's immediate needs and threats. Also localized disturbances and utter destruction of local communities' social fabric and livelihoods were documented and confirmed in a June 1999 report on the park by the Forestry Development Authority (FDA).

Fauna and Flora International and WWF-West Africa worked with the FDA and SCNL to prepare a two-year initiative to restart management of Sapo National Park, which was funded principally by the Darwin Initiative of the UK Department of Environment, Food and Rural Affairs and by WWF-International from April 2000 through approximately July 2002. The objectives of this initiative are to (1) re-establish active, effective, planned management of Sapo National Park, (2) build local communities' support and respect for SNP, (3) build Liberian capacity in conservation management and planning, (4) build Liberian capacity in protected area management field skills using SNP as the primary training ground, and (5) assist the Government of Liberia to evaluate and choose areas for expanding the protected area network through developing a rapid ecological assessment index for evaluating an area's conservation value. In parallel, SCNL received a grant from the Whitley Foundation to initiate a faunal monitoring program at SNP to investigate large mammals like the forest elephant and many duikers. The project is assisting to develop the ecological index mentioned in objective 5, and to monitor an area proposed as an extension to SNP. These projects are well underway and have created significant positive momentum.

An initial 18-month operational plan for SNP prepared in March 2001 needs to be expanded into a longer-term management plan for the park and the surrounding landscape. This initiative has also confirmed the extraordinary biological value of the Park as well as adjacent areas, which have been proposed as extensions to the Park. However, SNP and its surrounding landscape remain relatively untouched by commercial activities and are still of extraordinary conservation value.

3.1.6.2 Mount Nimba Nature Reserve

Created in October 2003, Mount Nimba Nature Reserve brings to two (2) the number of protected areas in Liberia. Dominated by a semi-montane and deciduous forest, it is one of the 14 centers of plant endemism within the Upper Guinea Hotspot. The Mount Nimba Massif is located within the Sanokole quadrangle and is found on the northeastern border of Liberia.

Due to the mountainous effect, the area has a milder temperature during most of the year than the rest of the country. The hills and mountain ranges with their special vegetation are the favorite migration and wintering sites of palearctic migrants such as European pied flycatcher, *Ficedula hypoleuca*, spotted flycatcher, *Muscicapa stritata*, Garden warbler and rock thrushes *monticola* found in rocky areas. It is believed that the Nimba Range does not have the full height to develop a true montane rainforest. The Nimba slope between 500 and 700 meters contains a large number of plant species, representing not fewer than 82 genera of trees and brushes. *Piptadeniastrum*, *Heritiera*, and *Lophira* are common. Between 700 and 900 meters *Parinari* becomes increasingly common, as well as *Parkia* and associated species. There is an ecological boundary at about 850 meters from where a dense layer of clouds usually covers the slope and ridges except during the dry months. Nimba is an important bird area and a designated world heritage site.

Conservation initiatives date back to the late 1960s when a research program was planned and undertaken by Kai Cury-Lindahl under the leadership of Malcolm Coe in 1964. The Nimba ornithological study was also conducted during this period. The first ornithologist who worked around Mount Nimba was Stuart Keith from the American Museum of Natural History, New York and he discovered two (2) species new to science and a sub-species identified as Nimba Flycatcher, *Melaenornis annamarulae* and the yellow-footed honeyguide, *Melignomon eisentrauti*.

In 1968, the German Forestry Mission to Liberia conducted the Nimba National Forest Inventory, which described the Nimba Range to contain a forest of transitional belt between lowland and mountain evergreen forest. As a result, the Government proclaimed two national forests, the East and West Nimba National Forests. The study shows that the Nimba Range is not high enough for the development of true montane rainforest. There is an ecological boundary at about eight hundred fifty (850) meters up wards, a dense layer of clouds usually cover the slopes and ridges except in the dry months. To date, only small remnants of forest are now left above 1200 meters dominated by *Parinari* and *Garcinia polyanatha*.

In the 1970s, the IUCN conducted a detailed survey and as a result the area was proposed as a Nature Reserve. Beginning 1971, the Forestry Development Authority, the Agency of Government responsible for forestry in Liberia, saw the need to rehabilitate portions of the area already degraded by logging activities and shifting cultivation. They began a tree-planting programme, which later extended to large areas of plantations. In December 1996 and January 1997, a German Forester, Mr. Wulf Gatter, with interest in ornithology, traveled to Liberia during the civil war (1989 – 2001) to begin actual work on the Mount Nimba Range. At the end of his work, he recorded many species of birds around the Nimba Range. Mr. Gatter is author of the book, “Birds of Liberia”, published in 1999.

3.1.6.3 National Forests

There are eleven (11) national forests currently under partial protection. These forests are set-aside as production forests, from where concession areas are carved out. Conservation activities such as wildlife management are permitted, but no farming,

hunting and human settlements (except logging camps and similar activities) are permitted in the national forests. These forests are situated in the northwest and southeast of the country. See table 14:



Figure 14: A Partial view of The Grebo National Forest near River Gee

Table 14: National Forests and Related Data

NATIONAL FOREST	AREA IN ACRES	AREA IN HECTARES
Krahn-Bassa	1,270,000	513,962
Grebo	643,603	260,462
Gola	510,168	206,995
Kpelle	432,000	174,828
Yoma	6,456	2,649
Lorma	176,000	71,226
South Lorma	107,503	43,506
Gbi	81,370	32,930
Gio	165,480	66,969
East Nimba	71,650	28,966
West Nimba	32,000	12,950
TOTAL	3,496,230	1,415,443

3.1.6.4 Proposed New Protected Areas

In November 1998, March 1999 and April 2000, conferences were held in Monrovia under the auspices of FDA with participation of national and international NGOs, and discussed ways, among other environmental issues, of re-invigorating biodiversity and protected area conservation in Liberia. All three workshops concluded that (1) restarting active management of SNP was Liberia's top conservation priority, along with (2) an intensive training campaign for Liberians in wildlife and protected area management to replace the ageing pre-war staff, (3) creating a scientifically sound and representative system of protected areas across the country, and (4) a massive public awareness campaign on the environment. These priorities are in harmony with the FDA's 10-Year Development Plan, prepared in 1997 for forest management activities in Liberia.

In early 1999, the World Bank/WWF Global Forest Alliance supported a survey of the nearby Cestos and Senkwehn Rivershed forests in the Krahn-Bassa National Forest, which have been proposed as a national park and part of a south-east Liberian biosphere reserve including Sapo National Park. Unfortunately, due to intense logging and subsistence agricultural activities in this area, its conservation value has been seriously undermined and the possible boundaries of a biosphere reserve are being reconsidered.

Since the second half of 2001, The FDA, the Ministry of Planning and Economic Affairs and National Environmental Commission of Liberia have teamed up with Conservation International and FFI to undertake a national-level forest re-assessment and updating of the Liberian protected area system. The project is using satellite imagery, GIS and a facilitated process in Liberia to determine the criteria for classifying different types of protected forest in Liberia, to identify the important areas of forest cover in Liberia, to map these, to carry out field visits, to assess their biological and socio-economic characteristics not visible from satellite images, and to prepare recommendations for updating the country's protected area system. This initiative is to be completed in 2004. This is a national survey of forests and forest biodiversity, which is drawing on the rapid biological assessment index under development.

Table 15: Proposed Protected Areas

Name	Proposed Designation	Estimate Coverage Hectares/Acres		Estimated Coverage of additional Areas Hectares/Acres		Proposed time frame for Gazettement
Lake Piso	Nature Reserve	30,766	76,025			July 2002
Cestos Senkwen	National Park	91,698	226,595			July 2002
Wologezi	National Park	80,001	197,690			December 2002
Grebo	National Park	-	-	260,000	643,000	July 2002
Wenegizi	National Park	71,422	176,491			December 2002

3.1.7 Traditional and Community Forestry

Sustainable Biodiversity management requires a natural balance between commercial, conservation and communal uses of the forest. The concept of the development of traditional and community forests is based on the fact that cultural and biological diversity are closely interlinked. When indigenous people have their environments destroyed, when they are uprooted and displaced and lose their identity, there is danger that their vast store of knowledge will be lost, both to the people themselves and to humanity. One way to maintain traditional knowledge is to establish community forests, which can be preserved for the survey of plants and other products of significant values, enhanced through the use of traditional knowledge. This is conceived with the background that forests, especially in the tropics, contain most of the world's biodiversity. It is believed that about 80% of the products used by pharmaceutical companies come from tropical forests. Community forests can easily promote the CBD requirement of access to genetic resources and the fair and equitable sharing of benefits arising out of their utilization. This has not been the case with Liberia.

The concept of community forestry is very new in Liberia. However, there have been traditional communal farms from time to time. Traditional communal farms are owned by clans or chiefdoms and planted with rice and other minor cash crops to support the unit that owns the farm. The crops developed are the property of the clan or chiefdom, and not any one individual. In recent times there have been attempts to develop community forests in Liberia.

The only large-scale community forestry project was undertaken by the Society for the Conservation of Nature of Liberia in southeastern Liberia. With funding from the Catholic Relief Services (CRS), SCNL initiated a project aimed at establishing community forests in southeastern Liberia proximal to the Sapo National Park. The goal of the project was to empower local community people to establish permanent community forests where sustainable use and local participatory research on non-timber forest products can be conducted and documented.

Three community forests, each one square mile large, were established in Kabada, Geeloh Town and Nimopoh Clan, all in Sinoe County. A survey conducted using traditional knowledge, identified several plants of medicinal value. The forests have been accorded legal status. Land entitlement deeds were prepared, probated and turned over to the county authorities for submission to the target communities. Results from the community forest survey and works of students are in Appendix 9.

Fauna and Flora International is currently working on a communal forest creation regime to be piloted around the Sapo National Park based on the expressed desire of the communities proximal to the Park. The study will incorporate lessons learned from CRS/SCNL project.

3.1.8 Crops of Economic Value

Our traditional people and the expatriate community have long ago identified plants of economic value in Liberia. Major crops of economic value importance are *Hevea brasiliensis* (Rubber), *Theobroma Cacao*, (Cocoa), Coffee species (Coffee), *Oryza Sativa* (Rice), *Zea mays* (maize or corn), *Dioscorea Species* (yam), *Manihot utihissima* (Cassava), *Arachis hypogaeae* (ground nuts) *Vigna Unguiculata* (Cow pea), *Brassica Oleracea* (Cabbage), *Elaeis guineensis* (oil palm), *cocos nucifera* (coconut) *Carica Papaya* (paw paw), *Musa sapientum* (Banana) *Persea Americana* (Avocado/butter pearl), *Citrus sinensis* (sweet orange), *Mangifera idica* (mango/Plum).

Hevea brasiliensis is an important crop grown mostly in the tropics. It is one of the most important and chief export commodities of Liberia because of its latex. Prior to the introduction of rubber, *Funtomia elastica* was the main source of latex. *Hevea* was introduced into West Africa during the Second World War when the demand for rubber was very high. The producing countries in West Africa include Liberia, Nigeria, Ghana, Ivory Coast, and Cameroon (Baffour, 1981). The uses of rubber ranges from the manufacture of flexible tubings, water proof shoes, booths, toys, rollers driving belts, battery cages, tyres to electrical fixtures. Other edible crops of economic value have also been mentioned; many of the plants are sources of foreign exchange earnings while others contribute to the nutritional level of the population providing energy, protein, fat and other body building nutrients.

3.1.9 Ex-Situ Conservation

Few works have been done in a bid to conserve the fauna and flora population of Liberia outside of its natural habitat. In the area of fauna ex-situ conservation, there been have had a number initiatives.

William V.S. Tubman Totota Zoo

The zoo was established in Totota, Central Liberia by the late Liberian President, W.V.S. Tubman. It has been reported that most of the early zoos in West Africa got their first stocks of animals from the Totota Zoo. The zoo is presently inactive.

Lakpazee Zoo

Another privately operated zoo, the Lakpazee Zoo was operated in Monrovia. Managed by Mr. Charles Steiner, a Swiss National, the zoo served as a host to various endemic and threatened species of Liberia. The zoo is presently inactive.

The New York Blood Center's Laboratory (VILAB II)

“VILAB” Research Laboratory is located in Charlesville, Margibi County, Liberia. It was established in 1974 by Dr. Alfred Prince of the New York Blood Center at the Liberian Institute for Biomedical Research. The intention was to carry out research using chimpanzees for the development of vaccines and immunotherapy for hepatitis A, B and C viruses and onchocerciasis “river blindness”. It was hoped that the selection for research in Liberia would result in humane use of chimpanzees with respect for their social and psychological needs and also would, subsequently, allow for provision of lifelong retirement under wild or semi-wild conditions.

The initial concept of releasing retired chimpanzees into the wild was abandoned when Dr. Prince realized that VILAB's captive chimpanzees had lost their fear of humans, and could thus pose a danger to tourist and villagers living adjacent to park areas. This would definitely put the existence of the chimpanzees in jeopardy.

VILAB acquired four (4) 10 – 90 acre islands in the nearby Farmington and Du estuaries and have released groups of 15 – 30 chimpanzees onto these islands. Release onto the islands began in 1978. Within twelve (12) years, VILAB's personnel gained considerable expertise in the rehabilitation and release process. Although the released chimpanzees became well adjusted to their island habitat and learned to eat the wild fruits available, it was necessary to supplement their diet and, during the dry season, to provide water.

In June 1990, 75 chimpanzees were housed at the laboratory and 90 had been retired on five of the six islands. By 2003, there were 58 chimpanzees: 18 adult females, 15 adult males and 25 adolescents/babies. The 58 chimpanzees presently housed at VILAB are incarcerated in outdoor cages and enclosures. Since May 1990, there have been 69 documented live births (plus one infant born dead); only 34 have survived. Eighteen (18) released between April 2000 and April 2001 currently inhabit two islands.

Botanical Gardens

For floral population on the other hand, two (2) institutions have been identified to have programs for ex-situ conservation. The Firestone Plantations Company manages a botanical research garden, which is home to numerous indigenous species and exotic ones. Pollution Control Association of Liberia (POCAL) also maintains a botanical garden in the Township of Johnsonville, Montserrado County. This botanical garden serves as a habitat for mainly threatened and vulnerable species of Liberia.

3.2 Agricultural Systems

3.2.1 Biodiversity in Agricultural Systems

There is general understanding that the country is going through a seemingly unending food crisis. Agricultural productivity and total annual food and fiber production are in shortfall, agriculture productions and progress in agricultural growth has been slow and limited in extent. The agricultural sector, at present, is dualistic with a small modern segment and a relatively large traditional enclave. The main source of Liberia's food supply appears to be derived from small-scale farming and this may account for about 60% of the total output.

The agro-ecosystem of Liberia contains four major zones – (1) the coastal plains (2) hilly zone (3) mountain and plateau zone and (4) the northern highland zone. Thirty percent of the land area is arable while 2.5 % is pastureland. The agriculture biodiversity of the nation encompasses rich flora and fauna population which is characterized by domesticated plant and animal species, soil micro – organisms, pollinators, pests, wild relatives of domesticated crops and animals as well as plant and animals genetic materials including varieties, hybrids and different types of germplasm. Major crops grown are rice, cassava, maize, oil palm, cocoa, coffee, rubber and sugar cane. The Asian rice species (*Oryza sativa*) and the African species (*Oryza glaberrima*) are the two rice species grown. *Oryza glaberrima* is nowadays rare. Twenty-two aquatic varieties (19 exotic and 3 indigenous) and thirty-two terrestrial (25 exotic and 7 indigenous) are available. Nearly all the exotic varieties were brought from the West African Rice Development Association (WARDA).

About 90% of the locally produced rice is grown upland. Most of the upland soils are lateritic, acidic, infertile, and low in humus. The swamp soils are comparatively better in nutrients and humus; they are however, waterlogged from May to October. Traditional farming with its low technologies still dominates the agriculture sector. Shifting cultivation and livestock production remain their characteristics. Pastureland estimated at 182,000 ha is largely unexploited because livestock production is still an infant industry in Liberia.

Livestock production in Liberia has always been the least prioritised as compared to crops. The industry plays a minimal role in Liberian agriculture. This is indicative of the high annual importation of livestock as well as livestock products. Cattle, goat, sheep, pig, rabbit, guinea pig, chicken, duck and guinea fowl are the main animals used in Liberian livestock agriculture. Although the local breeds are well adapted to the local conditions, their productive capacity is lower than that of the exotic breeds. Local breeds have been recorded as producing stunted babies, and the maturity period is longer than that of the exotic breeds. Research in Animal Husbandry in Liberia is very weak. Livestock feeding, housing and health are also major problems in the sector. Livestock population for eight counties (Montserrado, Margibi, Nimba, Sinoe, Bong, Rivercess, Grand Bassa, and Grand Gedeh) are compared to both pre-war and post-war Liberia (Table 5)

Nimba County is recorded to have the highest livestock population in both pre-war (55,096) and postwar (24,362). The modern segment comprises a number of firms, prominent among which are the Firestone Plantations Company, Cavalla Rubber

Corporation, Liberia Agricultural Company, Cocopa Rubber Corporation, Weala Rubber Corporation, which employ huge labor.

3.2.2 Pastoral Landscapes

There are fifteen or more landscapes in Liberia. They are used to raise large ruminants (cattle) and small ruminants (goats and sheep). Permanent pastures account for two (2) million hectares in terms of land use for 1998 (FAO, 2001). The government of Liberia has established four (4) major pasturelands intended to enhance and maximize livestock production. These ranches and pasturelands are listed in Table 18. Most of these ranches are colonized by weed as there are no livestock.

Table 16: Pasturelands of Liberia

	Pastureland	Location	Ownership
1.	Ricks Institute	Montserrado County	
2.	Todee Ranch	Montserrado County	
3.	Central Agriculture Res. Institute	Bong County	
4.	Bong Mines	Bong County	
5.	Cuttington University College	Bong County	
6.	J.T. Philips	Kpein, Nimba County	
7.	Karweaken	Grand Gedeh	
8.	Jaoudi	Grand Gedeh	
9.	James Greene Agriculture Training Institute	Sinoe	
10.	University of Liberia College of Agriculture and Forestry	Fendell Campus, Montserrado	
11.	Liberia Agriculture Company(LAC)	Grand Bassa	
12.	David Moore Farm	Grand Bassa	
13.	Foya	Lofa	
14.	Grand Kru	Grand Kru	
15.	Maryland(Three Ranches)	Maryland	

Source: Table adapted from Field Survey, 2002

3.2.3 Aquaculture and Fisheries

Aquaculture was established in the early 1950s in Liberia. The aquaculture institutions are: the Central Agricultural Research Institute, Lofa County Agriculture Development Project, Bong County Agriculture Development Project, Nimba County Agriculture Development Project and the Klay Aquaculture Fishery. These institutions were all functional in constructing, breeding and supplying local indigenous fingerlings such as Tilapias and Clarias to local fish farmers for stocking their ponds. These institutions were also involved in training fish farmers in aquaculture production. Presently, they are all in ruins due to the 1989 civil conflict except the Klay Aquaculture Hatchery which was rehabilitated by the Lutheran World Service/World Federation in 2000 but later destroyed in 2002 during the resumption of renewed fighting. Aquaculture production contributed immensely in providing protein for the farmers and their families. It also provided money for fish farmers from the sales of fish, thus contributing to poverty reduction.

Marine fisheries as well as inland fisheries and aquaculture are the two main components of the Liberia fishery system. Marine fishery accounts for most of the fish catch of the country. The continental shelf provides habitat for various fishes such as tuna, shrimp, lobsters and other fishes with fins. It covers 70,000 sq. miles, but it is of irregular shape. Artisanal fisheries cover about 20,000 km² of fishing grounds. This sector accounts for a workforce of 10,000 including full time, part-time, sport fishermen and fishmongers. It generates revenue between US \$10 and \$15 million, corresponding to 12% in GDP of the agriculture sector. It provides 65% of the protein needs of the country. Prior to the 1989 civil conflict, marine waters accounted for about 85% of the annual fish consumption while the inland recorded 15%. Table 17 indicates that total annual marine catch increased significantly in 1999. This accounts probably for the high national demand for fish consumption coupled with the increase of fishing companies. In 2002, a reduction in the total annual marine catch was recorded. The pelagic and some demersal fish species that are being exploited are as follows: sardinellas (*Sardinella maderensis* and *Sardinella aurita*), chub or Spanish mackerel (*Scomber japonicus*), bonga (*Ethmalosa fimbriata*) and anchovy (*Engraulis encrasicolus*). Species of the families carangidae and thunidae are also recorded. Other important demersal fish group exploited by marine artisanal fishers belongs to the families sparidae, pomadasidae, scienidae and serranidae.

Table 17: Volume of Fish Production, 1995 – 2002

Year	Artisanal	Industrial	Total
1995	3460	1675	5135
1996	2036	1104	3140
1997	2519	2061	4580
1998	3757	3071	6830
1999	7078	4394	11471
2000	5331	5003	10334
2001	6543	4228	10771
2002	4899	5009	9908

Source: (Regulatory and Statistics Section, Bureau of National Fisheries, Ministry of Agriculture, 2002)

3.2.4 Agro-forestry and Tree Plantations

It is widely recognized by many development agencies that tree planting and establishment of woodlots should be an integral part of rural development programmes. This is considered because plantation forestry fulfils many roles in agriculture in that farming practices can be combined with tree planting of any kind. In addition, trees can be the ingredients in modifying the environment, which is critical to successful cropping. A simple woodlot can provide shade, shelter, soil fertility, bee pasturage, as well as firewood and poles for construction. Woodlots can also support energy needs by using some of the products to produce charcoal and gather firewood. Woodlots can also be used for energy sources in supply of electricity to support wood turbines.

Agro-forestry (taungya) is a land-use system in which trees are grown in association with agricultural or pasture crops through a spatial or temporal arrangement and in which there are both ecological and economic interactions between the trees and other components of the system. Agro-forestry encourages shifting cultivators to settle in one place, thereby reducing rate of deforestation and land degradation. In this system, tree crops can also be planted in association with ornamentals. Raising food crops can continue until overhead shade prevents satisfactory growth of the food crops. This period may be between 4-5 years, during which time many annual crops can be intercropped. Good examples for Liberia are rice, beans and peanuts. The implementation of this scheme requires that trees are planted in a wide spacing between rows to provide the food or cash crops adequate room to survive. Any fertilizer applied to the food crops will usually benefit trees. Similarly, the weeding necessary for the food crops also benefits the tree crops.

This system is not restricted to a family unit with its own area of land to work, but can be adopted in almost any plantation developed where soil and site conditions are suitable for food crop production. Tree planting may primarily serve as a soil improvement mechanism and/or area for grazing of domestic animals. As a soil improvement mechanism, the trees used are usually nitrogen fixing. When the woodlots serve as grazing fields, it enhances supply of valuable meat.

Application of the concept of agro-forestry in plantation development has not been meaningfully developed in Liberia. The system has largely been limited to the planting of upland rice during the establishment of plantations by the Forestry Development Authority. Swamp rice production was later introduced as an extension of agro-forestry by the cultivation of low areas.

Establishment of plantations has not kept pace with land degradation due to deforestation. It is estimated that 2% (480,000 acres) of the land area of Liberia (24,000,000 acres) is lost to deforestation annually, whereas, reforestation has achieved the replanting of about 27,000 acres since the inception of the programme in 1971 with scattered plantations in Grand Cape Mount, Grand Gedeh, Nimba, Bomi, Bong and Rivercess Counties. Additionally, plantation development by FDA has largely made use of exotic tree species as opposed to indigenous species. (See table 18).

Table 18: Species used in plantation development in Liberia

NOG	SPECIES	Provenance	EXOTIC/INDIGENOUS
1	<i>Gmelina arborea</i>	S.E. Asia	Exotic
2	<i>Tectona grandis</i>	Cote d'Ivoire	Exotic
3	<i>Pinus caribaea</i>	Honduras	Exotic
4	<i>Pinus oocarpa</i>	Central America	Exotic
5	<i>Terminalia ivorensis</i>	S.E. Liberia	Indigenous
6	<i>Terminalia superba</i>	S.E. Liberia	Indigenous
7	<i>Triplochiton scleroxylon</i>	S.E. Liberia	Indigenous
8	<i>Khaya ivorensis</i>	S.E. Liberia	Indigenous
9	<i>Cordia olliadora</i>	Nicaragua	Exotic
10	<i>Pterogata macrophyla</i>	S.E. Liberia	Indigenous
11	<i>Eucalyptus spp</i>	Australia	Exotic
12	<i>Ochoma bicolor</i>	Fiji	Exotic
13	<i>Entandrophrama spp</i>	S.E. Liberia	Indigenous
14	<i>Techmeila heckeli</i>	S.E. Liberia	Indigenous
15	<i>Cieba pentandra</i>	S.E. Liberia	Indigenous
16	<i>Hieriteira utilis</i>	S.E. Liberia	Indigenous
17	<i>Nesodogondia papaverifera</i>	S.E. Liberia	Indigenous
18	<i>Acacia spp</i>	S.E. Asia	Exotic

Forestry Development Authority Plantation Reports

3.2.5 Gene Banks

Generally, seed banks can be categorized into two groups in Liberia. They are the village seed bank and the institutional seed bank. The villagers are the custodians of the village seed lots. Their seeds are mainly stored in the thatch roof bin and for institutions; their seeds are in a modernized bin.

There are two institutional seed bank facilities. The institution, which serve as host to these facilities are The Central Agriculture Research Institute (CARI) and the Small holder Rice Seed Project. These institutions are located in Bong County, and presently both CARI and SRSP lie in ruins due to the civil war.

The Central Agriculture Research Institute (CARI) served as an institution for conducting agricultural related research. Prior to the civil war, the Small Holder Rice Seed Project (SRPS), which multiplied, dried, processed, stored and distributed improved rice seed, for example LAC-23 and seeds of other crops. The Smallholder Rice Seed Project was established to multiply rice seeds for both upland and lowland small-scale farmers.

3.3 Socio-Economic Aspects of Biodiversity

3.3.1 Eco-tourism

In Liberia, the tourism sector is one area that is underdeveloped despite the sector's great potential. The underdevelopment of tourism can be attributed to the lack of political will on the part of successive governments to develop the sector. The tourist attractions include cultural, ethnic, historical, environmental, recreational and commercial tourism. There are also historical sites and landmarks found within the country, which are of tourist attraction.

Many potential areas that have been recorded in the annals of the tourism industry include:

- ❖ Mount Nimba Biosphere Reserve
- ❖ Lake Piso wetlands in Grand Cape Mount County
- ❖ Sapo National Park in Sinoe County
- ❖ LIBR Chimpanzee Colony in Margibi County
- ❖ Kpatawee Waterfalls in Bong County
- ❖ Lake Shepherd wetlands in Maryland County
- ❖ Edina Slavery Point in Grand Bassa County
- ❖ Bat Cave in Lofa County
- ❖ Darlue Waterfalls in Grand Gedeh County
- ❖ Dead Island
- ❖ Stone Scenes of Grand Gedeh
- ❖ Red Deer Island
- ❖ Goma Waterfalls
- ❖ Sandy Coastal Beaches and Scenic Sites along the Atlantic Ocean
- ❖ Blue Lake in Tubmanburg.

A comprehensive programme would be required for the development of eco-tourism, and therefore benefits can be accrued for socio-economic development of Liberia.

3.3.2 Employment and Income Generation

The rural inhabitants constitute about 70% of the Liberian Population. Most of these rural inhabitants depend on their immediate environment for sustenance, which has immense implications for biological resources. Biological resources provide bush meat for protein, fire wood for domestic heating, wood for construction and employment opportunities for rural inhabitants. Agriculture and forestry being labor intensive employ large number of people both rural and urban; and therefore the conservation and management of biological resources would guarantee the sustainable livelihood of the population.

3.3.3 National Revenue Generation

Before 1990, mining, agriculture and forestry were the major economic activities in the country; however, for the last six years national foreign exchange earnings are dependent principally on biological resources, that is, agriculture and forestry.

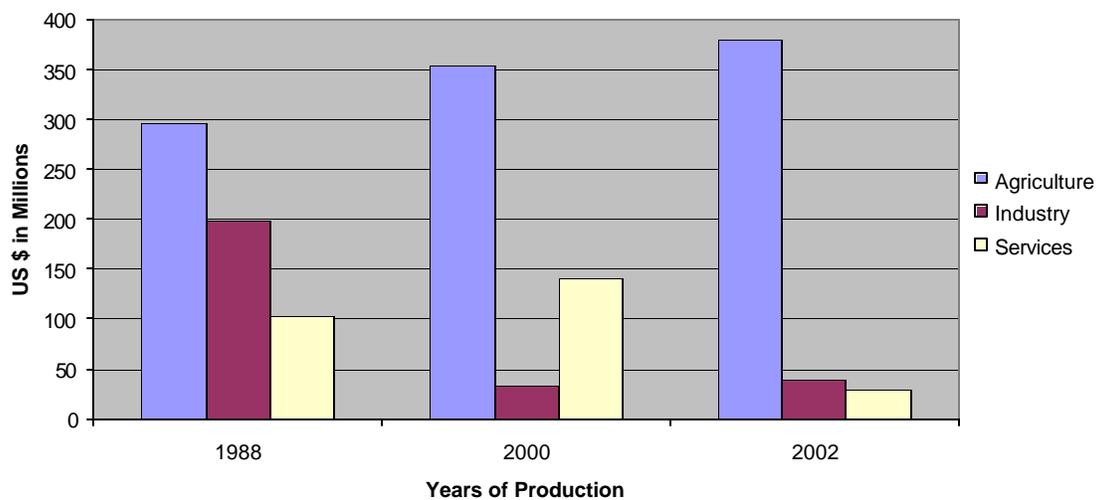


Figure 15: Sectoral contribution to national foreign exchange earning

As shown in the figure above, in 1988 US\$294.6 million, US\$ 199.5 million and US\$ 102.3 million were realized from agriculture, industry and services respectively. In the year 2000, US\$353.2 million, US\$34.0 million, US\$141.3 million were registered for agriculture, industry and services, respectively. Estimates of 2002 reveal US\$ 379.6 million, US\$ 38.4 million and US\$ 28.8 million for agriculture, industry and services, respectively.

3.4 Policies, Laws and Institutions for Biodiversity Management and Conservation

3.4.1 Natural Resources Management Policies

Prior to the coming into being of the National Environmental Commission of Liberia, there existed no central administrative and institutional arrangements for environmental activities. The management and protection of the environment was done at a sectoral level through the necessary line ministries and autonomous agencies. In May 2003, the Government of Liberia passed into law three (3) environmental instruments that form the bedrock for the coordination, integration and harmonization of programs and activities

relating to environmental matters in the country; and for legal and policy framework for biodiversity conservation and sustainable use in Liberia. They are:

- The National Environmental Policy of Liberia;
- The Environmental Protection Agency (EPA) Act;
- The Environment Protection and Management Law

The National Environmental Policy of Liberia

The necessity for formulating a national environmental policy is in recognition of the severe impact of man's activities on all components of the natural environment, especially the influences of population dynamics, high density urbanization, resource exploitation and the further realization regarding the critical importance of restoring and maintaining environmental quality for the welfare and development of the people.

The overall goal of the national environmental policy is to ensure long-term economic prosperity of Liberia through sustainable social and economic development, which enhances environmental quality and resource productivity on a long-term basis that meets the requirements of the present generation without endangering the potential of future generations to meet their own needs.

The ultimate aim of the national environmental policy is to ensure the improvement of the physical environment, improvement of the quality of life, and of the people/improvement of the economic and social living conditions of the entire citizenry, present and future generations. It seeks to ensure reconciliation and coordination between economic development and growth with the sustainable management of the natural resources. Particularly, the policy seeks to:

- Maintain ecosystems and ecological processes essential for the functioning of the biosphere;
- Ensure sound management of the natural resources and the environment;
- Adequately protect human, flora, fauna, their biological communities and habitats against harmful impacts, and preserve biological diversity;
- Integrate environmental considerations in sectoral and socio-economic planning at all levels throughout the nation; and
- Find common solutions to environmental problems at regional and international levels.

The national environmental policy also spells out priority areas of social and economic development which include occupational health and safety; development of human settlements; recreational space; national monuments and cultural heritage; poverty alleviation; population management; environmental impact assessment; environmental information; conservation of biological diversity; conservation and management of water resources; conservation and management of wetlands; and environmental economics. It also covers sustainable management of sectoral systems including land use; forest and wildlife; protected areas; energy production and use; control of toxic and hazardous substances; agricultural/forestry chemicals; waste management and sanitation; marine and coastal management; mining and mineral resources; noise and air pollution. The development of people's participation is also highlighted.

The Environmental Protection Agency (EPA) Act

This Act created the Environmental Protection Agency (EPA) of Liberia, as the principal authority over all environmental programs and activities in the country. It also provides the organizational structure of the EPA, headed by an executive director, and assisted by a deputy executive director, legal assistant and administrative/finance assistant. The agency recognizes the role of sectoral environmental units such as water, agriculture, maritime, energy and forestry. These units are to work in conjunction with the respective line ministries and autonomous agencies that are involved with the environment. The agency also has an environmental conservation section that will oversee international environmental conventions such as the Convention on Biological Diversity, United Nations Framework Convention on Climate Change, Montreal Protocol, and the Cartagena Protocol on Biosafety.

The Environment Protection and Management Law

The law forms the legal framework for the sustainable development, management and protection of the environment by the Environmental Protection Agency in partnership with relevant ministries, autonomous agencies and organizations as well as in a close and responsive relationship with the people of Liberia. It also provides high quality information and advice on the state of the environment and matters connected therewith.

The Law stresses intersectoral coordination and allows for sector specific statutes. It also addresses a wide range of environmental issues including environmental impact assessment, audit and monitoring; environmental quality standards; pollution control and licensing; guidelines and standards for the management of the environment and natural resources; protection of biodiversity, national heritage and the ozone layer; inspection, analysis and records; international obligations; information, access, education and public awareness; and offences.

3.4.2 Laws for Conservation, Sustainable Use and Benefit Sharing of Biodiversity

The country has not developed any specific laws to address the three objectives of the Convention on Biological Diversity. However, the Environment Protection and Management Law provides for conservation and sustainable use, but there is no provision for access to genetic resources and the fair and equitable sharing of benefits arising out of their use. There is thus the need for preparing a national environmental action plan (NEAP) and to revise the Environment Protection and Management Law to address the three objectives of the Convention.

3.4.3 Institutional Settings for Biodiversity Management and Conservation

Several institutions, including Government Ministries and Agencies, local and international NGOs, academic and research institutions and some development partners participated in the process. Most of these institutions have not been able to fully carry out their responsibilities. The following constraints are common to nearly all the institutions.

1. Inadequate trained personnel and misplacement of available personnel
2. Lack of basic facilities and infrastructure
3. Low level of public participation
4. Poverty
5. Inadequate public education
6. Insufficient political will
7. Inadequate policy and legislation
8. Lack of coordination and cohesion

Government Ministries and Agencies:

Environmental Protection Agency (EPA)

Principal authority for the management of the environment, and mandated to coordinate, monitor, supervise and consult with relevant stakeholders on all activities in the protection of the environment and sustainable use of natural resources; promotes environmental awareness and implementation of the national environmental policy and the environmental protection and management law; oversees the implementation of international environment related conventions.

Forestry Development Authority (FDA)

Responsible to sustainably manage the forest and its related resources. Provides long and middle-range planning in the forestry sector as well as preparing forestry policy, law and administration; supervises of adherence to forest legislation and concession agreements; calculates and determines forestry fees; evaluates investment proposals, executes reforestation and forest research and training; monitors activities of timber companies and executes protected area programmes and administers wildlife and national parks.

Ministry of Agriculture (MOA)

Plans, executes, administers, manages and supervises agriculture programs and provides extension services; trains local farmers in improved cultural practices, and supplies farm inputs to enhance food security.

Ministry of Lands, Mines and Energy (MLME)

Has the statutory responsibility for the development of mineral, water and energy resources of the country and the administration of its lands; in charge of land surveys in all parts of the country; coordinates the activities of miners of gold and diamonds, including granting of operation licenses; regulates beach sand mining and works along with the Ministry of Agriculture and the University of Liberia to conduct training and research on land rehabilitation.

Ministry of Rural Development (MRD)

Integrates developmental activities with rural activities; is in charge of the development of farm to market and feeder roads; provides safe drinking water to rural communities; involved in rural planning, low-cost housing projects for the acceleration of rural development, including rural energy generating activities.

Ministry of Planning and Economic Affairs (MPEA)

The Ministry serves as the direct link between implementing Ministries/Agencies, NGOs, PVOs, and the international community. In addition, MPEA is responsible to:

1. Give technical guidance to all GOL Agencies in the preparation of development programs and projects;
2. Review proposals for new development programs and projects on changes in existing programs and projects under consideration in view of the resources available and make recommendation to the national planning council;
3. Review progress made on programs and projects, which have been adopted, initiating special investigation into the execution of those programs and projects, and report findings and recommendations to the national council

Ministry of Internal Affairs (MIA) –Responsible to administer the affairs of all Government functionaries ‘within local and urban areas of Liberia. The Ministry oversees the activities of local Government bodies such as the chiefdoms and clans; supervises all County Superintendents; guarded by the revised interior regulations of Liberia, which give the Ministry custodianship over all private and public properties within the territorial confines of the country.

Bureau of Maritime Affairs - In charge of Liberia’s maritime programme, with much of its work directed at ship registry.

Ministry of Health and Social Welfare (MOHSW)

The Ministries coordinates and administers the general health services of the country; ensures the availability of drugs; collects health statistics and monitors events and conditions affecting the general public. The Ministry is in charge of preventive and curative services, and vital statistics for the registration of deaths and births.

Monrovia City Corporation – Monrovia City Corporation was first created as a Commonwealth District in 1833 by the Commonwealth of Liberia. A legislative Act of 1973 abolished the Commonwealth District and created the Monrovia City Corporation, giving it all municipal rights, powers and authorities, including enforcement of city ordinances, management of municipal wastes, recreation, public education and awareness and provision of services in environmental health and sanitation.

Liberia Water and Sewer Corporation – Responsible to Plan, execute, administer, manage and supervise the generation and distribution of water to the public. It is also responsible for the supply of safe drinking water and provides services concerning the sanitary disposal of waste and maintains the water sewerage facilities. The Corporation produces, transmits and distributes pipe-borne water. The Corporation rehabilitates water and sewer facilities throughout Liberia and improves and expands services to meet the water needs of all residents.

Liberia Electricity Corporation – Created by an Act of the National Legislature in 1973 with the mandate to generate, transmit, distribute and sell electricity at an economically reasonable tariff throughout the length and breadth of the country; plans, executes, administers, manages and supervises the generation and distribution of electricity.

Liberia Petroleum Refining Corporation – Plans, executes, administers, manages and processes crude oil into finished petroleum products for the Liberian market and also ensures that petroleum products are always available.

Liberia Mining Company (LIMINCO)

The Liberia Mining Company took over from LAMCO JV Operating Company and is placed in charge of the facilities of that company. LIMINCO is therefore responsible for any negotiations regarding exploration of Mount Nimba and future investment of that massif.

National Non-governmental Organizations:

Society For the Conservation of Nature of Liberia (SCNL)

The Society for the Conservation Nature of Liberia, founded in 1986, is the oldest and pioneer environmental and Conservation NGO in the country. SCNL conducts research on natural history of Liberia and makes the results widely public. SCNL advocates for the conservation of the forest of Liberia and associated resources, especially wildlife. The Society has been actively involved in advocacy for creation of protected areas. SCNL is involved in bio-monitoring and socio-economic surveys.

Farmers Associated to Conserve the Environment (FACE)

Mission is to help empower local farmers to engage in modern, stable farming practices that are sustainable, environmental friendly, and have the propensity to yield significant positive net income. FACE is involved in seed rice multiplication and mangrove conservation. The focus is to promote stable, modern farming systems in order to improve food production and enhance the natural environment.

Society Against Environmental Degradation (SAED)

Promotes environmental awareness, education and action oriented projects in urban and grass-rooted communities. SAED is involved in working in wetlands and water birds management, promoting the alternative sources of energy and promoting and conducting environmental impact assessment as a decision-making tool for sustainable development.

Center for Environmental Education and Protection (CEEP)

Center for Environmental Education and Protection of Liberia (CEEP) has the mission to contribute to poverty reduction through environmental education and public awareness, lobby and advocacy in sustainable development. CEEP has been engaged in teaching principles and concepts of environment in schools and the communities through workshops and seminars. There are also on-going programmes in health education, population and nutrition mainly for the youth. The organization also provides environmental consultancy.

Environmental Relief and Development Research Organization (ERADRO)

Environmental Relief and Development Research Organization (ERADRO) is involved with the promotion of extension services in the field to identify and resolve health problems arising from environmental factors in basic principles of environmental research, social mobilization, animation of health/hygiene education, solid/domestic waste programmes in schools and communities.

Pollution Control Association of Liberia (POCAL)

Involved in advocacy for waste management and disposal; organizes nature clubs in schools and supports drama clubs in communities; has established a botanic garden, in Johnsonville, Montserrado County.

Liberia Indigenous Forum for the Environment (LIFE)

The Liberia Indigenous Forum for the Environment strives to work with local communities to bring about awareness and empowerment on matters of environmental and conservation concerns. One of its major thrusts is to ensure that traditional knowledge is respected and maintained in Liberia, and promoted in conservation of biodiversity, especially promotion of medicinal plants. LIFE has been concerned about the state of timber operations, especially the fate of some timber species thought to be threatened or vulnerable. LIFE seeks to contribute to sustainable timber management and benefit sharing by local communities in Liberia.

Save My Future Foundation (SAMFU)

Mission is to promote sustainable development of Liberia's natural and human resources. The activities are mostly community-based, involving indigenous and local community people. SAMFU's major technique is the participatory rural appraisal method. SAMFU gathers and disseminates information on the activities of multinational companies operating in Liberia, especially those working in the extractive industries.

Association of Environmental Lawyers (GREEN ADVOCATES), INC. (AEL), established in December 2000 by a group of lawyers, strives to create and maintain a multi-disciplinary environmental team, Green Advocates Team on the Environment (GATE), comprising not only lawyers but also professionals with science, engineering and other career backgrounds critical to the accomplishment of the group's mission of PROTECTING THE ENVIRONMENT THROUGH LAW; works with stakeholders in Liberia to promote environmental protection; provides primarily but not exclusively legal support to green groups and parties who suffer environmental inequity; advocates basically appropriate environmental protection legislation; pursues court action to compel compliance with and enforcement of current green laws; develops a legal regime for park management; formulates legal communal forest management action plans; strives to make people aware of national and international environmental laws as well as their rights and responsibilities regarding environmental protection; advances creative ideas and innovative strategies for biodiversity conservation and sustainable livelihood options such as ecotourism, scientific research concession, and conservation for debt relief.

Liberia Community Development Foundation (LCDF)

LCDF implements short and long-term community integrated development projects in conjunction with local community people to enable them alleviate poverty and secure lasting improvement in their quality of lives. LCDF's aims are to:

1. Organizes basic business 'management training programs
2. Effects micro credit programs
3. Develops intensive agriculture programs;
4. Upgrades health and sanitation in local communities;
5. Provides education to the disadvantaged/underprivileged

Action for Greater Harvest (AGRHA)

The Mission of AGRHA is to "Ensure Sustainable Food Security for Rural Liberian Households". The vision is "A Liberia where rural Liberian households create sustainable food security for themselves".

Union of Rural Farmers Association (URFA)

The organization was founded to assist peasant farmers in the formulation and management of agricultural and rural development community-based programmes that have direct focus on household food security and the provision of infrastructure assets, leading to self-reliance and poverty reduction

Liberia National Christian Institute (LINACIE)

The organization strives to respond to the increasing needs of people with epilepsy. The objectives are as follows:

1. To raise public awareness about epilepsy and its effects
2. To provide care in local communities and displaced centers
3. To improve the quality of lives of people with epilepsy
4. To dissemination information about represent the rights and interests of people with the disease

Society of Liberian Foresters (SOLF)

The four major objectives are to:

1. Creates public awareness about the economic, environmental, aesthetic, cultural and recreational values of the forest resources through education, publication and research.
2. Promotes the wise use of forest and its associated resources
3. Provides consultancy to private forest owners and forest concessionaires
4. Works with other organizations with the view of promoting conservation of forest resources

Enviro-link Liberia, Ltd

Links people and communities to the environment through advocacy, awareness, education, training and research; involved in environmental impact assessment in collaboration with the EPA and other environmental institutions.

Grand Gedeh Community Servant Association (GECOMSA)

Based in Southeastern Liberia, GECOMSA is the forerunner of community-based initiatives to promote the sustainable management of wildlife through a sustained awareness campaign and identification of alternative programs. They conduct campaign on sustainable bushmeat consumption. They are involved in bush meat awareness and sustainable development in Southeastern Liberia, as well as environmental education in Grand Gedeh and River Gee Counties.

International Non-governmental Organizations:

Conservation International (CI):

Uses science, economics, policy, and community involvement to promote biodiversity conservation in tropical rain forests and other endangered ecosystems worldwide. CI works in 23 countries in Latin America, Africa, and the Asia Pacific Region. CI is a field-based, non-profit organization that protects the Earth's biologically richest areas.

Flora and Fauna International (FFI)

The Fauna & Flora International (FFI), an INGO acts to conserve threatened species and ecosystems worldwide, choosing solutions that are sustainable, are based on sound science and takes account of human needs. The institution has been conserving wildlife in Liberia since 1996 when it contributed to restarting management of Sapo National Park following the civil war of the 1990s. FFI is currently implementing a mainly European Commission-funded project in partnership with the Government of Liberia and in collaboration with Conservation International. The project is co-funded by the Critical Ecosystems Partnership Fund (CEPF). The overall objective of this three (3)-year project entitled: **A Re-assessment of Forest Cover, Updating of the Protected Forest System, and Improvement of Environment Information for Liberia**, is to promote sustainable forest management and conservation of Liberia's biological diversity, and to improve overall environment management.

Academic Institutions:

University of Liberia

The University of Liberia attracts many hard-core professionals in the Colleges of Science and Technology, Agriculture and Forestry and the Business and Public Administration. College of Science and Technology offers bachelor's degree in biology, zoology, engineering, chemistry, geology, physics and mathematics; the College of Agriculture and Forestry offers bachelor's degree in agronomy, general agriculture, general forestry, wood science and technology, and home science and community development; College of Medicine, Regional Planning, College of Liberal and Fine Arts, the College of Business and Public Administration offers bachelor's degree in accounting, management, economics and public administration.

Cuttington University College

The Cuttington University College in Central Liberia offers bachelor's degree in general science, biology, chemistry, physics and mathematics. Other relevant courses offered in the area of biodiversity are agriculture and integrated rural development.

Don Bosco Polytechnic

Run by the Catholic Church in Liberia, it offers bachelor's degree in health sciences (including degree in nursing), engineering, business management, and accounting.

United Methodist University (UMU)

The mission statement of UMU is "to provide quality education within a Pan African context through which persons can acquire general and professional knowledge and skills within the framework of Christian values and ethics. This level of education is built on the foundation of Christian and moral principals".

UNITED NATIONS AGENCIES:

UNDP

The six (6) pillars of UNDP's mission are to fight poverty, build good governance, engage in crisis prevention and recovery, combat HIV/AIDS, gender mainstreaming in development and environmental sustainability and rational management of natural resources. Within the framework of the Convention on Biological Diversity, UNDP is one of the three implementing agencies for the Global Environment Facility (GEF) to assist countries to meet the challenges they face in conserving their various environments. The other two are the United Nations Environment Programme (UNEP) and the World Bank. UNDP implemented the process, but went slightly beyond the call of duty. Aside from project funds, UNDP provided a field vehicle for the project and later provided office space for the staff and consultants.

At this stage of our history, coming from a long conflict, which now involves United Nations Peacekeeping for Liberia, the country will definitely continue to look up to UNDP for support to biodiversity conservation.

UNHCR

UNHCR is the agency within the United Nations System responsible for refugees. It was established to respond to and address refugee crises that have evolved over the years. The primary objective of UNHCR is to ensure respect and active recognition for the basic human rights of refugees, including the ability to seek asylum, and to help make certain that no refugees are returned involuntarily to a country where they have reason to fear persecution.

UNHCR established its presence in Liberia in 1991. Since then the nature of UNHCR's operations in the country has evolved and adapted to address the variety of humanitarian challenges that have faced Liberia.

We will expect the agency to respond to the need for rehabilitation lands degraded as a result of refugees and internal displacement.

FAO

The FAO is mainly responsible for promotion of agriculture, with emphasis on food security. FAO ensures that the quest for food security does not compromise sustainable development. FAO has been involved in a national forestry programme, and they served on the steering committee to the project. Assistance will be needed from FAO to enhance agriculture productivity and forestry reform.

UNESCO

UNESCO is involved in the conservation of biodiversity by providing support to education and training on the importance of environment and biodiversity, which should be incorporated in school curricula and research programmes.

UNESCO has funded the tri-national meetings involving Guinea, Liberia and Ivory Coast for the conservation of Mount Nimba, and contributed in efforts for Liberia's accession to the World Heritage Convention in 2002.

Private Sectors:

Liberia Agriculture Company

Operates a rubber plantation in Grand Bassa County; has developed pasturelands and once dealt in raising cattle; develops rubber clones for its own use.

Firestone Plantations Company

Established in 1926, operates the world's single largest rubber plantation at Harbel in Margibi County; establishes nursery for rubber clones and once involved in botanical research; owns and operates the largest private hydro electric plant in the county.

3.4.4 Employment for Biodiversity Management and Conservation

Human resources involved with biodiversity in Liberia are limited. This limitation is characterized by the lack of adequate trained personnel and the migration of trained personnel to developed countries. Most of the already trained personnel are within the agriculture, forestry and biological areas. These few adequately trained personnel are found within the public and private sectors. The public sector that employs human resources in biodiversity is government ministries and corresponding autonomous agencies. Among these are the MOA, MLME, MRD, MIA, FDA, EPA, Bureau of Maritime Affairs, Liberia Water and Sewer Corporation (LWSC), and Liberia Electricity Corporation (LEC). Also local and international NGOs employ people trained in biological sciences.

The Ministry of Agriculture (MOA) employs a wide range of trained professionals and technicians in agriculture, fisheries, livestock, agricultural economics, farm management and agricultural engineering. MOA has three branches, which are directly linked to biological resource management and conservation. These are: the National Bureau of Fisheries, the Bureau of Livestock Services, and the Central Agricultural Research Institute (CARI). The National Bureau of Fisheries is responsible for the control of fisheries activities along the coastal waters including monitoring fishing boats and the development of plans and programs of the fishery sub-sector. The Bureau of Livestock Services is responsible for the provision of veterinary and quarantine services. It is charged with the responsibility of promoting livestock production. The Central Agricultural Research Institute has the mandate to conduct research in the area of crop production, crop protection, genetic improvement, livestock production and fishery. CARI was one of the most affected institutions during the civil war.

The Ministry of Lands, Mines and Energy employs few professionals in the areas of hydrology, cartography, survey, geology, meteorology, mining engineering, remote sensing and aerospace science. It has the statutory responsibility for the development of mineral, water and energy resources of the country and the administration of its lands. This institution is the focal point for the United Nations Convention to Combat Desertification; works along with the Ministry of Agriculture and the University of Liberia to conduct training and research on land rehabilitation.

The Ministry of Rural Development employs few experts in the natural and social sciences for the sustainable use of biodiversity for socio-economic development of the rural dwellers.

The Ministry of Internal Affairs employs mainly local traditional experts, as well as urban and rural planners in conserving and protecting biological resources for the well being of the local communities.

The Forestry Development Authority (FDA) employs many trained foresters. There are very few postgraduate and several graduate professionals. The Wildlife Division of FDA has no trained graduate personnel in wildlife management. A team of technicians is administering the Division. FDA has a directorate, which is concerned with Biological Conservation. This directorate comprises two (2) divisions: The Division of National Reforestation and the Division of Wildlife and National Parks. The National Reforestation Division is charged with the responsibility to carry out and/or facilitate the development of forest plantations, provide technical and advisory services to people engaged in tree farming and Agro-forestry and planting trees in urban communities. The Division of Wildlife and National Parks is responsible for the establishment, monitoring and supervision of National Parks, Nature Reserves, and Game Reserves. It is responsible for the promotion of wildlife management in general, including the judicious utilization of wildlife resources.

The National Environmental Commission of Liberia (NECOLIB) has the mandate to coordinate all environmental related activities, including conservation of biological diversity. It is also the arm of Government responsible to nominate national focal points to the Ministry of Foreign Affairs for the coordination of international environmental conventions, to which Liberia is a signatory. The Commission employs personnel to manage programmes in biodiversity, bio-safety, ozone depleting substances, persistent organic pollutants and coastal/marine.

Training in biological resources management is undertaken by vocational and higher institutions of learning. Among these are the UL, CUC, and BWI. The University of Liberia attracts hard-core professionals in the Colleges of Science and Technology, Agriculture and Forestry and the Business and Public Administration. College of Science and Technology offers bachelor's degree in biology, zoology, chemistry, geology, physics and mathematics; the college of Agriculture and Forestry offers bachelor's degree in agronomy, general agriculture, general forestry, wood science and technology, and home science and community development; the college of Business and Public Administration offers bachelor's degree in accounting, management, economics and public administration.

4. THREATS TO BIODIVERSITY IN LIBERIA

The threats to biodiversity in Liberia are due to several anthropogenic factors, prominent among which are poverty and ignorance, shifting cultivation, misguided timber exploitation and monoculture plantation development, poaching and lack of land use planning. These factors have led to the overexploitation and misuse of biological resources. Without attention and remedial measures taken the situation could reach catastrophic level.

4.1 Threats and Root Causes of Biodiversity Loss

4.1.1 Human Settlements and Population Pressures

Since independence in 1847, the population of Liberia has been growing at an average rate of 3.6%. By 1962, there were 27 persons per square mile (10 persons/km²), and by 1974 the population density had increased to 39 persons per square mile (15 persons/km²), with Montserrado and Monrovia averaging 173 persons per square mile (67 persons/km²). Other densely populated areas recorded in 1974 included Bong, 53 persons per square mile (20 persons/km²), Maryland 55 persons/square kilometers (21 persons/km²), and Nimba 54 persons/square mile (21 persons/km²). As a result of the need for food, shelter, infrastructure and income for the population, these higher densities have brought pressure to bear on the land and natural resources, thus threatening biodiversity.

The arrival of Firestone Plantations Company in 1926, coupled with the Open Door Policy of 1948, changed the population pattern. This resulted in fast growing enclave economies and led to a redistribution of the population, triggering population increase in Monrovia and other urban centers. Lesser concentrations of populations occurred in Lower Buchanan, Cavalla River, Lower St. Paul River, North and Northwest Liberia. There were also clusters of the population along the transport spine between Kakata and Ganta. Other population concentration areas included Yekepa, Bong Mines and large rubber plantations in other parts of the country. In all of these areas, the natural vegetation has been degraded and/or replaced with monoculture rubber farms. The population growth in these areas has also induced land degradation and threatened biodiversity.

The most recent phenomenon is the threat posed by population on biodiversity as a result of the civil war between 1989 and 2003. During that time there were massive internal displacements and refugee movements. Internal displacements occurred all over the country, while refugees were concentrated in north, northwest and southeast Liberia. The refugees and displaced people had to build homes and cultivate farms and engage in hunting to feed themselves. To satisfy their fuel needs, they also collected firewood from any tree found. In some cases, they produced charcoal for energy. They also exerted pressure on game species by hunting for food. As the war prolonged and the situation deteriorated, these activities gradually moved from subsistence levels to income generation. Charcoal, bush meat and round poles were brought to urban centers for sale. This put more pressure on the resources and further threatened biodiversity.

The civil war in Liberia was intermittent and recurring. Consequently, soon after people returned to their homes they were driven out again. Whenever the displaced people settled, they built shelters using renewable natural resources and cleared new grounds. This repeated process of land clearing led to the decimation of some animal and plant species and loss of their habitats.

4.1.2 Shifting Cultivation

About 800 A.D., tropical forests covered nearly the entire country (see figure 22). In 1960-1967 a survey by a German Forestry Mission reported 75% forest cover for Liberia, and in 1985 IDA/FDA/FAO forest resources survey found that figures had dropped to about 50%. The greatest threat facing forests in Liberia comes from shifting cultivation. The 1985 report puts the annual deforestation rate of 0.5%. By 1988 it was estimated at 1%, while recent estimates by the World Resources Institute put annual deforestation rate at 2% of the land area. Shifting cultivation is said to account for about 95% of deforestation. As only 1.17% of Liberia forests are under protection, the remainder is exposed to shifting cultivation.

Under shifting cultivation the location of the farm changes every year. Normally, the area next to the previous field is chosen if a forest is available, otherwise the cultivator would move far away. The farmer is obliged to come back to the already cleared forest after a nine-year fallow. This fallow period is necessary for the build up of nutrients from vegetation debris that comes after harvest. Shifting cultivation is a traditional way to conserve nutrients in the soil. The greatest part of the soils of Liberia is lateritic, which does not contain much essential plant nutrients, most especially nitrogen, phosphorous calcium and magnesium. The little nutrients available in the soil are caught as in a sandwich by iron and aluminum oxides. Thus a subsistent farmer is compelled to shift annually to make profit of nutrient conserved by shifting cultivation fallows for lack of inorganic fertilizers.

Beyond threatening the natural vegetation, shifting cultivation is also a threat to many endangered and endemic animals including birds, mammals and reptiles that inhabit forests. Amongst these are black casqued hornbill, white-breasted guinea fowl and the eagle; and the pygmy hippopotamus, which is found mainly in Liberia and inhabits streams and rivers in the primary forests. Other animals, which are threatened by shifting cultivation, include the African elephant, the chimpanzee, the red colobus and Diana monkeys, the Jenktin's and Zebra duikers.

*Figure 16: Pygmy
(Choeropsis*



*hippopotamus
liberiensis)*

Table 19: Species diversity, endemism and threat

Class	Total species	Total endemic	Total threatened
Amphibians	38	4	1
Plants	2,200	103	46
Mammals	193	?	17
Birds	581	1	11
Reptile	67	2	2
Mollusces	NA	NA	1
Other Inverts.	NA	NA	1
Total		110	79

Source: World Conservation Monitoring Centre, IUCN, FAO

4.1.3 Beach Erosion

Beach erosion is of concern in the coastal cities like Monrovia, Buchanan, Greenville, Harper, Robertsports and Cestos City. Beach erosions come from bad location of seaports and to a lesser extent beach mining of sand for construction and from tidal waves. Coastal erosions are contributing to loss of nesting grounds for sea turtles.

4.1.4 Timber Exploitation and Rubber Plantations

Timber Exploitation

The threats posed by timber exploitation to biodiversity can be summarized as follows:

- a) The creation of needless road network and human settlement;
- b) Excessive removal by logging of only 20 timber species out of the 225 known to Liberia;
- c) Further clearing of land for cultivation;
- d) Skidding of logs by tractors that destroy the vegetation in the path; and



- e) Cutting under sized timber, which has not attained the minimum diameter cut limit, jeopardizes reproduction and survival of the timber species.

The first facet of threats by timber exploitation is that construction of unplanned roads in the forest are often needless in the long run, despite that in the short term they are used for timber exploitation. When logging operations cease these roads encourage shifting cultivators, who eventually establish settlements by clearing vegetation. These roads also provide access for poaching.

Figure 17: Road construction in OTC Concession Area



Figure 18: Stock pile of logs at the Port of Harper

Hence, it is important to take the following measures to counter that threat:

- Enforce regulations for pre-set diameter cuts limits;
- Reclaim unneeded roads after timber operations; and
- Plant local tree species on degraded lands.

Rubber Plantations

There are eight large-scale rubber plantations established in the country. These plantations are owned and operated by foreign business interests. They include: Firestone Plantations Company in Harbel, Margibi County, Cavalla Rubber Corporation in Maryland County, the Cocopa Rubber Plantation (Nimba County), the African Fruit Company (now Sinoe Rubber Corporation in Sinoe County), the B.F. Goodrich (now Gutrich Rubber Plantation in Bomi County), the Salala Rubber Corporation (Bong County) and the Liberian Agriculture Company (Grand Bassa County). These companies have cleared more than 57,000 hectares of primary forest for rubber plantations.

The conversion of huge areas of once diversified humid forest ecosystems into monocultures focusing on only one species, *Hevea brasiliensis*, is of ecological concern, as it has led to biodiversity loss. The tropical ecosystem is characterized by both high species richness in many taxa and complex biotic interactions among components of various species. This richness provides for a positive mutual interaction among species that a single species rubber plantation cannot provide.

As such, plants found in forests adjacent to monoculture plantations depending on pollinator species are threatened with extinction by the loss of the pollinators that often depend on the natural forests for their survival. By the same token, pollinators that are specialized on specific plant diversity could die out if the plant is removed. Maintaining a plant pollinator interaction in the tropics is of utmost importance since tropical forests are sensitive to extinction of pollinators.



Figure 19: Rubber Plantation in Firestone at Harbel

It is therefore necessary that corrective actions be undertaken to:

- a) Leave enclaves of natural forest on high elevations and along waterways;
- b) Determine proportion of land that should be covered by monoculture;
- c) Set aside enclaves of natural forest and wetlands within monoculture areas.

4.1.5 Poaching and Hunting

Livestock production is very rudimentary and at a low level in the country; hence, the major source of animal protein is from poaching and hunting of wild animals. Hunting by definition is the extraction from its natural habitat, by means of shotgun, poisoning, erecting snares and/or netting. It becomes poaching when no legal basis is sought.

Hunting as a threat to biodiversity stems from:

- a) The commercialization of bush meat in the absence of wildlife management strategies.
- b) The lack of basic information such as population density and distribution, sex and reproductive biology. As a result hunting is carried out in all seasons.
- c) The construction of logging roads followed by development of logging camps
- d) The lack of alternative sources of protein
- e) Use of snares results in huge biodiversity loss and wastage because hunters do not visit snares regularly, and some hunters even lose track of where snares are set.
- f) The wanton and reckless construction of roads in the forests followed by human settlements.
- g) Lack of enforcement of the law prohibiting the hunting of endangered species.



Figure 20: Jenktin's duiker (*Cephalophus jentinki*)

4.1.6 Over-exploitation of Biological Resources and Poverty as an Underlying Cause

Over-exploitation of biological resources induced by socio-economic deprivation has had profound pressure on natural ecosystems for firewood, charcoal and medicinal plants, resulting to loss of biodiversity. The modification and subsequent destruction of the biodiversity can lead to the loss of fauna and flora. Some plant and animal species may become totally extinct as a result.

Before the civil war (1989) the use of firewood, charcoal and medicinal plants was at a minimum in the urban areas. Their use was prominently restricted to the rural communities as they were abundant. Nearly every facet of the Liberian population now depends on firewood and charcoal as a source of domestic energy in the absence of public electricity and other alternative sources of energy. Another threat emanating from excessive use of biological diversity is the neglect or reluctance to replenish the essential tree resource through plantation and the promotion of individual and community woodlots/tree farming.

In the same vein the impoverishment of the greater portion of the population creates the situation of dependence on herbal medicine as a principal means of medication. The plants used are harvested without regard to their regeneration capacities.

In a summary, overexploitation of biological resources can be attributed to:

- a) Ignorance and lack of awareness of the effect of the mode of harvest on biodiversity; it may include for example in fishing, the net size, poisoning by plant toxins and the use of chemicals; the total destruction of the plant for the extraction of its exudates as in the production of palm wine
- b) Absence of organized programmes for replenishment
- c) Impoverishment of the population
- d) Poverty

4.1.7 Political Instability and Wars

For the last 14 years Liberia, has been in a state of near anarchy as a result of the civil war that began in December 1989. During this period many human lives were lost (estimated at 250,000 people), properties were destroyed. The consequences of these have been manifested in the following ways:

- Skills essential for environment and biodiversity management were lost through death, incapacities and migration.
- Records and publications (biodiversity information) important for the conservation and sustainable use of biological resources were destroyed
- The only research institution, CARI, was vandalized and destroyed during the war, resulting in loss of crop and livestock genetic materials
- Domestic animals were decimated, including pets like cats and dogs.
- Planting stocks of local food crops such as rice, cassava, sugar cane, plantain and banana were destroyed. This is also true for cash crops such as coffee and cocoa.
- Livestock were also destroyed during the war
- The massive displacement of people affected food security.

The impoverishment of the population, in addition to frequent displacement has resulted in the destruction of plant communities and fauna habitats.

4.1.8 Education in Biodiversity Conservation

The inadequacy of popular education about biodiversity can be attributed to

- a) The absence of environmental education at any level in the schools,
- b) The absence of environmental information centers to provide documentation and referral services to the general public on the conservation and sustainable use of biodiversity
- c) Disruption of awareness programmes conducted jointly by FDA and SCNL by the civil war,
- d) Inadequate human capacities in the conservation and sustainable use of biodiversity,

Inadequate public education and awareness programmes pose threat to biodiversity, as people would continue using biological resources in irrational ways due to ignorance of the consequences of their actions.

4.1.9 Lack of Land Use Planning

When the national forests were declared in 1953, setting them aside for the practice of forestry, it was the first time any land allocation was done. Since then the Government has never established a complete system of land utilization. All lands not under the national forest system are used without any regulation for any purpose including alluvial mining. Thus, they are threatened as a result of the following:

- a) Lack of an appropriate land tenure system and the lack of land use feasibility studies,
- b) Inadequate zonal regulations for villages, towns and cities
- c) Unclear system of ownership and access to land
- d) Confusion within families, and among ethnic groups

4.1.10 Invasive Alien species

There are many floral and faunal species that invaded Liberia over the last several decades. Invasion here means accidental and unplanned introduction of plant and animal species. Some of the plant species are: the water hyacinth, the Nile salad, *Leucecea leucocephalus* and the *Chromolaena odorata*. *Chromolaena odorata*, a perennial shrub is a typical pioneer species of secondary forest succession with a strong heliophilic character and vigorous vegetative development. Initially *C. odorata* spreads through seed dispersion, but after establishment it may also reproduce vegetatively from lateral branches; regrowth occurs after slash and burn cultivation. It was introduced in West Africa around 1937 through contaminated seed lots of *Gmelina arborea*, a tree species imported into Nigeria from Sri Lanka for reforestation purposes. The first observation of *C. odorata* was made in early 1940s from Enugu in central part of Nigeria. The primary mechanism by which *C. odorata* spreads is through human activities. Such activities include road construction and maintenance of dirt (unpaved) roads and railways, which are of major importance in Côte d'Ivoire, Liberia, Congo and DR Congo (Zaire).

The major problem with *C. odorata* is that it provides shelter and breeding spaces for harmful insects such as the variegated grasshopper, *Zonocerus variegatus*, which moves from *C. odorata* variegatus to cassava fields and feeds on the leaves causing important yield losses. Due to its abundant vegetation development *C. odorata* may over grow the young tree and hence leads to poor crop establishment. During the dry season, it constitutes a real fire hazard. Roadsides and open places around human settlements are often overgrown by dense bush of *C. odorata*, making it a nuisance to the settlement and traffic.

In addition to the problem of *C. odorata*

- A) There has not been any inventory done on the alien and invasive species
- B) There are no techniques developed to control the spread of these species
- C) The quarantine service of the Ministry of Agriculture, which is responsible to regulate the entry of alien species, is weak and incapacitated.



Figure 21: *Chromolaena odorata*

There are many alien species, considering exotic food and ornamental plants introduced in Liberia over the years. A good example is our staple, rice, which is an exotic. The most industrious crop, *Hevea brasiliensis* was introduced, and so are many species developed in forestry plantations. Few of the alien species are known to be invasive, but the most offensive are the water hyacinth and *Chromolaena odorata*. Water hyacinth covers the entire surfaces of some water bodies near towns and villages. *Chromolaena odorata* was first seen in Nimba County in the early 1980s, but it has spread to many parts of the country, getting close to Monrovia and other urban centers.

4.1.11 Inadequate Mining Exploitation Schemes

The Government grants Mineral Development Agreements (MDA) in place of mining concessions. The first stage for an MDA is a five-year exploration period, during or after which mining plots are selected. Upon approval of the operator's plan by the Government, mining can proceed by the granting of a license for a maximum of 20 years, depending on reserves. At the conclusion of the exploration phase, the concessionaire

may abandon the concession because he warrants it uneconomical; or identify sub-areas he intends to retain for further investigation and production. Liberia unfortunately has had a history of mineral concessions, which were signed but never advanced beyond the initial exploration phase.

There are presently several mineral concessions in Liberia within which the concessionaires are exploring for and/or exploiting various minerals, iron ore, diamonds, gold, uranium, bauxite, etc.

The New Minerals and Mining Law approved April 3, 2003, requires that environment impact studies (EIS) be conducted and approval for mining is dependent on the reports submitted. There is also a requirement for periodic environmental audit (PEA).

Their threats to biological diversity stem from:

- a) The fact they serve as population magnet. i.e., they attract huge population
- b) People who settle in these areas engage in shifting cultivation to provide themselves with food
- c) They engage in poaching for income and as source of protein
- d) They also use other biological resources for construction, fuel and medicine
- e) Mining also brings about large pits which pose hazards
- f) Mining generates sediments and pollutants which affect river bodies and other floral and faunal habitats
- g) There is the lack of environmental impact assessment

4.1.12 Inappropriate Application of Agrochemicals

The misapplication and indiscriminate use of agrochemicals can:

- a) Result into endangering the food chain and consequently affecting the status of biodiversity, and the agrochemicals may affect the functioning of the organ of plants and animals;
- b) Have a negative effect on soil biodiversity, agro-biodiversity, and aquifers
- c) Result over-reliance on agro-chemicals rather than alternatives, thus affecting biodiversity
- d) Occur if there is insufficient training in the use of agro-chemicals

4.1.13 Inadequate Law enforcement for Resource Exploitation

The Ministries and Agencies of Government, which by their operations are involved in biodiversity conservation and management, were created by legislative enactments that spelled out their responsibilities. Prominent amongst them are the agency's obligation in protecting the environment. Salient example of this is the legislative enactment creating the FDA in 1976. Provision of this act indicates that all laws and regulations for the conservation of the forests and development of the resources therein shall be enforced. A total of 28 regulations have been promulgated.

The enactment of the New National Forestry Law of 2000 also provides for environmental protection. It states in chapter 8, section 8.1 that 'All forestry operations and activities shall be conducted so as to avoid waste and loss of natural (biological) resources and to protect natural (biological) resources against damage, as well as to prevent pollution and contamination of the environment.

Similar provisions can be found in the laws and regulations of the Ministry of Lands mines and Energy, the legislative enactment creating the Liberia Environment Protection Agency, etc. No matter what legislations there may be, their enforcement depends largely on the social evolution and the will power of the people, on one hand and the technical and logistical capability of the agency of concern on the other hand.

Thus the enforcement of laws for the exploitation of mineral resources can be hampered by:

- a) The lack of participation of the people in designing the laws
- b) The lack of awareness of the law by the people who are directly affected by the laws. This may create problem during the implementation of the laws
- c) The lack of enforcement mechanisms and guidelines
- d) The lack of logistics including transportation, office equipment communication sets, etc
- e) The will of the people to abide by the laws is often not enlisted
- f) Insufficient political will

4.1.14 Insufficient Trained Human Resources in Biodiversity Management

The principle institutions that are relevantly involved in Biodiversity human resources development are the College of Agriculture and Forestry and the College of Science and Technology at the University, The Division of Science and the Department of Agriculture and Integrated Rural Development at the Cuttington University College and the Forestry Training Institute of the Ministry of Education and the Maritime Training Institute.

The graduates of these institutions are employed most often with the Ministry of Agriculture, the Forestry Development Authority or some corporation in the sectors; the Ministry of Lands, Mines and Energy and the Ministry of Education.

The insufficient personnel in biodiversity management results from the following:

- a) Low incentives for graduates, that is, low salaries, lack of housing and essential facilities, schools for children and dependents and low employment possibilities
- b) Time gap in training- 14 years of civil wars resulted into ageing of trained personnel
- c) The lack of incentives and the civil wars induced economic migration and 'brain drain'
- d) The existing Institutions lack the appropriate biodiversity curricula, e.g., Wildlife management, fishery, social forestry, aquaculture and watershed management.

4.1.15 Inadequate Taxonomic Knowledge of Plants and Animals of Liberia

Research in the area of taxonomy began early in the 1800s in Liberia by German naturalists such as Schwein (1875-1877), J. Buttiker and F. X. Stampfli (1879-1887) and M. Dinkling (1894-1930). R. B. Sharoe (1880) did some research work on the birds of Liberia. A Harvard University expedition on ornithology of Liberia was synthesised in 1930. Other research work included the Trees of Liberia by Kunkel (1963), Liberian High Forest Trees by H. G. Voorhoeve (1979), Birds of Liberia by Wulf Gatter (2000) and notes on the mammals and birds of Liberia by H. H. Johnston. There is also an atlas of Liberia Mammals published by The Zoological Society of Philadelphia. Several

works on the taxonomy of Liberia may be found in the repositories at the University of Wageningen in The Netherlands.

During 1960-1967, an inventory conducted found over 2000 plant species including 225 timber species in Liberia. The report accentuated the 225 timber species. Since the inventory there has been no updated account until in 2002 when a team of researchers from the University of Liberia and the University of Wageningen visited the Sapo National Park and its surroundings and the Krahn-Bassa National Forest for 18 days. During the visit, 6 species of flowering plants new to science were found.

It is apparent from the above that the works in taxonomy in Liberia has a big deficiency. This can be attributed to the absence of trained Liberians in biological sciences, especially in taxonomy. This low capacity is due to lack of incentives and motivation to pursue studies in the sciences.

4.2. Extent of Biodiversity Degradation

4.2.1 Rate of Biodiversity Loss

It is difficult to put a figure on the rate of loss of any aspect of biodiversity except for the natural forest, which is usually taken as 2% per annum. This loss is the result of a combination of factors including logging, agriculture, industry and human settlements.

The mangroves, are one of the most valuable forms of wetland ecosystem, are threatened as the rainforest. The mangroves are a characteristic biotope in tropical river estuaries and tidal zones. They constitute an incredible adaptation to the environmental conditions of entering salt, sea sweet, riverine water. The mangroves are an important resource as they sustain significant harvest of wood and wildlife. They also provide important environment services – reduce coastal flood and help filter sediments away from waterways. In addition, the mangroves serve as nursery ground for important fisheries and shrimps. The mangroves provide feed for livestock, shellfish for local consumption, timber for construction and charcoal for energy. Mangroves are also inhabited by many sea birds; hence can be a resort for photo safaris.

The threat to this valuable biological resource/ecosystem is neglect and the absence of management and global warming. Global warming results in a rising sea level. The rise in sea level will endanger habitat of endemic species, resulting in loss of their habitat.

4.2.2 Threatened and Endangered Species

There are 14 threatened and endangered mammals and 15 timber species.

The mammal species are:

- African elephant (*Loxodonta africana*)
- Chimpanzee (*Pan troglodytes*)
- Diana Monkey (*Cercopithecus diana*)
- Liberian Mongoose (*Liberritia kuhn*)
- Nimba otter shrew (*Micropotamogale la mollier*)
- Red colubus (*Procolobus badius*)

- Allens’ s round leaf Bat (*Hipposideros marisae*)
- Buettikofer’s Epauletted fruit Bat (*Epopops buettikoferi*)
- Jenktins Duiker (*Cephalophus jentinki*)
- Pygmy Hippopotamus (*Choeropsis liberiensis*)
- Sperm whales (*Physeter catodon*)
- Spotted – necked otter (*Lutra maculicellis*)
- West African Manate (*Trichechus senegalensis*)
- Zebra Duiker (*Cephalophus zebra*)

The timber species are:

No	Scientific Name	Trade Name
1	<i>Entandrophrama utilis</i>	Sipo
2	<i>Entandrophrama angolensis</i>	Tiama
3	<i>Entandrophrama candolei</i>	Kosipo
4	<i>Entadrophragma cylindricum</i>	Sapele
5	<i>Heritiera utilis</i>	Niangon
6	<i>Khaya anthotheca</i>	Khaya
7	<i>Lovoa trichiodes</i>	Lovoa/dibétou
8	<i>Tetraberlina tubmaniana</i>	Tet/sikon
9	<i>Tieghemella heckelli</i>	Makore
10	<i>Lophira alata</i>	Ekki/iron wood
11	<i>Triplochiton scleroxylon</i>	Wawa/obeche
12	<i>Piptadeniastrum africana</i>	dahoma
13	<i>Chlorophora regia</i>	Iroko
14	<i>Aniegre robusta</i>	aniegre
15	<i>Holea celiata</i>	Abura

Source: Liberia Indigenous Forum for the Environment, Report to IUCN-NL Under the Project, THREATENED AND VULNERABLE TIMBER SPECIES OF LIBERIA, 2004

4.2.3 Extinct Species

Due to the absence of taxonomy study, there is no information on species extinction. Besides, timber species, we have no accurate data on flowering plants. We therefore need an inventory to determine what we have, and any future disappearance may determine extinction

4.2.4 Forest Fragmentation

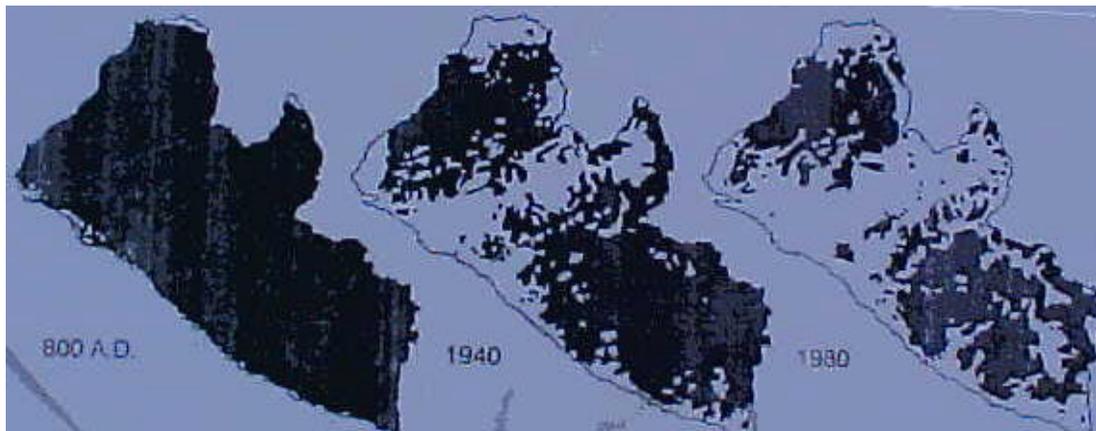


Figure 22: Trends of deforestation in Liberia

Human settlements followed by shifting cultivation, which embraces the ancient practice of burning usually resulting in erosion have caused the primary high forest to gradually disappear and replaced by secondary vegetation and savanna. Land development and road infrastructure, timber extraction, the introduction of rubber plantations within forest zones, Agricultural and industrial expansion have accelerated and continue to accelerate the reduction of forest cover. It is believed that Liberia is the only country in West Africa once covered entirely with primary high forest vegetation; however, these threats have caused substantial reduction in the nation's forest cover over the years.

The Germany Forestry Mission survey of 1960-1967 estimated the forest cover of Liberia to be around 75% of the land area of 24,000,000 acres. The survey paved the way for organized commercial logging. Two reasons were given for the high forest cover-low population density and late start of commercial logging.

About two decades after the first extensive forest inventory, a forest resources survey funded by FAO and FDA was carried out in 1985, put the forest cover of Liberia at about 49.8% of the land area. Annual deforestation rate was then estimated at about 0.5%. By 1988 annual deforestation was estimated at 1%. Recent estimates by World Resources Institute (WRI) put the rate at about 2%.

Table 20: Natural forest distribution

Forest type	Millions of hectares	%
Undisturbed productive (protected forests)	1.70	35
Disturbed productive (unprotected productive forest)	2.18	45
Sub-total	3.88	80
Disturbed unproductive forest	0.92	20
Total	4.80	100

1985 FDA/FAO/IDA SURVEY

The once continuous tracts of forests in Liberia are now isolated from each other due to fragmentation caused largely by shifting cultivation and human settlements. Logging and road infrastructure have also contributed to the fragmentation. Due to this fragmentation there are two distinct blocks of forest remaining in Liberia. They are the evergreen forest block in the southeast and the semi-deciduous block in the north. There is a distinct transitional zone of disturbed forest vegetation mostly along the Nimba-Monrovia corridor, which is becoming further dissected by the advances of shifting cultivation.

Within and around the two distinct blocks of forest, there is visible degraded landscape. In the north of the country, the Northern (Guinea) Savanna is creeping slowly into Lofa County. Due to extensive human settlements, there is now a distinct transition between the Grebo and Krahn-Bassa National Forest and the Grebo National Forest and another transition between Sapo National Park and Grebo National Forest, creating sub-blocks within the evergreen forest block. Along the Liberian –Ivorian border there is also a degraded landscape between the once connected Grebo National Forest in Liberia and the Tai National Forest in Ivory Coast due to cross-border activities, which have caused fragmentation of the forest.

4.3 Economic Implications of Biodiversity Loss

Biological resources, including those of the agriculture and forestry sectors, contributed in 1999 greatly to the national economy up to as much as 75%. Therefore, a decline or loss in biological diversity will jeopardize the national economy.

Loss of biodiversity in agricultural systems affects food security by wiping out the wild relatives of cultivated crops, a potential source of genes for future breeding; and also it reduces the number of strains within cultivated species. Also the existence of numerous strains of a given species increases the chance of having some strains that will be resistant to common diseases and unfavorable environment.

The loss of tree stocks on the other hand would retard not only forestry production, but also it would trigger the depletion of the carrying capacity of the soil. This situation leads to reduced land productivity which complicates agricultural productivity.

Household and subsistence production is also retarded once biological diversity is lost. The commercialization and utilization of food plant species, medicinal plants and other non-timber forest products (NTFP) are a source of income and services to both rural and urban communities, and aggregate into the national economy.

Biodiversity loss is not simply “happening”; it is the necessary effect resulting from a number of causes, which are at the root of the problem. This menace will only be solved when those causes are adequately addressed.

4.4 Trends in Liberia’s Forest Cover

The first national forest inventory in Liberia conducted from 1960 to 1967 by the German Forest Mission found that primary forest covered about 75% of the country. The FDA/FAO forest resources survey of 1985 put the primary forest cover of Liberia to about 50%. If this trend goes on, without concerted efforts to reverse the trend in Liberia forest management and conservation, one can predict that by 2020 the forest cover will be reduced to 25%. Liberia is considered to be a biodiversity hotspot in Upper Guinea, and most of the biodiversity is held under its forest ecosystems. Unfortunately few taxonomic surveys have been made for Liberia, and recently in 2002 an 18-day survey by botanists from the University of Wageningen and the University of Liberia found 6 flowering plant species new to science around Sapo National Park. Hence every fraction of lost forest cover goes forever with unknown species. Decline in forest cover is a precursor to significant loss of biodiversity. Many animal and plant species depend on primary forest for survival. Reduction in forest cover therefore causes them to lose their habitats and threatens their very existence. Hence it is important to change that trend of forest cover loss by implementing a comprehensive biodiversity strategy and action plan.

5. NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

The national biodiversity strategy and action plan (NBSAP) comprises two components: the vision statement, the guiding principles, the goals and objectives on one hand and the Actions for Biodiversity conservation, sustainable use and benefit sharing on the other. The goals and objectives of the NBSAP are developed in consonance with the guiding principles. Six goals were developed upon which all the actions are based.

5.1 National Biodiversity Strategy

5.1.1. Biodiversity Vision, Guiding Principles, Goals and Objectives

5.1.1.1. National Biodiversity Vision Statement

In commitment to the Millennium Development Goals of the Government and consistent with the National Environmental Policy of Liberia, the overarching biodiversity vision of Liberia is for the people to acknowledge and exercise responsible stewardship over biological resources to meet the needs of the present without endangering the ability of future generations to meet their own needs. The vision statement of the National Biodiversity Strategy and Action Plan (NBSAP) is therefore, “to have a society that lives in harmony with its natural environment, balances livelihood and conservation of biological resources and promotes equitable sharing of benefits arising from the sustainable use of genetic resources as an integral part of national socio-economic development.”

5.1.1.2 Guiding Principles

For the realization of the national biodiversity vision, the implementation of the NBSAP in Liberia will be guided by the following principles:

1. Liberia’s economic development must be based on sustainable use and sound management of renewable and non-renewable resources;
2. Every citizen of Liberia has a constitutional right of access to genetic resources and the fair and equitable sharing of benefits arising from the use of the resources;
3. Increased understanding and awareness of issues related to genetic resources should be promoted;
4. Regular assessment, monitoring and evaluation of biological diversity should be conducted and results widely publicized;
5. An integrated systems approach to biological resources and multi-sectoral planning should be put in place;
6. Involvement of women, youth, the elderly and other vulnerable groups in natural resource policy formulation, planning, decision-making and program implementation should be encouraged as an essential tool;
7. There should be mechanism to create and facilitate the conditions and opportunities for local communities and individual resource managers to manage biological diversity sustainably;
8. Ecosystem approach should be seen as critical to comprehensive and effective conservation and sustainable use of biological diversity;
9. Sustainable use of biological diversity requires appropriate policies and legislations and their enforcement requires adequate institutional capacity and human resources;

10. The underlying causes of biodiversity loss, which include poverty, ignorance, population dynamics, must be addressed in an effort to effectively conserve biological diversity.

5.1.1.3 National Biodiversity Goals and Objectives

The goal and objectives of the NBSAP are developed in consideration of the above principles for the enhancement of effective conservation and sustainable use of biological diversity in Liberia for the benefit of everyone.

Overall goal:

To sustainably use biodiversity on a long-term basis in order to meet the requirements of present generations without endangering the potential of future generations to meet their own needs.

The specific goals are:

1. To take appropriate measures to protect critical ecosystems against harmful effects or destructive practices for conservation of biological diversity;
2. To create biodiversity awareness among sectors of the society and promote international cooperation;
3. To commit the people to the sound and sustainable use of biological diversity to bring about socio-economic development;
4. To promote rational utilization and conservation of biological diversity;
5. To promote access to genetic resources and the fair and equitable sharing of benefits arising from their utilization
6. To contribute to the fulfillment of the Millennium Development Goals through poverty alleviation, food security, and women empowerment in biodiversity conservation by 2015.

Goal 1

To take appropriate measures to protect critical ecosystems against harmful effects or destructive practices for conservation of biological diversity;

Objectives

1. Manage, conserve, protect and maintain game species and agricultural biodiversity as well as representative samples of forest ecosystems, inland water ecosystems, coastal and marine ecosystems, wetlands, natural heritage sites.
2. Set aside at least 10% of the land area for Strict Protection and 30% of the land area for protection and multiple-use for partial protection.
3. Build human and institutional capacities for conservation and sustainable use of biodiversity
4. Review existing laws for harmonization and enact new ones as appropriate

5. Develop EIA criteria for all programmes and projects that are likely to have significant impacts on biological diversity
6. Develop guidelines for access to genetic resources in Liberia
7. Leave enclaves of natural forests on higher elevations and along waterways
8. Determine and regulate the proportion of land that can be covered by monoculture
9. Design non-destructive methods of fish harvesting that are destructive to stock
10. Conduct an inventory of alien invasive species.
11. Introduce techniques to control invasive species.
12. Regulate the introduction of alien species.
13. Empower Biodiversity law enforcement officers by providing them with logistics such as, communication and transportation equipment
14. Provide incentives to attract graduates in biological sciences and management for biodiversity hotspot sites in remote areas
15. Protect Liberia's coastline from erosion by tidal waves by putting in place breakwaters with rocks.
16. Regulate, manage and control the risks associated with the use and release of living modified organisms that could affect the conservation of biological diversity.

Goal 2

To create biodiversity awareness among sectors of the society and promote international cooperation

Objectives

1. Regulate, manage and control the risks associated with the use and release of living modified organisms
2. Evaluate traditional knowledge and practices, and promote those that can enhance conservation of biodiversity
3. Conduct regular assessment and monitoring of biodiversity and institute corrective measures where appropriate
4. Build human and institutional capacities for biodiversity awareness and international cooperation
5. Encourage collaboration among biodiversity related institutions for synergies

7. Foster public support for actions to conserve biodiversity
8. Support scientific research for the conservation and sustainable use of biodiversity
9. Promote access to and transfer of technologies and technology cooperation, and control risks associated with biotechnology
10. Introduce environmental education at all levels and establish and maintain an environmental information center to provide documentation and referral services to the general public on conservation of biological diversity
11. Promote information exchange as well as technical and scientific cooperation with other countries and regional bodies in relation to biodiversity conservation.
12. Promote non-destructive harvesting methods of medicinal plants
13. Intensify awareness campaign about Biodiversity conservation and values for the wide public
14. Ensure the participation of people in designing biodiversity related laws and enforcement guidelines
15. Support Biodiversity institutions to develop and revise Biodiversity curricula as appropriate
16. Encourage users to follow methods of agrochemicals application for the conservation of soil biodiversity, agro-biodiversity, aquifers and watersheds

Goal 3

To commit the people to the sound and sustainable use of biological diversity to bring about socio-economic development

Objectives

1. Promote and develop alternative sources of energy
2. Build human and institutional capacities for sustainable use of biodiversity to enhance socio-economic development
3. Encourage the involvement of civil society and the private sector in conservation of biological diversity
4. Enhance synergies between the Convention on Biological Diversity and other United Nations Conventions relative to the environment
5. Contribute to poverty alleviation through the sustainable use of biological resources
6. Promote land Use planning to cope with diverse needs
7. Promote community and individual woodlots in the rural areas

8. Devise appropriate mining exploitation schemes that account for biodiversity conservation and clean environment
9. Enlist the will of the people to abide by the Biodiversity laws rather than mere enforcement
10. Train Liberians in plant and animal taxonomy
11. Undertake taxonomic inventory of Liberia
12. Promote environmental friendly and efficient agricultural practices

Goal 4

To promote rational utilization and conservation of biological diversity

Objectives

1. Build human and institutional capacities to ensure rational use of biological diversity
2. Encourage the involvement of civil society and private sector to become receptive to rational use of biological diversity
3. Encourage collaboration among Biodiversity institutions to enhance rational use of biodiversity
4. Improve logging methods to lessen effects of skidding, logging roads, harvesting of financially immature timber
5. Review and revise logging legislation
6. Review and strengthen enforcing mechanisms about commercial logging
7. Regulate exploitation of non-timber forest products
8. Adhere to ITTO guidelines on logging along waterways
9. Regulate and coordinate pit sawing
10. Devise a participatory mechanism for reforestation and afforestation to involve the Government of Liberia (GOL), local communities, concessionaires, international NGOs and donors
11. Review and enforce regulation on bush meat trade

Goal 5

To promote access to genetic resources and the fair and equitable sharing of benefits arising from their utilization

Objectives

1. Build human and institutional capacities for fair and equitable sharing of benefits arising from genetic resources
2. Contribute to poverty alleviation through fair and equitable sharing of biodiversity benefits

Goal 6

To contribute to the fulfillment of the millennium development goals (MDGs) through poverty alleviation, food security and gender empowerment in biodiversity by 2015.

Objectives

1. Build human and institutional capacities for the fulfillment of MDG 2015
2. Contribute to poverty alleviation through the fulfillment of MDG 2015
3. Promote the involvement of women, elderly and youth in the design and implementation of Biodiversity projects
4. Promote domestication and multiplication of animals as alternative sources of protein and income generation

Assumption of Liberia's NBSAP

Security and peace will be restored by the implementation of the 2003 Comprehensive Accra Peace Agreement and UN Security Council Resolution 1509

Some Residual Recommendations:

1. Encourage the government of Liberia to re-instate hydroelectricity generation and distribution
2. Encourage GOL to undertake rehabilitation of degraded lands
3. Appeal to donors to return and recommence their activities
4. Appeal to all warring factions to respect the 2003 Comprehensive Accra Peace Agreement
5. Conduct land use feasibility studies
6. Review and adapt land tenure system to current situation.