

LIBERIA'S FOURTH NATIONAL REPORT

COVER PAGE

FORWARD TO THE FOURTH NATIONAL REPORT

It is approximately nineteen years now since Liberia ratified the Convention on Biological Diversity. As a Contracting Party, the country is committed to a number of obligations including the three objectives of the Convention on Biological Diversity: the conservation of biodiversity; the sustainable use of its components; and the fair and equitable sharing of benefits arising from the use of genetic resources. These three objectives translate into obligations by which the country is bound.

Article 26 of the Convention on Biological Diversity obligates parties to develop and submit national reports at the request of the Conference of the Parties. On the strength of the above, the Government of Liberia through the Environmental Protection Agency undertook the task to complete the Fourth National Report. This report confirms the important contribution by stakeholders to the elaboration of environmental policies in the country, by allowing the evaluation of all national actions undertaken in the various environment and natural resources sectors for the conservation of biological diversity.

Liberia has so far concluded three thematic reports. The country did not complete the first and Second National Reports, and thus the current report is Liberia's second, the first being the Third National Report which was submitted last year.

Activities included in the Fourth National Report to the Convention on Biological Diversity reflect a higher degree of initiatives undertaken since the Third Report, reflecting Liberia's level of compliance with obligations under the convention up to 2008. The report was written based on the guidelines provided by the secretariat as established by Decisions V/19, VI/25, and VII/25 of the Conference of the Parties

The report confirms that Liberia's targets for environmental sustainability are established under the Poverty Reduction Strategy. This is a three year development agenda for the country, which will be reviewed as required. Once implemented, the PRS will pave the way for the development of additional targets to be included in future development planning.

Whilst hailing the status of integration of biodiversity into national development planning undertaken thus far, it should be noted that some of the thematic areas would require further supporting studies/assessments that are yet to be undertaken. These include thematic areas other than forest biodiversity where significant progress has been made.

To conduct this exercise, the Environmental Protection Agency recruited three consultants to work with the Project Coordinator/Lead Consultant. Data collected by these consultants were collated and presented in a draft report which was brought to a National Steering Committee Meeting and then to a stakeholders' workshop. Views/opinions from the consultative processes were inculcated into the document and then validated at a national workshop.

The major stakeholder institutions which participated in the process include: The Ministries of Lands, Mines & Energy; Agriculture; Health & Social Welfare; and Internal Affairs. Other institutions include: The Forestry Development Authority; Liberia Water & Sewer Corporation, Colleges of Agriculture & Forestry, and Geography at the University of Liberia; International NGOs, Local NGOs; and Civil Society Groups.

The broad nature of representation, wider stakeholders' collaboration, as well as divergent views and opinions expressed enriched the report. Thus the Environmental Protection Agency received adequate cooperation in the development and finalization of the report.

Kind regards.

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EXECUTIVE SUMMARY

Liberia has been credited for its extensive and unique biodiversity, including the largest remaining tract of the Upper Guinea Forest in West Africa and an impressively diverse range of wildlife and plant species. By the end of the millennium (1999), the West African Conservation Priority –Setting exercise for the Upper Guinea Ecosystem identified Liberia as the top priority country for conservation efforts in humid West Africa. The country contains approximately forty two percent of the Upper Guinea Tropical Rainforest. This massif comprises about 10 million acres of evergreen forest in the Southeast around the borders with the Ivory Coast and deciduous forests in the Northwest bordering Sierra Leone and Guinea.

The country's resources contain a significant amount of biodiversity including over 2000 different vascular plants (including 225 tree species); 600 bird species; 150 mammal species, and 75 reptile species. Liberia's forests also produce a wide range of other environmental goods and services that benefit Liberia and the rest of the world.

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. Protection and management of national forest areas and reserves have therefore been of greater concern to the communities which depend on the natural resources for livelihood.

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%. The 70% of the rural population, their traditions and cultures are built around the use of the resources found in their immediate environment.

Conservation Forestry:

The National Forest Policy of 2006 identifies three categories of forest: Conservation Forest includes biodiversity conservation (at the landscape, site and species levels) and maintenance of the other environmental functions of forests (e.g. soil and water protection). It includes protection of specific forest areas as well as measures to enhance the environmental quality of other forest areas (e.g. through rehabilitation of secondary forests). The aim of forest conservation is to sustain and enhance these functions for current and future generations.

Traditional and Community Forestry

Sustainable Biodiversity management requires a natural balance between commercial, conservation and communal uses of the forest. Balancing these three concepts continues to be a challenge. 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. 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.

Commercial Forestry:

Commercial forestry is the production and processing of wood and non-wood forest products for profit. 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.

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.

Wetlands and Mangroves

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. The development of this ecosystem remains a major challenge.

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 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.

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. About 11% of the urban and rural poor create livelihood from fishing.

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.

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. Other resources are yet to be tapped.

Agricultural Systems

Biodiversity in Agricultural Systems

Liberia is currently a food insecure country. 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. 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).

Livestock production in Liberia has always been the least prioritized 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

Pastoral Landscapes

There are fifteen or more pastoral 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. Most of these ranches are colonized by weed as there are no livestock.

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. 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 in 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.

Agro-forestry and Tree Plantations

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

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. Additionally, plantation development by FDA has largely made use of exotic tree species as opposed to indigenous species.

Gene Banks

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 is under renovation while SRSP has not reached its pre-war status.

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), 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.

Socio-Economic Aspects of Biodiversity

Poverty is a big problem in Liberia and this is likely to hamper efforts towards development. In 2001, about 76.2 per cent of the population was estimated to be living on less than US\$1.00 a day, and 52 per cent on less than US\$0.50 per day (extreme poverty) (UNDP 2004b). Approximately 86.4 per cent of the rural population falls below the poverty line. Almost all sections of the society are inflicted by poverty, including professional groups such as craftsmen, school teachers and mine workers. In terms of age groups, about 60 per cent of the most productive age group (25-44) falls below the poverty line. Most of these people depend on environmental goods and services for livelihood. Poverty has been identified as one of the factors contributing to unsustainable use of biological resources.

Employment opportunities are limited. According to the Ministry of Planning and Economic Affairs, only 55 per cent of males and 40.6 per cent of females are currently economically active (MPEA 2005). Overall, about 80 per cent are estimated to be unemployed, and there is even more hidden unemployment.

CHAPTER ONE: STATUS, TRENDS, AND THREATS

i. INTRODUCTION

This chapter provides an overview of status, trends, and threats to biodiversity in Liberia. The aim is not to be more elaborate or comprehensive but rather to highlight information to inform all stakeholders about the biodiversity processes in the country, and to provide both government and the secretariat with tools for decision-making.

Liberia has been credited for its extensive and unique biodiversity, including the largest remaining tract of the Upper Guinea Forest in West Africa and an impressively diverse range of wildlife and plant species. By the end of the millennium (1999), the West African Conservation Priority –Setting Exercise for the Upper Guinea Ecosystem identified Liberia as the top priority country for conservation efforts in humid West Africa. The country contains approximately forty two percent of the Upper Guinea Tropical Rainforest. This is the single largest portion for any country in the region.

The country's forests have historically been valued more for their commercial use than for their communal and conservation potentials due in part to their generation of income for government operations and more recently, as a resource to be exploited as a means of fuelling conflict. Commitment to protecting its forest areas from unsustainable use therefore has been a herculean task.

ii. STATUS AND TREND OF BIODIVERSITY

About 70% of the population lives in the rural areas depends on the products and services of agricultural, forestry and other extractive industries for their livelihood. Protection and management of national forest areas and reserves have therefore been of greater concern to the communities which depend on the natural resources for livelihood.

Liberia has 42% of the remnant of the Upper Guinea Forest. This massif comprises about 10 million acres of evergreen forest in the Southeast around the borders with the Ivory Coast and deciduous forests in the Northwest bordering Sierra Leone and Guinea. These forests contain a significant amount of biodiversity including over 2000 different vascular plants (including 225 tree species); 600 bird species; 150 mammal species, and 75 reptile species. Liberia's forests also produce a wide range of other environmental goods and services that benefit Liberia and the rest of the world.

Value and Potentials for Biodiversity in Liberia

The country also 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%. The 70% of the rural population, their traditions and cultures 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.

FOREST BIODIVERSITY

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.

It is estimated that the Upper Guinean Rainforest contains 2,800 vascular plant species, of which nearly one quarter are endemic and one in fifteen are rare. Estimates of total species diversity, endemism and threats for other major groups of organisms are either lacking or likely to be very approximate. Information on all IUCN Red List Species known to be found in Liberia has been compiled by Conservation International in the Key Biodiversity database. At present, there is very limited information on the national distribution of these species, making it difficult to design an e The National Forest Policy of 2006 identifies three categories of forest:

Conservation Forestry:

Conservation Forest includes biodiversity conservation (at the landscape, site and species levels) and maintenance of the other environmental functions of forests (e.g. soil and water protection). It includes protection of specific forest areas as well as measures to enhance the environmental quality of other forest areas (e.g. through rehabilitation of secondary forests). The aim of forest conservation is to sustain and enhance these functions for current and future generations. Below are discussed areas of Liberia's conservation programs.

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.

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 striata*, 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*.

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.



Figure1: A Partial view of the Grebo National Forest near River Gee

Table 1: 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

Community Forestry

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 improve community forests in Liberia.

Community Forest includes the production of wood and non-wood forest products, plus the use of forests for other purposes such as: Cultural rituals; future farmland and settlement areas; and the protection of sacred sites. Community Forestry focuses more on the interests of people who live in and on the fringes of forest areas.

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.

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.

Commercial/ 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.

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.

Wildlife

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* have 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 Troglodyte's_troglodytes*, *Pan Troglodyte's verus*, *Pan Troglodyte's vellerosus* and *Pan Troglodyte's schweinfurthi*. Subspecies *Pan Troglodyte's 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:

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.

Table 2: Conservation Priority Ratings of Liberian Primate Species

	A	B	C	Total
Potto	1	3	1	5
Dwarf Galago	1	2	1	4
Sooty 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**

At the national level, the Wildlife, National Parks, and Recreation Division of the forestry Development Authority is engaged both in wildlife surveys and in identifying threatened animal species. Wildlife surveys which have been supported by Conservation International and Fauna & Flora International have focused primarily on existing protected areas and on proposed extensions to these areas.

Wildlife remains a critical source of proteins to rural Liberians, as well as a source of cash income. Animals are killed and may be eaten locally, or sent raw or smoked to urban areas for sale. Hunting is principally done with firearms, snares and pits, and sold on the roadside or in market places. Most hunting has been for consumption within Liberia; although recently with intense forest loss in Sierra Leone and Ivory Coast, bush meat markets in border areas in these countries are rapidly increasingly supplied from Liberia.

Bush meat and wildlife surveys over the past years have indicated that most Liberians believe wildlife to be inexhaustible. Many local villagers feel that hunting has no impact on wildlife populations. To meet growing demands by 2002, a large-scale commercial bush meat industry emerged in South-eastern Liberia.

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 1



TABLE 3: 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

SPECIES, ECOSYSTEMS AND HABITATS

There has been no recent detailed assessment of the distribution of natural communities in Liberia. Historical surveys of the forests of Liberia focused primarily on its timber potential. Their value for biodiversity management is therefore limited and given the rapid rates of deforestation over the last three decades, they are inadequate for conservation management planning.

Additionally, there is no parallel project to map and inventoried non-forest habitats such as marine, coastal and wetland habitats given their high importance as sanctuary of threatened migratory species. Another neglected ecosystem with very little or no work done on it is the mountain ecosystem.

LOCALCHECKLISTS

The major constraint on systematic conservation planning in Liberia is the lack of up-to-date species checklists for a wide range of sites across the country. Very little is therefore known about the distribution of most organisms. For many major groups of organisms, there is a wealth of historic data, but these are from a very restricted range of (easily accessible) sites. The distribution of many species can be predicted from the distribution of forest types and knowledge of their composition from other parts of the region. Example, the distribution and ecological profiles of 280 rare plants and 56 timber trees has recently been plotted across the Upper Guinean Forests. As part of the problems, species in large areas in Liberia have never been collected in a systematic fashion and it is likely that endemic species of very restricted distribution will be discovered. Although Liberia contains the largest surviving forest block of Upper Guinean Rainforest, it is also the least botanically explored country in humid West Africa.

Annotated checklist and distribution maps of 400 resident bird species and regular migrants to Liberia were published in 1998. There appear to be no readily accessible checklists of mammals, fish, or invertebrates. Despite of the near lack of checklist at the global level, biodiversity information management is moving from a state of chaos to a more coordinated system of bioinformatics which has enabled local data sets to be collated to form a regional and international picture. Through the courtesy of this medium, the following information was extracted on Liberia's species:

Table 4: Summary of data available on Global Biodiversity Information Facility on Liberia's species

KINGDOM	NUMBER OF TAXA
Animals	940
Fungi	28
Plants	87
Protozoa	17
Unclassified (most of which are plants)	767
Total (including family, genus, species, sub-species)	1839
Total number of records	39,262

SPECIES IDENTIFICATION

There are extensive Liberian species reference collections in museums and herbaria across the world, particularly in the U.S.A., but no adequate working collections in Liberia. Access to these international collections from within Liberia is constrained by the absence of recognized facilities for the receipt of loans. This is the serious handicap for taxonomic study based in Liberia. Local taxonomists would be forced to travel abroad in order to work with herbarium materials given that taxonomists need access to type specimens (that define the names of plants) if plants are to be correctly identified and knowledge about species is to be collated and communicated.

There is no national floral of Liberia, and no comprehensive local field guides to plants. There is however a comprehensive field guide to forest trees, shrubs, and lianas from the Upper Guinean Forests has recently been published.

Table 5 : Showing the top ten institutions providing data on Liberian biodiversity to GBIF

Data Provided Institution	Country Where Based
Fish Base LB server (www.fishbase.org.ph	Philippines
National Herbarium Nederland Wageningen Branch (145.18.162.291)	Netherlands
National Herbarium Nederland-Leiden branch (145.118.162.91)	Netherlands

(www.nationaalherbarium.nl	
Thee academy of Natural Sciences (www.janthina.acnatsci.org	USA
MCZ-Harvard University Provided (digir.mcz.harvard.edu)	USA
Missouri Botanical Garden (MO) (digir.mobot.org)	USA
GBIF-MNHN (Paris (dsibib.mnhn.fr)	France
Natural History Museum Science Database collection (www.nhm.ac.uk)	UK
Louisiana State University Museum of Natural Science (LSUMZ) (130.39.185.43)	USA
Field Museum (FMNH (digir.fieldmuseum.org)	USA

THREATENED SPECIES

Information on globally threatened species can be obtained from the sources given in table below. While these databases are continually updated, they depend on accurate information from each country. In regions where regular and reliable monitoring of species populations has not been carried out, it is likely that this information is highly inaccurate. Rare species may be present but undiscovered; species known to be present may be suffering serious but unrecognized decline.

Table 6: Sources of Information on the Global Threat Status of Major Organism Groups

Group	Data Sources
Mammals	IUCN Red List of Threatened Species
Birds	Birdlife International Globally Threatened Birds Factsheets
Plants	1997 IUCN Red List of Threatened Plants (Walter and Gillett 1998)
Reptiles	IUCN Red List of Threatened Species
Amphibians	Global Amphibian Assessment
Fishes	IUCN Red List of Threatened Species

It is not clear what criteria are used to identify nationally threatened species. For the sake of international comparability, it would be most logical to use the IUCN Categories and criteria (version 3.1). This system is widely used and easily understood, and has been extensively tested.

Table 7: Species diversity, endemism, and threat, Sources: World Conservation Monitoring Centre, IUCN, FAO (NBSAP)

Class	Total Species	Total Endemic	Total Threatened
Amphibians	38	4	1
Plants	2,200	103	46
Mammals	193	N/A	17
Birds	581	1	22
Reptiles	67	2	2
Molluscs	N/A	N/A	1
Other invertebrates	N/A	N/A	1
Total	N/A	110	89

Alien and Invasive Species

There are many flora and faunal species that have invaded Liberia over the decades, but four main plants AIS are identified. These are *Chromoleana Odorata*, *Acacia* Species, *Eichornia Crassipes*, and *Lucaena Leucocephala*. The ecological impact of *Lucaena* has not yet as serious as the first three because it is still limited to the localities where it was originally introduced. but it colonises very rapidly. *Acacia* species introduced by the FDA in Zarwea, Grand Cape Mount County is rapidly spreading over the original forest and it requires quick attention lest the entire region is *Acacia* forest.

Chromoleana Odorata

Chromoleana odorata, a herb, is a typical pioneer species of secondary forest succession with a strong heliophilic character and vigorous vegetative development. Initially it 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 to 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 in Enugu, central Nigeria. The primary mechanism by which *C. odorata* spreads is through human activities. Such activities include road construction and maintenance of dirt or unpaved roads and railways, which are of major importance in Côte d'Ivoire, Liberia, Congo and the Democratic Republic of Congo.

C. odorata habitat and breeding spaces for harmful insects such as the variegated grasshopper, *Zonocerus variegates*, which then attacks cassava fields causing substantial yield losses. Due to abundant vegetative development, *C. odorata* out-competes young trees leading to poor crop establishment. During the dry season, it constitutes a fire hazard. Roadsides and open places around human settlements are often overgrown by dense bush of *C. odorata*, making it a nuisance to settlement and traffic.

One of the most globally well-known water weeds is the Water Hyacinth. It occurs in the coastal areas of Liberia. The Water hyacinth is an exotic, free-floating aquatic plant with shiny, dark green, upper parts and a brilliant blue-purple flower with yellow markings. *E. crassipes* can form small colonies, “floating islands” or extensive mats that can cover thousands of hectares of previously open water. When invasive, water hyacinth forms a complete covering of the water surface that excludes most light and air for submerged organisms thus depriving them of essentials for survival. A significant reduction of general aquatic biodiversity and a change of fisheries results from invasion. The mats can also have serious mechanical impacts on water supply systems, drainage canals, inflows to hydropower generators, and movement of shipping and river flows. The hyacinth increases evapo-transpiration leading to significant water loss from reservoirs and other water bodies. The crowding of plants at the edges of water bodies prevents access to the water for collecting water or fishing.

IUCN’s Global Invasive Species Database (<http://www.issg.org/database/>) provides global information on invasive alien species. The database covers all taxonomic groups from micro-organisms to animals and plants. It is up-to-date and detailed, including information on species biology, ecology, native and alien range, references, contacts, links, and images information is supplied by expert contributions from around the world and is therefore of high quality. Seven Invasive species are listed for Liberia in the table below. It is likely that this is a significant underestimate of the number present in the country.

There appears to be no systematic mapping of invasive species distribution in Liberia at present. No inventory has as yet been done on AIS in Liberia. There is urgent need for research in this area. Techniques need to be developed to control the spread of these species.

Table 8: Invasive Species listed in the Global Invasive Species Database as present in Liberia

Species	Description
Chromolaena Odorata	A fast-growing perennial shrub that is a nuisance agricultural weed
Eichhornia Crassipes	Water hyacinth; may choke slow-moving to still water bodies and prevent beneficial use for fishing or navigation
Hypnea Musciformis	Marine algae that forms thick, unpleasant-smelling mats
Lantana Camara	Herb and serious agricultural weed
Leucaena Leucocephala	Agro-forestry tree that can invade semi-natural or natural habitats which are of conservation interest.
Solenopsis Geminata	Fire ant that destroys native ant communities, harms agriculture, and is a painful pest to human.

Vibrio Cholerae	Bacteria that causes cholera.
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It can be noted that records of past pests and pathogens outbreaks in Liberia are rare and do not adequately identify the organisms involved. The International Portal on Food Safety, Animal and Plant Health (<http://www/ipfsaph.org/>) provides access to official international and national information and contains useful data from other countries in the region. While knowledge of disease and pest control in Liberia is embryonic, authorities can make use of extensive international expertise.

Liberia is party to the International Plant Protection Convention, an international treaty designed to prevent the spread and introduction of pests of plants and plant products.

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. This has not been implemented.

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 9: 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.

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.

Wetlands of Liberia

Table 10: Important wetlands of Liberia

S/n	Wetland	Type	Size (acres)	Conservation Status
1	Lake Piso	Coastal Lacustrine	76,091	Proposed Nature Reserve/Ramsar Site
2	Marshall	Inland Riverine	n/a	Proposed Nature Reserve/Ramsar Site
3	Mesurado	Coastal	n/a	Ramsar Site
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	Ramsar Site
8	Kpatawee	Inland Riverine	n/a	Ramsar Site

Source: EPA 2004

The topography varies with the particular site. The coastal wetlands (Marshall, Mesurado and Lake Piso) are relatively flat with transition between coastal sandy soil extending to 8-10 miles inland and sandy loam or lateritic soil inland beyond this point. The inland wetlands (Gbedin and Kpatawee) consist of rough terrain with gentle rolling hills. The soils here are lateritic in nature.

In the Marshall, Mesurado and Lake Piso regions can be found lakelets/ponds, lagoons, rivers and creeks; these add up to the scenic beauty of the sites. Generally, the altitude of these areas varies between 0-322m above sea level. The Gbedin and Kpatawee wetlands contain rivers, creeks and ponds and their attitudes vary between 200-500m above sea level.

Ecological Characteristics

1. Characteristics of the prevailing ecosystem(s) and vegetation, the hydrological regime and the threats and impacts faced by the environment;
2. Key characteristics of the ecosystem and vegetation of the coastal wetlands (Mesurado, Marshall and Lake Piso):
 - Humid forest (a montane forest in the Lake Piso region and containing representatives of many flora and fauna species of Liberia),
 - Mangrove forests in the Lake Piso, Mesurao and Marshall regions,
 - Sea coast in the above three wetland regions.,
 - Savannah wood-land in the Lake Piso and Marshall Wetland regions,

The three wetlands above are dominated by mangrove vegetation and a well developed hydrological system generally consisting of rivers, creeks and ponds.

(a) Key characteristics of the ecosystem and vegetation of the inland wetlands:

- Humid forest (a montane forest in the Gbedin region and containing representatives of many flora and fauna species of Liberia).
- Rolling hills,
- Primary and secondary forest vegetation.
- Well developed hydrological systems generally consisting of rivers, creeks and ponds.

Threats identified in the area include:

Marshall Wetlands:

- Uncontrolled man-made bush fires, hunting of birds and sea turtles, mangrove harvesting for fuel wood and unsustainable/wasteful fishing.
- Reclaiming of wetland for construction of houses, hunting of sea turtles, mangrove harvesting for fuel wood, unsustainable/wasteful fishing and dumping of human wastes.

Lake Piso wetlands:

- Shifting cultivation, uncontrolled man-made bush fires, hunting of birds and other wildlife species ;(e.g. Sea turtles, monkeys and duiker), mangrove harvesting for fuel wood and unsustainable/wasteful fishing.

Gbedin Wetlands

- Shifting cultivation and hunting of wildlife

Kpatawee:

- Shifting cultivation and hunting of wildlife

Major species of flora and fauna and status thereof:

Marshall wetlands:

- **Major flora species:** Mainly mangrove and Parinari macrophylla
- Major fauna species: (i) **migratory birds** ----- herons, plover, flamingo, and ibis,

Resident birds --- Copper-tailed Glossy starlings- Lamprotornis cupreocauda, Rufous- Winged illadopsis- Illadopsis rufescens, African Pied hornbill- Tockus fasciatus, Double-spurred francolin- Francolinus bicalcaratus, Pied crows-corvus albus, Spur-winged goose- Plectropterus gambensis, and (iii) **mammalian species**----- Crocodile (Nile and Slender snouted-nosed) and sea turtles are major fauna species.

Lake Piso wetlands:

- **Major flora species:** Mangrove species, Parinari macrophylla, P. congensis, P. excelsa, Ceiba pantendra, Terminalia ivorensis, T. superba, Uapaca spp. and Beilschmiedia mannii.
- Major fauna species: (i) **migratory birds** ----- herons, plover, flamingo, and ibis and

- **Resident bird** --- Copper-tailed Glossy starlings- Lamprotornis cupreocauda, Rufous-Winged illadopsis- Illadopsis rufescens, African Pied hornbill- Tockus fasciatus, Double-spurred francolin- Francolinus bicalcaratus, Pied crows-corvus albus, Spur-winged goose- Plectropterus gambensis, and (iii) **mammalian species**----- Cercopithecus petaurista (Lesser spot – nosed), Colobus polykomos (Black & White Colobus), Cephalophus silvicultor- Yellow (backed duiker), Cephalophus obilgyl (Ogilby’s duiker) and Syncerus caffer nanus (Forest buffalor), Hexaprotodon liberiensis (Pygmy hippopotamus), Cephalophus niger (Black duiker), Pan troglodytes (Western Chimpanzee-) and Procolobus verus (Olive colobus). Crocodile (Nile and Slender snouted-nosed), manatee and sea turtles are major fauna species.

Mesurado wetlands:

- **Major flora species:** Mangrove only.
- Major fauna species: (i) **migratory birds** ----- herons, plover, flamingo, and ibis and
- **Resident bird** --- Copper-tailed Glossy starlings- Lamprotornis cupreocauda, Rufous-Winged illadopsis- Illadopsis rufescens, African Pied hornbill- Tockus fasciatus, Double-spurred francolin- Francolinus bicalcaratus, Pied crows-corvus albus, Spur-winged goose- Plectropterus gambensis, and (iii) **mammalian species**-----Crocodile (Nile and Slender snouted-nosed), manatee and sea turtles are major fauna species.

Gbedin wetlands:

- **Major flora species:** P. congensis, P. excelsa, Terminalia ivorensis, T. superba, Uapaca spp. and Beilschmiedia mannii.
- Major fauna species: (i) **migratory birds** ----- herons, plover, flamingo, and ibis; and ,
- **Resident bird** --- Copper-tailed Glossy starlings- Lamprotornis cupreocauda, Rufous-Winged illadopsis- Illadopsis rufescens, African Pied hornbill- Tockus fasciatus, Double-spurred francolin- Francolinus bicalcaratus, Pied crows-corvus albus, Spur-winged goose- Plectropterus gambensis, and (iii) **mammalian species**----- Cercopithecus petaurista (Lesser spot – nosed), Colobus polykomos (Black & White Colobus), Cephalophus silvicultor- Yellow (backed duiker), Cephalophus obilgyl (Ogilby’s duiker) and Syncerus caffer nanus (Forest buffalor), Hexaprotodon liberiensis (Pygmy hippopotamus), Cephalophus niger (Black duiker), Pan troglodytes (Western Chimpanzee-) and Procolobus verus (Olive colobus). Crocodile (Slender snouted-nosed).

Kpatawee wetlands

- **Major flora species:** P. congensis, P. excelsa, Terminalia ivorensis, T. superba, Uapaca spp. and Beilschmiedia mannii.

Major fauna species:

- **Migratory birds** ----- herons, plover, flamingo, and ibis

- **Resident birds** --- Copper-tailed Glossy starlings- Lamprotornis cupreocauda, Rufous-Winged illadopsis- Illadopsis rufescens, African Pied hornbill- Tockus fasciatus, Double-spurred francolin- Francolinus bicalcaratus, Pied crows-corvus albus, Spur-winged goose- Plectropterus gambensis, and (iii) **mammalian species**----- Cercopithecus petaurista (Lesser spot – nosed), Colobus polykomos (Black & White Colobus), Cephalophus silvicultor- Yellow (backed duiker), Cephalophus obilgyl (Ogilby's duiker) and Syncerus caffer nanus (Forest buffalo), Hexaprotodon liberiensis (Pygmy hippopotamus), Cephalophus niger (Black duiker), Pan troglodytes (Western Chimpanzee-) and Procolobus verus (Olive colobus).

(4) Threats to wetlands

Marshall Wetlands:

- Fuel wood harvesting for fish smoking and home energy.
- Farming (slash- system).
- Harvesting of poles for house/hut construction

Lake Piso wetlands:

- Fuel wood harvesting for fish smoking and home energy.
- Farming (slash- system).
- Sand mining
- Man-made fire (intentional burning of savannah)
- Dynamiting in waters to kill fish.
- Harvesting of poles for house/hut construction

Mesurado Wetlands:

- Fuelwood harvesting for smoking fish.
- Land filling/refilling for construction
- Sand mining
- Garbage disposal

Gbedin wetlands:

- Fuelwood harvesting for home energy.
- Farming (slash- system).
- Harvesting of poles for house/hut construction

Kpatawee wetlands

- Fuelwood harvesting for fish smoking and home energy.
- Farming (slash- system).
- Harvesting of poles for house/hut construction

Main socio-economic characteristics

1. Livelihoods

- For the coastal wetlands, major livelihood activities include fishing, farming, fuelwood harvesting, hunting, sand mining and transportation by lake, rivers and creeks;
- Major livelihood activities in the inland wetland communities include farming and hunting, although fishing activities are noticeable mostly during the dry season (November to April).

2. Access to natural resources

- Except for Mesurado wetland communities (urban communities), local community members of the wetlands have equal access to natural resources; communal system exists in most of the areas and this allows common user rights to community members. However, there are traditional rules to follow.

3. Average household size, presence of and access to education and health facilities, % of people living below the poverty line.

- The average household size for the five wetlands ranges from 8-14 persons. This range includes wives, husbands, children and other dependents. Generally, less than 60% of the communities have access to formal school facilities and less than 5% to health facilities. The percent of people living below the poverty line cannot be established because people in the areas are surviving on subsistence activities (mainly fishing, farming and hunting) for which assessment has not been done. Roughly estimating however, the figure could be between 80-90% on the average for the five sites.

Currently none of the sites is under any management regime. However, it is expected that the Lake Piso Region expected to be managed under multipurpose-use management regime after an expected gazettelement in 2008. This has not been done to date.

Aquatic Systems

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.

SURFACE WATER

Liberia possesses abundant surface water supported by six main watersheds. The principal rivers that support the watersheds are Mano, Lofa, St. Paul, Cestos, Cavalla and St. John rivers. These are shown in table 4.1. There are also numerous other micro-watersheds or sub-watersheds. The country shares seven international catchments with its neighbours. The Mano and Cavalla are shared basins between Sierra Leone and Ivory Coast, respectively, while Lofa, St. Paul and St. John drain parts of Guinea.

Table 11: Major River Basins

Basin	Area (km ²)	Annual flow (m ³ /sec)
Mano	6,604	251
St. Paul	12,820	512.3
St. John	14,762	N/A
Cavalla	13,726	380
Cestos	10,000	60.3
Lofa	9,194	N/A

Source: Liberia Hydrological Services, MLME 1988

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

Table 12: Marine invertebrates of ELWA, Banjor, Marshall and West Point

No.	PHYLUM	FAMILY NAME	SCIENTIFIC NAME	COMMON NAME	HABITAT
1.	Cnidaria		<i>Physalia pelagica</i>	Portugese man of war	Pelagic
2.	Cnidaria		<i>Chironex fleckeri</i>	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	Neanttes (Nereis) virens	Clam worm	Benthic
16.	Arthropoda		Panulirus argus	Spiny lobster	Bentic
17.	Arthropoda		Scyllarides	Shovel-nose lobster	Benthic
18.	Arthropoda	Portuidae	Callinectes	Blue crab	Benthic

			sapidus		
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 puntulata	Sea urchin	Benthic

Forest Elephant (Loxodonta africana)

Agricultural Systems

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.

According to the Liberia Demographic Health Survey, (MPEA, 1999-2000), the main sources of food for Liberian households are the markets (51%), and the farm or garden (48%). The food supply situation in rural areas is, however, more stable than in the urban areas. About 70% of rural households rely on foods from their own farms or gardens, with only 28% of households relying on the market. In urban areas, 95% of households depend on food from the market as their main source of food, with less than 5% relying on food from their own gardens or farms.

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 13: 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.

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 14: 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	
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Source: Table adapted from Field Survey, 2002

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 in 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 15: 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
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Source: (Regulatory and Statistics Section, Bureau of National Fisheries, Ministry of Agriculture, 2002)

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%.

Table16: 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

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.

Table 17: Species used in plantation development in Liberia

NOG	SPECIES	Provenance	EXOTIC/INDIGENOUS
1	Gmelina arborea	S.E. Asia	Exotic
2	Tectona grandis	Cote d'Ivoire	Exotic

3	<i>Pinus caribea</i>	Honduras	Exotic
4	<i>Pinus oocarpa</i>	Central America	Exotic
5	<i>Terminalia ivorensis</i>	S.E. Liberia	Indigenous
6	<i>Terminalia superb</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

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.

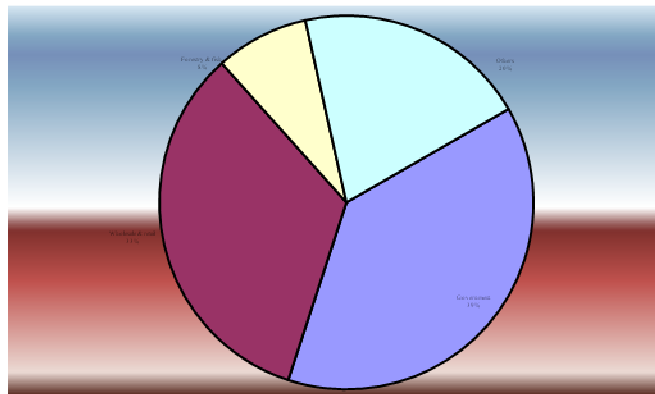
Socio-Economic Aspects of Biodiversity

POVERTY AND EMPLOYMENT

Poverty is a big problem in Liberia and this is likely to hamper efforts towards development. In 2001, about 76.2 per cent of the population was estimated to be living on less than US\$1.00 a day, and 52 per cent on less than US\$0.50 per day (extreme poverty) (UNDP 2004b). Approximately 86.4 per cent of the rural population falls below the poverty line. Almost all sections of the society are inflicted by poverty, including professional groups such as craftsmen, school teachers and mine workers. In terms of age groups, about 60 per cent of the most productive age group (25-44) falls below the poverty line. Most of these people depend on environmental goods and services for livelihood. Poverty has been identified as one of the factors contributing to unsustainable use of biological resources.

Employment opportunities are limited. According to the Ministry of Planning and Economic Affairs, only 55 per cent of males and 40.6 per cent of females are currently economically active (MPEA 2005). Overall, about 80 per cent are estimated to be unemployed, and there is even more hidden unemployment. However, one needs to consider that current unemployment trends are based on a depressed economy that is recovering from 14 years of war. Formal sector employment has been estimated at only 15 per cent, compared to 50 per cent pre-war era. Figure 2.1 shows the share of formal sector employment in the country. The contraction of the formal sector employment is due to the destruction of mines, private enterprises, as well as the continuous instability in the country.

Figure 2: Share of formal sector employment



Source: MOL 2005

The informal sector accounts for about 30 per cent of the entire labour force. The Ministry of Labour puts the figure of informal sector employment at 30,000 out of an estimated total labour force of 980,000 people (MOL 2006). According to UNDP, 52 per cent of the unemployed were in fact self-employed in the informal sector (UNDP 1998). In 2001, the informal sector accounted for 300,000 or 30 per cent of total employment. The sector is however constrained by domestic structural limitations and poor policies that should be reformed, especially high tax levies.

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.

Table 18: 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.

. 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.

Root Causes of Biodiversity Loss

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.

. 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.

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.

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
Molluscs	NA	NA	1
Other Inverts.	NA	NA	1
Total		110	89

Source: World Conservation Monitoring Centre, IUCN, FAO

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.

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 is 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 3: Road construction in OTC Concession Area



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.

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.

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

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.

Inadequate 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.

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

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, *Leucena 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* 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.
- D) 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,
- E) *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*.
- F) 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.

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

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

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;

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 of Liberia, 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.

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 synopsised 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.

Extent of Biodiversity Degradation

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, 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 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 rising sea levels, the rise in sea level will endanger habitat of endemic species, resulting in loss of their habitat.

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 (*Trichecnus senegabnsis*)
- Zebra Duiker (*Cephalophus zebra*)

Table 20: 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

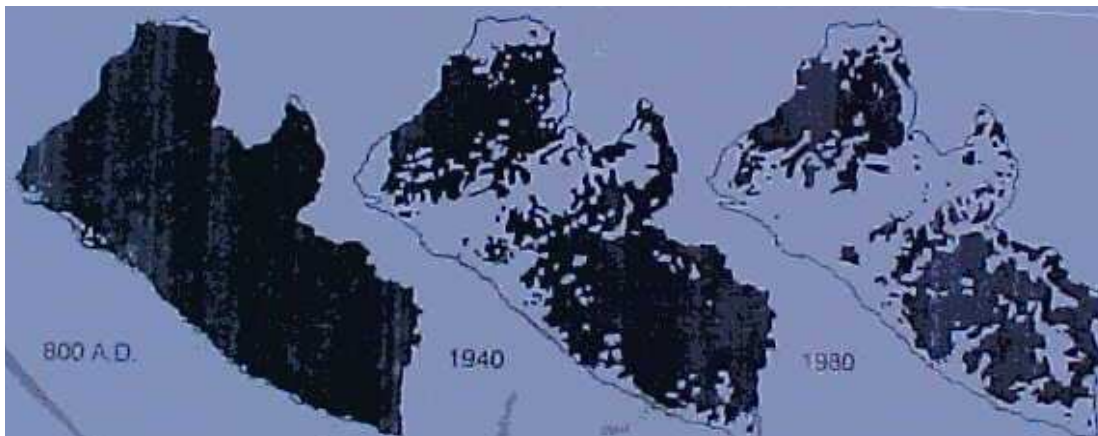
13	Chlorophora regia	Iroko
14	Aniegre robusta	aniegre
15	Holea celiata	Abura

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

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 EXTINCTIO

FIGURE 4: FOREST FRAGMENTATION



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%.

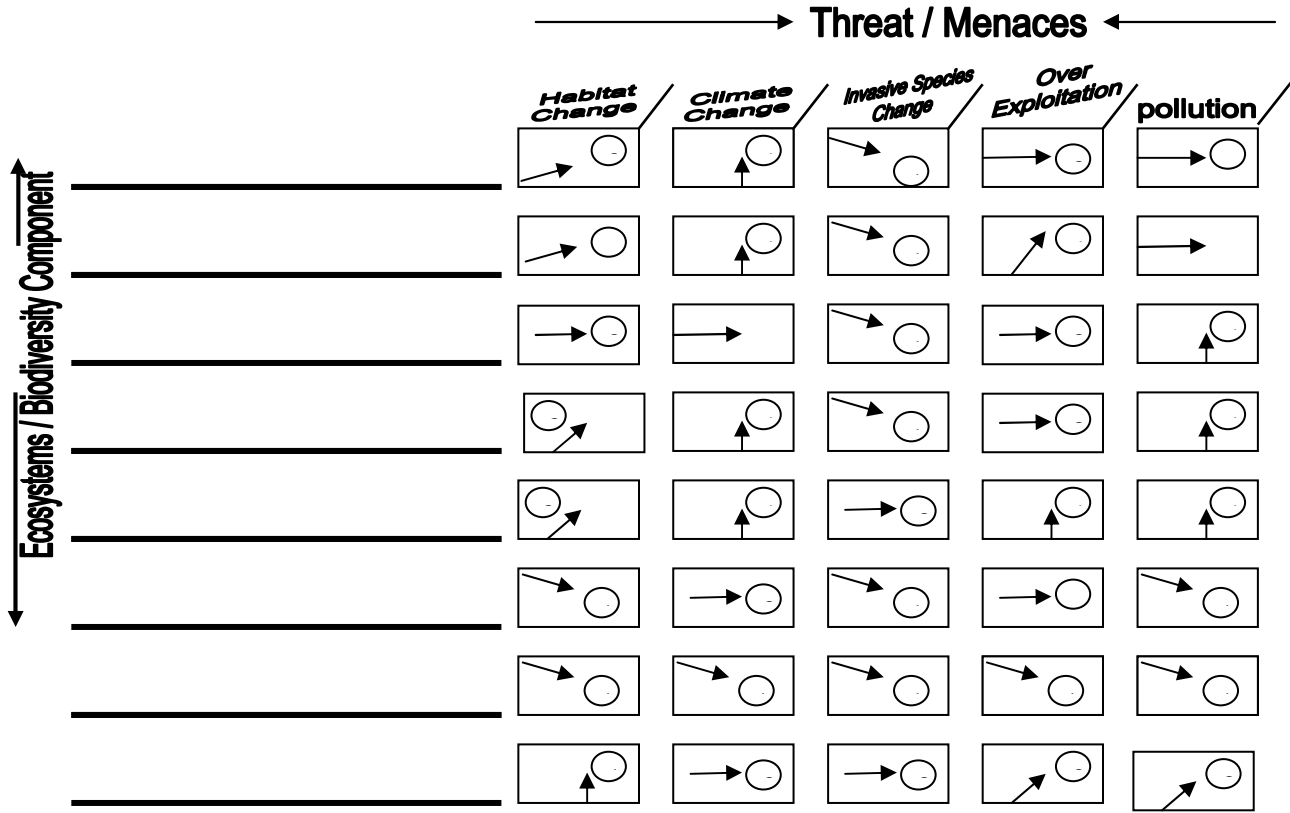
Table 21: Natural Forest Distribution

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.



CHAPTER TWO: CURRENT STATUS OF NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN

Liberia ratified the Convention on Biological Diversity on 8 November 2000, and has since become a party. Because of the ratification, the country qualified under the Convention to receive support for biodiversity programs and activities.

Article 6 of the Convention states that Parties are to develop national strategies, plans and programs for the conservation and sustainable use of biological diversity or adapt existing strategies, plans and programs that indicate measures to implement the Convention; including integrating them into relevant sectoral or cross-sectoral plans, programs and policies.

In compliance with the above provisions, Liberia began formulating its NBSAP in 2002 and completed the task in 2004. The Global Environmental Facility (GEF) provided funding totaling US\$254,000 dollars to draft the National Biodiversity Strategy and Action Plan. The task was to conduct an assessment on the status, trends and threats to biological diversity and develop strategies and action to combat them.

The Vision Statement states, that “in commitment with the Millennium Development Goals and consistent with the National Environment Policy of Liberia, the over-arching 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 the future generations to meet their own needs”.

The Vision Statement further provides for the Liberian people to have a society that lives in harmony with its natural environment, balancing livelihood and conservation of biological resources and promoting equitable sharing of benefits arising from the sustainable use of genetic resources as an integral part of national social-economic development.

Guiding Principles:

The below guiding principles were developed to facilitate the implementation of the NBSAP:

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 generic resources and the fair and equitable sharing of benefits arising from the use of these resources;
3. Increased understanding and awareness of issues related to genetic resources be promoted;
4. Regular assessment, monitoring and evaluation of biological diversity and the results widely publicized;
5. An integrated systems approach to biological resources and multiple sectoral planning be instituted;
6. involvement of women, youth, the elderly and other vulnerable groups in natural resource policy formulation, planning, decision making and programme implementation should be encourage as an essential tool;
7. Mechanism to create and facilitate the condition 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 must have appropriate policy and legislation and the enforcement backed by adequate institutional capacity and human resources;
10. The underlying causes of biodiversity loss which include poverty, ignorance and population dynamic, must be addressed in an effort to effectively conserve biological diversity;

OVER ALL GOALS:

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

SPECIFIC GOALS:

1. Take appropriate measures to protect critical ecosystems against harmful effects or destructive practices for the conservation of biodiversity;
2. To create biodiversity awareness among sectors of the society and promote international cooperation;
3. To commit the people of Liberia to sound and sustainable use of biological diversity in order to bring about social-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;

Thus, the NBSAP identified the above (6) goals, 61 objectives and 122 actions which are the thrusts anchored on frame work resources (including human and institutional) and the interaction between the two. It contains the national blueprint for the management of biological resources, (in-situ and ex-situ) in the country. It provides a holistic biodiversity management plan, which recognizes the close linkages among commercial, conservation and communal uses of forests. However, a review of the NBSAP, identified constraints and limitations in the implementation of the strategies among them:

1. Lack of a clear mechanism that define tasks;
2. Lack of clear sources of funding,
3. Lack of Indicators for monitoring and monitoring schemes;
4. Inadequate capacity to implement biodiversity conservation initiatives;
5. Overlapping jurisdiction and conflicting policies;
6. Lack of data base system and information sharing ;
7. Lack of specific geographical priorities;

Forest Re-Assessment using remote sensing technology also documented the existing forest cover of the country and the problems associated with conservation from 2002-2006. According to the findings, key causes of forest cover loss include poverty and the exclusion of local people from participation in protected areas management. A current project (Review of Experiences on

Integration of Protected Areas into Wider Landscape, Sectoral Strategies and the Poverty Reduction Strategy) which is supporting capacity assessment on the CBD Programme of Work on Protected Areas, pilots livelihood initiatives around protected areas from 2008 to present, and documents several issues affecting biodiversity conservation and the sustainable use of its components. Among these are:

1. Protected areas management in Liberia does not adequately address the issue of poverty
2. PA management has not integrated traditional knowledge and has until recently fallen short of recognizing local people particularly forest communities as key stakeholders;
3. There are no harmonized policies, programmes, and financial strategies in place for protected area management;
4. Capacity gaps for protected area management remains open; those involved with the actual activities have limited knowledge in PA management. There are inadequate programmes in place to address the issue.
5. Apart from forest biodiversity, mountain, agriculture, coastal and marine ecosystems, etc did not have professionals during the preparation of the NBSAP. As a result of this shortcoming, workgroups in the NBSAP formulation outside of the forest biodiversity did not include or devote special attention to these thematic areas. The lack of knowledge, understanding and appreciation may have also contributed to the inability to fully implement the NBSAP.
6. From the lesson and experiences gathered during the review, more will need to be done to improve management of the other thematic ecosystems.

In addition to the above, Chapter One catalogued issues such as: human settlement, population displacement, shifting cultivation, timber exploitation, commercial plantations, poaching and hunting, beach sand mining, land use planning, inadequate mining exploitation scheme, inappropriate application of agro-chemicals, inadequate law enforcement for resource exploitation, inadequate trained human resources in biodiversity management, inadequate taxonomic knowledge of fauna and flora in Liberia, etc which threaten biodiversity management.

New information, approaches and analyses from several conservation initiatives, saw the need to revisit the NBSAP exactly five years since it was approved by the Government of Liberia to ensure that the strategies comply with present day realities. This review is yet to be conducted.

PERFORMANCE MATRIX

Key Issues	Priority Objectives	Performance Indicators	Status of implementation
1. <i>Inadequate knowledge of species and ecosystem diversity</i>	<i>Improve and expand knowledge on the characteristics, uses and values of local biodiversity.</i>	<i>Training conducted on species identification and classification; Available data on values and uses of species.</i>	<i>Limited studies have been conducted on some ecosystem services. Much more needs to be done to capture the uses and values of biodiversity.</i>
2. <i>Inadequate data on in-situ and ex-situ conservation</i>	<i>Conduct assessment on both in-situ and ex-situ conservation;</i> <i>Integrate and enhance planned biodiversity conservation.</i>	<i>Reports from assessments available and in use; Improvement in integration and planning on biodiversity conservation.</i>	<i>Programs in agricultural research are being undertaken by the Ministry of Agriculture at CARI; FDA also has been undertaking conservation activities. These are not adequate to meet requirements of the convention.</i>
3. <i>Consolidating research and development programs for ex-situ and in-situ conservation</i>	<i>To integrate and enhance planned biodiversity conservation efforts with emphasis on in-situ conservation.</i>	<i>Joint research programs implemented by stakeholders' institutions on in-situ and ex-situ conservation.</i>	<i>Separate programs are being undertaken by Central Agriculture Research Institute, at the Ministry of Agriculture, the Liberia Institute for Biomedical Research and the University of Liberia</i>
4. <i>Lack of or inadequate harmonization of policies on biodiversity management</i>	<i>To consolidate research and development programs for in-situ and ex-situ conservation of biodiversity</i>	<i>Stakeholders' forum to harmonize policies; Policies harmonized and in use; Improvement in the management and conservation of biodiversity on an appreciable level.</i>	<i>Still pending</i>

<p>5. <i>Integrating the planning, implementation, evaluation and monitoring of biodiversity conservation in both government and non-governmental sectors.</i></p>	<p><i>To strengthen both human and institutional capacities for integrating biodiversity management;</i></p>	<p><i>Institutional capacities built to monitor, evaluate and implement biodiversity programs/activities;</i></p> <p><i>Joint programs are implemented with non-governmental organizations.</i></p>	<p><i>Needs further work</i></p>
<p>6. <i>Estimating current uses and values of biodiversity</i></p>	<p><i>To assist biodiversity planning and management at all levels;</i></p> <p><i>To create a database for biodiversity resources and their current values.</i></p>	<p><i>A database created on the uses and values of biological and genetic resources in the country;</i></p> <p><i>Data is used in development and conservation planning.</i></p>	<p><i>. Apart from scanty data on the value of forest wood, no realistic data is available on record.</i></p>
<p>7. <i>Increasing access to updated biodiversity information and data based systems.</i></p>	<p><i>To create a mechanism for access to information and for information sharing</i></p>	<p><i>A website established to access information on biodiversity;</i></p> <p><i>The web is linked to other regional and global networks.</i></p>	<p><i>The Biodiversity Add-On Project is seeking to establish a Clearing House Mechanism for biodiversity information with the expertise of IUCN;</i></p> <p><i>The project is in the maiden stage.</i></p>

<i>8. Encouraging and sustaining advocacy for biodiversity management</i>	<i>To ensure total coverage of population with knowledge and information about biodiversity conservation and management.</i>	<i>The use of local means to spread information on biodiversity utilized in addition to radio and leaflets; Traditional information systems established at local levels.</i>	<i>Biodiversity advocacy has largely been done through the means of the use of radio, workshops, and dramas; No permanent system has established for this purpose.</i>
<i>9. Strengthening linkages of local NGOs and CBOs with regional and global counterparts for conservation of biodiversity</i>	<i>To establish a network of experts and technicians on biodiversity conservation.</i>	<i>Network of technicians and experts established and working together at local and regional levels; Exchange of knowledge and expertise.</i>	<i>Network has been established along tripartite lines with Guinea, Ivory Coast, Sierra Leone on the protection and management of protected areas along our common borders. This is yet to expand to other levels.</i>
<i>10. Strengthening human resource capacities in the conservation and management of biodiversity</i>	<i>To establish a compendium of experts on the conservation and management of biodiversity.</i>	<i>Series of training, including short, medium and long term conducted to increase the level to personnel for biodiversity management; Compendium of experts available to draw from where and when necessary.</i>	<i>The Universities in Liberia have produced first degree level technocrats that would need advanced level of education to do more effective work; Support for graduate programs is needed if the required experts are to be found.</i>

Chapter 3: Sectoral and Cross-sectoral Integration or Mainstreaming of Biodiversity Considerations

Mainstreaming of Biodiversity into National Programs

The Government of Liberia has developed a national Plan of Action called the “Poverty Reduction Strategy”. This document contains the priority socio-economic development programs of action for the next three years (2008 – 2011). On page 179 of the PRS, the Government of Liberia pledged to “rigorously enforce Environmental Impact Assessment for all development projects and activities in the country”.

The local Millennium Development Goals call for the integration of principles of sustainable development into country policies and programs as a way of reversing of environmental resources.

With the EIAs and SEAs being strategic in the national development agenda, it is believed that biodiversity considerations will be addressed.

Obstacles and Challenges in the Implementation of the Strategies and Actions:

Some of the major challenges affecting the implementation of the NBSAP are the lack of specific laws and regulations to deal with biodiversity issues. Biodiversity issues are not clearly highlighted even in sectors where they are essential. The other is the inability of the government to establish the administrative mechanism called for in the NBSAP. Once the secretariat is established and empowered, issues of biodiversity coordination and monitoring will be enhanced.

Another challenge to successful management of natural resources is the availability of financial and human resources. It is important that government steps up support to environmental governance to ensure the maximum security for resources.

Resources Availability:

The GEF and International Non-governmental Organizations primarily are the key institutions currently funding programs, projects and activities being implemented in Liberia. However, funding has largely been focused on forest biodiversity in exclusion to other thematic areas dealt with in the NBSAP. Thus, resources are still inadequate to effectively implement the NBSAP and for the overall coordination and monitoring of biodiversity programs.

Conclusions / Way Forward:

Considering the gaps and weaknesses in the implementation of the NBSAP, it is important that future initiatives include the revision of the strategies and actions to match current realities. The review, update, or revision must take into account the building of synergies with other RIO Conventions, and should be done in close collaboration with ongoing regional initiatives in the implementation of the RIO Conventions.

Sectoral and Cross-sectoral Integration or Mainstreaming

Thematic Area	Institutional Mandates & Instruments	Mechanism for Mainstreaming Biodiversity Information	Roles and Responsibilities	Existing Research and Areas of focus	Funding Mechanism
Forest Biodiversity	<p>Responsible for forest governance;</p> <p>Instruments include: The Reformed Forestry Law of 2006, Forest Policy and Plan of Action;</p> <p>A National Wildlife Law is nearing completion and should be ratified by the National Legislature shortly.</p>	<p>Liberia has conducted social-biological surveys of proposed protected areas and allocated up to 950,000 hectares to the protected area network with at least 100,00 allocated per year up to (December 2010) as consistent with the suitability study;</p> <p>Using community forest management techniques to identify viable economic opportunities for communities from forest resources, and providing extension and technical assistance in community forest</p>	<p>Various institutions including Ministry of Internal Affairs, Environmental Protection Agency, Forestry Development Authority and University of Liberia</p>	<p>Conservation with focus on threatened and endangered species</p>	<p>Funding is provided by the GEF, International INGOs, Government of Liberia</p>

		<p>management;</p> <p>Conserving protected and important biologically diverse areas with an emphasis on providing sustainable livelihoods for communities at the fringes of the forests;</p> <p>Enhancing environmental benefits from forestry reserves through an analysis of potential markets for trading of carbon credits.</p>			
Agriculture Biodiversity	<p>Responsible for agricultural programmes.</p> <p>A draft agriculture policy has been completed;</p> <p>An assessment of the Agriculture Research Institute conducted to improve capacity and</p>	<p>Review the mandates of existing agricultural parastatals.</p> <p>Encourage, promote and strengthen 100 farmers based organizations as the primary institutions for farmers cooperation with particular emphasis on women and</p>	Ministry of Agriculture, NGOs, Civil Society groups.	Agro-research in products and technology, land and water management and extension communication.	FAO, USAID ADR INC. multilateral institutions etc

	<p>programs.</p>	<p>youth; Establish food security monitoring system to observe food security and nutrition indicators, and provide early warning of potential emergency</p> <p>Review and implement incentives measures for private sector investment consistent with the investment code as well as tax and revenue laws by 2011.</p>			
Inland water	<p>The management of water resources both underground and surface water.</p> <p>A draft integrated water management policy has been completed.</p>	<p>Increase access to safe drinking water from 25-50% by 2011, including to 45% of rural population;</p> <p>Establish water quality testing facility nationwide with trained staff and necessary equipment,</p> <p>Develop or</p>	<p>Ministry of Lands, Mines and Energy, Liberia Water and Sewer Corporation, Ministry of Health and Ministry of Public Work</p>	<p>Research work on ground water.</p> <p>No immediate actions on Inland waters contemplated in present PRS.</p>	<p>EU, Government of Liberia and multilateral institutions</p>

		procure improved hydro geological information system etc			
Health	<p><i>To improve the health status of increasing number of citizens, on an equal basis, through expanded access to effective basic health care, backed by adequate referral services and resources.</i></p> <p><i>A National Health Policy has been completed since 2008 along with a ten year plan of action</i></p>	<p>Develop and implement National Health Leadership and management program by 2009;</p> <p>Develop and finalize national human resource policy, plan and SOPs by 2009;</p> <p>Expand access to disease prevention and control programs, particularly for HIV/AIDS and tuberculosis by December 2010;</p> <p>Develop and institute architectural standards for health infrastructures by 2008;</p> <p>Establish a health management</p>	The Ministry of Health & Social Welfare, EPA, Monrovia City Corporation and Liberia Water & Sewer Corporation	Research is being done in area of health information management systems since 2008, and three research initiatives are ongoing on health financing.	World Health Organization , UNICEF, Multilateral and bilateral organizations

		<p>information system unit by 12/2008;</p> <p>Develop a national health financing policy and strategic plan by 2009;</p>			
Fisheries and Livestock	Responsible to cultivate and develop programs for fisheries and livestock	Develop a National Fishery Law. Law is in draft form and yet to be validated.	Ministry of Agriculture, FAO, National and International NGOs.	<p>The Central Agriculture Research Institute is carrying on research on variety of seedlings and livestock. CARI has 35 pigs along with nurseries; Also there are 135 pigs at Tumutu in Bong County, and 35 pigs also at the Klay Hatchery in Bomi County. The Klay Center also has 13 fish ponds and 12 ducks.</p> <p>At the Liberia Institute for Biomedical Research, research is</p>	FAO, Government of Liberia, Bilateral and multilateral Institutions

				being conducted on chimpanzees.	
Mining	Responsible for issuance of licenses for mineral exploitation/exploration	<p>Liberia has admitted into the Kimberly Process since 2007</p> <p>Reviewed and amended the New Minerals and Mining Law to be consistent with the National Mining Policy, Public Procurement and Concession Act, the New Forestry Law, the Extractive Industries Transparency Initiative, the Kimberley Process and the Revenue Code since 2008;</p> <p>Reviewed and approved the design of a Mining Cadastre Information Management System by June 2008;</p> <p>Analyze</p>	Ministry of Lands, Mines & Energy		Government of Liberia, Bilateral and Multilateral Institutions

		impact of existing regulations on small-scaled miners and amend to facilitate small-scale mining and to ensure the protection of human rights and the environment by Oct. 2008.			
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CHAPTER 4: **Conclusions: Progress Towards the 2010 Target and Implementation of the Strategic Plan** Country: LIBERIA

GOALS AND TARGETS	PROGRESS TOWARDS THE TARGET		
	CORRESPONDING NATIONAL TARGET	ASSESSMENT TOWARD 2010	RATE (1-5)
Protect the components of biodiversity			
<i>Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes</i>			
Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.	Global target adopted.	Liberia has official declared that it would set aside 30% of its forest resources for conservation purposes. Only 4% has been legally established.	2
Target 1.2: Areas of particular importance to biodiversity protected	Some national targets and indicators to fulfill this Goal are defined under the NBSAP, and were largely dependent on global targets. These include: Objective 1.1; 1.5; 1.7;1.9; 1.14.	Liberia has two legally protected areas, (Sapo National Park and the East Mt. Nimba Nature Reserve) with six proposed ones. The NBSAP sets national targets for areas of particular importance to biological diversity, and has developed strategies and actions for the management of protected areas systems, but these actions have largely remained less implemented.	3
<i>Goal 2. Promote the conservation of species diversity</i>			
Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups.	Some national targets and indicators to fulfill this Goal are defined under the strategic objectives 2.1, 2.4, 2.8, 2.10, 2.12, and 2.16 of NBSAP.	Baseline studies have been conducted on species inventory, identification of endangered species and species at risk; identification of particular significant habitat, and identification of areas of particular economic significance.	2
Target 2.2: Status of threatened species improved.	Some national targets and indicators to fulfill this Goal are defined under Goal 1 objective 1.10, 1.11, and 1.12 and goal 2 objective 1.1, 2.9 of the NBSAP.	Red List of plants for Liberia published in 2001. Adopted an international red list for terrestrial fauna & marine organisms. The red list needs to be updated and published for fauna and flora	3

GOALS AND TARGETS	PROGRESS TOWARDS THE TARGET		
	CORRESPONDING NATIONAL TARGET	ASSESSMENT TOWARD 2010	RATE (1-5)
Goal 3. Promote the conservation of genetic diversity			
Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.	<p>Some national targets and indicators to fulfill this Goal are defined under the strategic objectives 1.16, 2.1, 2.2, and 2.3 of NBSAP.</p> <p>Goal 2 Objective 10 Action 1 in the NBSAP call for the ratification of the International Treaty on Plant Genetic Resources for Food and Agriculture, and the development of sub-regional legal instrument for trans-boundary conservation of genetic resources in the Mano River Basin.</p>	<p>The Central Agriculture Research Institute has been involved in research focusing mainly on agriculture biodiversity (livestock and plant species). It also has a gene bank.</p> <p>The Liberian Institute for Biomedical Research has been largely involved with vaccines development for hepatitis using chimpanzees.</p>	2
Promote sustainable use			
Goal 4. Promote sustainable use and consumption.			
Target 4.1: Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.	<p><i>Goal 4, Objective 4.2, 4.3, 4.4, 4.6, 4.8, 4.10, and 4.11 of the NBSAP address national concerns on promotion of sustainable actions in the use of biodiversity products.</i></p>	<p><i>Liberia has made significant progress in reforming laws, policies, regulations and programs of action in the sustainable management of biodiversity.</i></p> <p><i>In addition, both the FDA and the GCLME have developed five years plan for forest management and for development of the coastal and marine systems in the country. The tenure in both cases is from 2005 – 2009.</i></p>	3
Target 4.2. Unsustainable consumption, of biological resources, or that impact upon biodiversity, reduced.	<p>Goal 3 objective 5 actions 1, 2; Objective 6 Action2 are in support of the global program.</p>		
Target 4.3: No species of wild flora or fauna endangered by international trade.	<p>In line with the global target.</p>	<p>The PRS has strategic objective to: Manage existing protected areas including Mt. Nimba Nature Reserve and Sapo National Park totaling 193,500 hectares, in accordance with the National Forest Reform Law and FDA Regulations by Dec. 2008;</p>	2

GOALS AND TARGETS	PROGRESS TOWARDS THE TARGET		
	CORRESPONDING NATIONAL TARGET	ASSESSMENT TOWARD 2010	RATE (1-5)
Address threats to biodiversity			
<i>Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.</i>			
Target 5.1. Rate of loss and degradation of natural habitats decreased.	Global target adopted; One or two national targets set, both by FDA, GCLME and MDG.	The forest policy sets aside 30% of the forests for conservation purposes. The Millennium Development Goals also targets an increase of 3.4 million hectares by 2015.	2
<i>Goal 6. Control threats from invasive alien species</i>			
Target 6.1. Pathways for major potential alien invasive species controlled.	Global targets adopted	Goal 1 Objective 6, Action 1 of the NBSAP calls for the development of regulations concerning the introduction of exotic genetic resources by 2008.	1
Target 6. 2. Management plans in place for major alien species that threaten ecosystems, habitats or species.	Global targets adopted	To meet the 2010 target will require the sharing of experiences, expertise and resources in support of effective management plans. At the moment, no measures have been taken for the achievement of the target	1
<i>Goal 7. Address challenges to biodiversity from climate change, and pollution</i>			
Target 7.1. Maintain and enhance resilience of the components of biodiversity to adapt to climate change.	Global targets adopted	A national Adaptation Plan of Action has been completed since 2008.It calls for rehabilitation of 47 hydrometric stations destroyed during the war in order to provide meteorological information to serve as early warning system for climate variability. The document also calls for the construction of coastal defense systems in coastal cities to prevent coastal erosion. The PRS calls for harmonization of national meteorological and hydrological services within the appropriate legal framework in line with WMO standards by 2008.	2

GOALS AND TARGETS	PROGRESS TOWARDS THE TARGET		
	CORRESPONDING NATIONAL TARGET	ASSESSMENT TOWARD 2010	RATE (1-5)
<p>Target 7.2. Reduce pollution and its impacts on biodiversity.</p>	<p>Global targets adopted; also some national targets are in place.</p>	<p>The PRS calls for increase access to safe drinking water from (25% to 50%) by 2011, including 45% of the rural population. It also insists on the sustainability of 90% of water and sanitation in the country by the same period.</p> <p>Development of national solid waste management policy, strategy and regulations to ensure effective coordination and sustainability of efforts in the disposal of domestic refuse, clinical and toxic wastes, to engage the private sector to invest in solid wastes management. Policy has been completed.</p> <p>Ensure that EIA/EIS are undertaken and that sound environmental practices in project developments/implementation by 2011. 3</p>	
<p>MAINTAIN GOODS AND SERVICES FROM BIODIVERSITY TO SUPPORT HUMAN WELL-BEING</p>			
<p>Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods</p>			
<p>Target 8.1. Capacity of ecosystems to deliver goods and services maintained.</p>	<p>One or more national targets developed/established.</p>	<p>The NBSAP developed strategies and actions on ecosystem protection that was to be achieved in 2009.</p> <p>The Forestry Development Authority has a five year plan which extends to 2009 for the restoration of degraded forests components under its reforestation and afforestation programmes.</p> <p>The PRS advocates for land policies and programs to provide security of tenure and to enhance access in order for smallholders to move to more profitable and sustainable livelihood by 2009. It also calls for the recognition and protection 3</p>	
<p>Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people maintained.</p>	<p>Same as global target</p>	<p>The Forestry Legislations have provisions that support not only sustainable management of forest products; but also address sustainable livelihood issues, as well as poverty concerns. This trend is not seen in the agriculture sector. 3</p>	
<p>Protect traditional knowledge, innovations and practices</p>			
<p>Goal 9 Maintain socio-cultural diversity of indigenous and local communities</p>			
<p>Target 9.1. Protect traditional knowledge, innovations and practices.</p>	<p>No national target, but Liberia ascribes to the global target</p>	<p>The Environment Protection and Management Law have provisions for the protection of traditional knowledge and practices; there is, however, no program to translate the legal mandate into action.</p> <p>NBSAP also call for action to document the knowledge and practices. 2</p>	

GOALS AND TARGETS	PROGRESS TOWARDS THE TARGET		
	CORRESPONDING NATIONAL TARGET	ASSESSMENT TOWARD 2010	RATE (1-5)
Target 9.2. Protect the rights of indigenous and local communities over their traditional knowledge, innovations and practices, including their rights to benefit-sharing.	<i>No national target established, but the country ascribes to the global target.</i>	<i>Community Rights Law has been drafted by the FDA, FFI, IUCN, and CI, along with local NGOs Initiative underway to hold national consultative meeting to commence the process of documenting traditional knowledge, practices and innovations,</i>	2
Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources			
<i>Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources</i>			
Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions.	<i>Global target adopted.</i>	<i>Liberia is in the process of developing ABS legislations, including, An Act, Regulations and Guidelines with the support of the ABS Africa Initiative. These legislations are expected to be completed by mid 2010.</i>	2
Target 10.2. Benefits arising from the commercial and other utilization of genetic resources shared in a fair and equitable way with the countries providing such resources in line with the Convention on Biological Diversity and its relevant provisions	<i>Global target adopted</i>	<i>Prior to the civil conflict, the Central Agriculture Research Institute and the College of Agriculture and Forestry at the University of Liberia were involved in the collection of germ plasms of rice and tree species for experimental purposes. These research were coordinated with a number of institutions including the International Rice Research Institute, (IRRI); International Institute for Tropical Agriculture at the University of Ibadan in Nigeria, (IITA), and the West Africa Rice Development Association, (WARDA). Though these activities have been ongoing, no national mechanism is in place for sharing.</i>	1
Ensure provision of adequate resources			
<i>Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention</i>			
Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.	<i>Same as global target.</i>	<i>Liberia has depended largely of GEF funded programs, including support for projects under UNCBD, UNFCCC, UNCCD, Stockholm, Montreal Protocol and the Cartagena Protocol among others. Currently support is available for the ADD-On Biodiversity Enabling Project and the Consolidation of Protected Areas Network (COPAN). However, national institutions have made efforts to integrate mechanisms in their sectoral plans.</i>	4
Target 11.2. Technology is transferred to developing country Parties, to allow for the	<i>Global target adopted</i>	<i>Liberia enjoys the benefits of technology transfer that allows for the effective and efficient implementation of</i>	3

GOALS AND TARGETS	PROGRESS TOWARDS THE TARGET		
	CORRESPONDING NATIONAL TARGET	ASSESSMENT TOWARD 2010	RATE (1-5)
effective implementation of their commitments under the Convention, in accordance with its Article 20, paragraph 4.		<i>the Convention in accordance with Article 20 paragraph 4.</i>	

Conclusion:

In the opinion of the consultants, considerable efforts have been made in the overall management of biodiversity in the country; especially in the area of forest biodiversity, but much still needs to be done. There is still need to conduct assessment that would make data par with current realities.

Recommendation:

1. Conduct assessment in other thematic areas other than forest biodiversity;
2. Revise/update the NBSAP to reflect current realities. This should be preceded by an assessment to document the present biodiversity status of the various ecosystems in the country;
3. Strengthen enforcement and monitoring mechanisms for forest biodiversity; especially in protected areas;
4. Make livelihood activities around protected areas sustainable and ensure community leadership. Provision of alternative sources of livelihood must be targeted and realistic for people in and around PAs;
5. There must be consistency in dealing with the cultural, socio-economic and political factors relative to PAs;
6. Complete and implement community rights law;
7. Utilize the SAPO experience and implications to deal with socio-cultural issues in future establishment of protected areas;
8. Complete and implement agriculture policy and action plan and ensure their inculcation into the National Development Programs;
9. Develop sustainable land management policy and action plan to regulate the proper utilization of land resources;
10. Conduct inventory on inland waters and aquatic ecosystems to discover their full potential, and to design strategies and actions to improve the ecosystem;
11. Complete the mountain policy and develop strategies and actions for the conservation of mountain resources;
12. Design strategies and actions to implement wetlands policy; taking into consideration patterns of construction that undermine their integrity;
13. Conduct inventory to gather data on alien and invasive species;
14. Develop mechanisms to strengthen/improve communication of biodiversity information as well as public education and awareness;
15. Develop incentives program for biodiversity management;
16. Complete and implement the MRU Tripartite Agreement on the management of the Mount Nimba Massif, the Wonigizi-Zeama Forest, the Tai-Grebo Forest and the Gola Forest;
17. Develop national actions on Plant and Genetic Resources, the Strategic objectives, and improve efforts toward the 2010 target;
18. Take actions to address beach sand mining, and erosion occurring along major cities in the country;
19. Develop mechanisms to deal with wastes in the country. Special attention must be paid to medical wastes, toxic and hazardous wastes, human wastes and construction wastes;
20. Inculcate Ecowas' environment policy and action plan into national agenda and programs;
21. Implement AU Environment and Agricultural programs at national level.

Appendix I - Information concerning reporting Party and preparation of national report

A. Reporting Party

Contracting Party	
NATIONAL FOCAL POINT	
Full name of the institution	ENVIRONMENTAL PROTECTION AGENCY
Name and title of contact officer	JONATHAN W. DAVIES/ FOCAL POINT
Mailing address	ENVIRONMENTAL PROTECTION AGENCY, 4TH STREET, BOX4024, MONROVIA, LIBERIA
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CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Full name of the institution	ENVIRONMENTAL PROTECTION AGENCY
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SUBMISSION	
Signature of officer responsible for submitting national report	ASST. PROF. JEROME G. N. NYENKA Acting Executive Director/GEF Operational Focal Point
Date of submission	AUGUST 2009

Annex II - Provisional framework of goals, targets and indicators to assess progress towards the 2010 Biodiversity Target

Targets	Progress Made in Incorporating Targets	Indicators	Obstacles/Challenges
<p>Article 5 Cooperation</p>	<p>Liberia has participated in three tripartite meetings of the Mano River Union countries involving Guinea, Ivory Coast and Sierra Leone on the protection/conservation of the Mount Nimba Massif between 2002 and 2008. This agreement also includes the Gola National Forest between Liberia and Sierra Leone; the Wonigizi-Ziama Forest between Guinea and Liberia, and the Tai-Grebo National Forest between Liberia and the Ivory Coast</p> <p>Liberia has also been involved in the ECOWAS sub regional environment meetings to draft an environmental policy and action plan. The Actions were completed on November 15, 2008 in Abuja, Nigeria.</p> <p>The Ministry of Agriculture has also been involved ECOWAS and the NEPAD Comprehensive African Agriculture Development Program (CAADP), which provides an integrated framework of development priorities aimed at restoring</p>	<p>A MRU Plan of Action has been completed and will become function in 2009.</p> <p>An ECOWAS Environment Policy and Action Plan have been completed awaiting approval by the meeting of the Heads of State</p> <p>A regional</p>	<p>Harmonizing these policies with on-going local initiatives and inculcating them into the National Development Strategies;</p> <p>Sourcing funding for the adequate and timely implementation of these programs.</p> <p>Same as above</p>

	<p>agricultural growth, rural development and food security.</p> <p>Liberia ascribes to the Kimberley Process in harvesting minerals, especially gold and diamonds in the country.</p>	<p>initiative has been completed, and countries have agreed to pledge 10% of national budgets to agriculture.</p> <p>In line with the NEPAD philosophy, the 2006 Abuja Food Security Summit has renewed its commitment to eradicating hunger by 2030.</p> <p>A Kimberley Process Certification Scheme is in place at the Ministry of Lands, Mines and Energy.</p>	<p>Same as above</p>
<p>Article 6 General Measures¹</p>	<p>The Forestry Development Authority in its legislations has set aside 30% of the forest areas of Liberia for conservation purposes. In fulfillment of that, six new protected areas have been proposed to add to the two already existing. Conservation is a key component of the five-year plan. Both the NBSAP and the Environment Protection and</p>	<p>The COPAN Project now under implementation for the next three years.</p> <p>Implementation of forest concession</p>	<p>It will require a very strong political will in the face of government's economic priorities to implement the 30% forest areas for conservation purposes.</p>

¹ Considering that there is a separate chapter of the report on this Article, there is no need to list relevant information here.

	Management Law support the above.	agreements.	
Article 7 Identification and monitoring	<p>The country has taken several actions by establishing a hydrometric lab in the Bureau of Hydrological Services, Ministry of Lands, Mines & Energy that is responsible for data and information on hydrology and meteorology. The V-LAB in Margibi County conducts studies on chimpanzees for the purpose of developing vaccines for hepatitis A, B, &C.</p> <p>There are GIS labs at the Liberia Institute for Statistics and Geographic Information Systems and the Forestry Development Authority. These systems played pivotal roles in the national data processing and the Forest Re-assessment Project between 2001-2004.</p> <p>The EPA has two Departments: Monitoring, Assessment & Conservation, and the Department of Outstation & Inspectorate that are responsible for environmental assessment, monitoring standards, and compliance issues. The FDA has a department for forest conservation.</p>	<p>Hydrological and meteorological data are regularly collected and analyzed.</p> <p>Vaccines to treat childhood diseases are produced and used by the Ministry of Health & Social Welfare.</p> <p>Environmental inspectors are assigned in the provincial counties to carry out monitoring and compliance duties.</p>	<p>Maintaining the stations</p> <p>Accessing funding to continue the research.</p> <p>The need to complete the decentralization</p>

			process. Currently only eight of the fifteen provincial counties are covered.
Article 8 (a) to (e) (protected areas)	<p>Liberia has two protected areas and six proposed ones. The 2006 Forest Policy of Liberia apportioned 30% of the forested land for conservation purposes. In addition, FDA has, in collaboration with Fauna & Flora International and Conservation International, implemented a forest re-assessment project from 2001-2004 in order to identify the rate of forest cover removal; establish additional protected areas and to set standards and guidelines for conservation purposes. Under the RAMSAR Convention, five wetlands of international importance have been gazetted.</p> <p>A project: Integrating Protected Areas Management systems into the National Poverty Reduction Strategy of Liberia” is being implemented by the Environmental Protection Agency.</p> <p>The Sapo National Park, the largest of the protected areas network in Liberia, was increased by over 200 hectares in 2003 to create buffer around the park as a way of preventing encroachment by local farmers and loggers. In addition, environmental corridor was proposed in the</p>		<p>Creating public awareness about the importance of conserving and protecting our protected areas</p> <p>Implementation of standards and guidelines established for conservation of protected areas and wetlands of international significance.</p>

	<p>same year linking the Grebo National Forest and the Tai National Park in cote D'ivoire in order to protect threatened species. Actions are under way to legislate the proposed environmental corridor.</p>		
<p>Article 8(h) (alien species)</p>	<p>The Central Agriculture Research Institute has been rehabilitated to carry on gene banks and seed development programs for the Ministry of Agriculture. This is supplemented by initiatives of the College of Agriculture and Forestry, University of Liberia. These programs conduct sampling on species for the purpose of plant and animal breeding and categorization. These programs are not yet fully operational due to various constraints.</p>	<p>CARI is now involved with crop research, with increased focus on food security; soil and water management research with focus on land productivity, etc; and livestock and fisheries research.</p>	<p>Restoring the level of trained personnel impacted by the civil crisis to carry out research and other scientific work.</p>
<p>Article 8(h) Alien Species</p>	<p>The Act adopting the New Agriculture Law in 1973, calls on the Ministry of Agriculture to prevent entry into Liberia of injurious plants and animal, pests, and diseases existing in foreign countries, and to prevent the spread of such pests and diseases should they become established in Liberia. Furthermore, sub-section 1.4a calls on the ministry to promulgate reasonable rules and regulations pertaining to the inception and control of the importation of living plants and animals of every description and in every form as are necessary to protect the agriculture and food</p>		<p>The Liberian laws have identified natural habitats for threatened species; but appropriate measures are yet to be put in place to safeguard them.</p>

	<p>supply of the republic from injurious plants and animals, pests and diseases existing in foreign countries.</p> <p>Prohibit the importation into Liberia of plants and animals which are poisonous, noxious or which produce deleterious drugs or which may be effected or infected by harmful pest or diseases, or which might have exposed to such pests or diseases sixty days before there importation except as prohibiting the importation of such plants or animals for scientific, experimental or educational purposes. The ministry is yet to complete its guidelines and policies in order to implement the above-mentioned provisions.</p>		
Article 8(j) and related provisions (traditional knowledge)	<p>There has not been any initiative on traditional knowledge and innovation in the country. Although the Environment Protection and Management Law have provisions on the importance of cultural and traditional sacred sites, no programs relative to the Akon Guideline has been developed.</p>		<p>An assessment of the knowledge systems and practices is needed to reflect a comprehensive picture and to document the knowledge innovations and practices.</p> <p>TK needs to be inculcated into the National Development Agenda.</p>
Article 8 (excluding paras (a)-(e), (h) and (j))			

<p>Article 9 (ex situ conservation).</p>	<p>The Central Agriculture Research Institute has initiated field gene bank program following the destruction of its facilities during the civil war.</p> <p>The New York Blood Center (V_LAB) in Margibi County also known as the Liberia Biomedical Research Institute is carrying on research activities using chimpanzees to develop vaccines with the concept of releasing retire chimpanzee in the wild.</p>		
<p>Article 10 (sustainable use)</p>	<p>The Environmental Framework laws of the Environmental Protection Agency and the Reform Forest Laws, policies and regulations 2006, clearly define the path for conservation and sustainable management of biological diversity. The NBSAP recommended strategies and actions on how to go about it but the missing link is no standards have been developed to enforce these legislations, policies, regulations and progrannes.</p> <p>The Environmental Protection and Management Law and Environmental Policy recognize customary use of biological resources that is compatible with sustainable use and conservation of biodiversity. The revised FDA's Regulations 2006 also recognized traditional</p>		<p>The revision and implementation of the National Biodiversity Strategy and Action Plan; the implementation of the three Cs by the forestry Development Authority, especially the Community Forestry that inculcates social agreements with traditional conservation programs.</p>

		<p>conservation approach to biodiversity conservation. The regulations require every forest concessionaire to enter into Social Agreement with communities where the concession is located. According to the Regulations, the Social Agreement will address where the locals should permit logging activities and where logging activities cannot take place because of its cultural and traditional significance among others.</p>		
Article 11 (incentive measures)		<p>The Environment Protection & Management Law considers incentive measures as one key tool for sustainable biodiversity management. The NBSAP developed the necessary strategies and actions; there are however, no national programs and standards to achieve it.</p> <p>The NCSA also identified incentive measures as an important instrument in biodiversity management.</p>		<p>Implementing the actions and strategies recommended in the NBSAP, the NCSA and the EMPL.</p>
Article 12 Research and Training		<p>There are several institutions involved in research and training in the country. They include: The Central Agriculture Research Institute; the College of Agriculture & Forestry; the Liberia Biomedical Research Institute; the Forestry Development Authority, and</p>	<p>Graduates from these various training programs performing tasks in their various disciplines.</p>	<p>Increase financial and technological resources to improve programs and services.</p> <p>Need to develop standards for scientific research</p>

	the Bureau of Hydrological Services, Ministry of Lands, Mines & Energy.		and training
Article 13 (education and awareness)	<p>The Department of Intersectoral Coordination at the Environmental Protection Agency has been engaged in information dissemination and awareness on general sustainable environmental including issues on biodiversity conservation and sustainable use. Target population includes: policy makers, students and civil society.</p> <p>The FDA and the Press Union of Liberia are undertaking public awareness, education and information dissemination projects on the Reform Forestry Law, Regulations, Policy and Five-Year Forest Management Plan.</p> <p>The EPA and the Ministry of Education are expected to launch programs with the latter integrating key environmental information into the curricula of primary, secondary and tertiary schools</p>	Training workshops, stakeholders' meetings, policy and EIA reviews, etc.	<p>Although public education and information contribute to increased citizens' consciousness about environment and sustainable use of natural resources, the process is fragmented. There is no clear policy and program to be followed by stakeholders.</p> <p>The EPA has yet to develop policy, strategy or action on public awareness, education and information. As such, there is national blueprint for communication, education and awareness relative to Decision VI/19 in the Annex.</p> <p>Limited capacity to implement the planned programs.</p>
Article 14 Impact Assessment	All key environment institutions have provisions in their legislations for environmental impact assessment. These include the three EPA legislations; the FDA, Ministry of Lands, Mines and Energy. The EPA has also completed its regulations and guidelines on		The deployment of environmental inspectors and monitors to ensure compliance in line with GOL commitment. Deployment has been completed in eight of the fifteen sub-

		<p>the EIA process.</p> <p>The Poverty Reduction Strategy commits the Government of Liberia to strict compliance to EIA application for all key infrastructure and industrial projects. It provides that government will publish sector-specific EIA guidelines for infrastructure, forestry and mining.</p>		<p>divisions of the country.</p> <p>Providing the requisite logistical and technical support for the task.</p>
Article 15 Access to Genetic Resources		<p>The three environmental framework laws and the Reformed Forestry Law, Policy, Regulations, and the Five-Year forest Management Plan have provisions to facilitate access to genetic resources for environmentally sound uses.</p> <p>Liberia is not signatory to the International Treaty on Plant Genetic Resources for Food and Agriculture; and has no program under this treaty concerning plant genetic resources. It however intends to consult both the protocol on PGRFA and the Bonn Guidelines whenever resources are available to draft ABS legislation.</p> <p>The country has developed a proposal for GEF support to conduct assessment of genetic resources and to develop ABS legislation. The request is still pending.</p>		<p>ABS, the third objective of the CBD has not had the required attention in Liberia. The drafting of an ABS Policy and Regulation will should raise awareness on genetic resources and their importance in the conservation of biological diversity.</p> <p>Building of national capacity by the CBD to develop legislation will be an important step.</p>
Article 16 Access to, and		<p>Liberia has developed a National Biosafety</p>		<p>Updating and implementation of</p>

Transfer of Technology	Framework, which when approved by the Policy Council and ratified by the National Legislature will address issues relevant to the conservation and sustainable use of biological diversity and/or use of genetic resources.		the NBSAP and the Biosafety Framework
Article 17 Exchange of Information	<p>The NBSAP Goal II, (objective 9 and 11) calls for promoting access to and transfer of technology and technological cooperation in the control of risk associated with biotechnology. It also recognizes the promotion of information exchange as well as technical and scientific cooperation with countries and regional bodies in relation to biodiversity conservation.</p> <p>The Environmental Protection Agency has been engaging the private sector institutions to both participate and support initiatives relevant to the transfer of technology.</p>		Ratification of the National Biosafety Framework is an important factor.
Article 18 Technical and Scientific Cooperation	Liberia participated in the sub-regional environmental consultations to draft an ECOWAS Environment Policy and Action Plan in 2006 to 2008. The policy respects complementarity, regionality and solidarity.		Policy and Action Plan approved by the African Ministerial Council on the Environment.
Article 19 Handling of Biotechnology	Liberia has not commenced detailed investigation into biotechnology and its impact in the country.		Need for assessment to determine the level of biotechnology in the country.
Article 20	The Global Environment		Other biodiversity

Financial Resources	Facility has supported a number of projects in the country relevant to the conservation		thematic areas would need support.
Taxonomy	There is active program on taxonomy in the country. Apart from a 2004 study in the Sapo National Park, no other initiative is known.		The NBSAP and other national studies reveal that Liberia's biodiversity potential is yet to be known and develop.
Ecosystem Approach	<p>The Government of Liberia has been working with countries of the Mano River Union to agree a Memorandum of Understanding on the management of the Mount Nimba Massif, the Tai-Grebo Forest, the Wonigizi-Ziama Forest, and the Gola National Forest.</p> <p>A National Workshop on PA of Liberia was held in Nimba County where a Resolution and Plan of Action were developed</p>		
Climate Change and Biodiversity	<p>A National Adaptation Program of Action has been completed since 2006. This was followed by a workshop of regional experts for local consultants in Green House Gas Inventory and Vulnerability Assessment in preparation for work on the First National communication.</p> <p>The First National Communication has been completed</p>		<p>Gaps identified in the National Capacity Self-Assessment project need to be address. These gaps exist at all levels; individual, institutional and systemic levels.</p> <p>Synergies also need to be built across the three RIO Conventions: UNCBD, UNFCCC, and UNCCD.</p>
Tourism and Biodiversity	The Ministry of Information, Culture & Tourism has no provision in the Act that		Public education and awareness of the importance of

	<p>established the ministry; nor any policy or guidelines that outline steps to mitigate the impact of tourism on biodiversity.</p> <p>The Environment Protection & Management Law defines the requisite measures to assess, monitor and measure the impact of tourism on biodiversity management.</p> <p>Although the NBSAP sets up the strategies and actions for addressing the impact of tourism on biodiversity, these strategies and actions are yet to be Implemented.</p>		<p>Tourism and Culture in biodiversity management is crucial.</p> <p>An assessment of the tourism sector is a necessity to assist in drawing up actions and strategies, as well as implementing them.</p>
PoW on Agricultural Biodiversity	<p>An assessment to document shortcomings in the agricultural sector and to design strategies and actions was completed in 2007. A draft agriculture Policy is in the final draft phase.</p> <p>The Bureau of Fisheries of the Ministry of Agriculture and the GCLME project at the EPA conducted joint assessment and monitoring of fisheries resources in 2006. The report has not yet been widely distributed.</p>		<p>An Agricultural Policy has been completed and should be ratified by the parliament shortly.</p> <p>A national fishery law is also completed and ready for validation.</p>
PoW on Inland Water Ecosystems	<p>The issue of water management is fragmented due to many statutory agencies having different kinds of jurisdictions over management control. For instance, the Bureau of Hydrological Services, Ministry of Lands, Mines & Energy has responsibility for inland water management; the Bureau of Fisheries in the</p>	<p>A draft Integrated Water Management Policy has been enumerated and ready to be submitted to the parliament for enactment.</p>	<p>An integrated water management system, or policy to address overlapping, cross activities and enabling institutions to develop joint actions and plans for implementation.</p>

	<p>Ministry of Agriculture has charge over coastal watercrafts; the Bureau of Maritime Affairs is charged with responsibilities over the maritime zone of the country; the Liberia National Coast Guard controls the territorial waters; while the Liberia Water & Sewer Corporation is charge with the providing quality and safe water for urban centers or cities.</p>		
PoW on Forest Biodiversity	<p>Liberia has in place a forest policy; protected areas management guidelines; forest management plan; community forest manual and code of harvesting practice which are being used in the forestry sector of the country.</p> <p>The rights of indigenous people as well as local communities and their involvement in forest biodiversity conservation is a crucial issue spelt out in the Revised forestry Law. In addition, local communities are being engaged and encountered around the Sapo National Park to adapt community forest practices. Community forest constitution has been drafted to empower local communities and give them whatever ownership rights will guarantee their rights to benefits from their community forests.</p>		<p>A Community Rights Law has been completed and should be ratified by the legislature soon.</p> <p>Communities also enjoy social benefits based on contracts developed by the FDA. These need to properly function.</p>
PoW on Marine and Coastal	A National Action Plan under the GCLME Project has been completed for the protection		Implementation of the plan of action

Biodiversity	<p>of coastal and marine areas against land-based activities. A national steering committee is also in place.</p> <p>Restoration plan for mangroves is contained in the five-year plan (2005-2009) of the Coastal and Marine Ecosystem Plan of Action. There is also a conservation plan for West Africa Manties, which is being developed by consortium of nature conservation NGOs and statutory agencies such as the FDA.</p>		Completion and implementation of the National Wetlands Policy
PoW on Mountain Ecosystems	<p>Liberia joined the rest of the world in 2002 to celebrate the IYM with funding from the FAO. The program was intended to promote sustainable development in mountain communities, and the conservation of mountains and mountain biodiversity resources. Beyond Mountain 2002, a proposed mountain policy for Liberia was developed and submitted to the government through the Environmental Protection Agency. The draft policy contains elements of sustainable use of mountain biodiversity/resources and the maintenance of genetic diversity in mountain ecosystems.</p> <p>Liberia is working with Guinea, Ivory Coast, and Sierra Leone to complete a Memorandum of understanding for the management of the Mount</p>	A draft mountain policy has been developed.	<p>The enactment of the draft policy by the National Legislature and its implementation;</p> <p>Finalization of the MOU among the four countries and the implementation of action plan.</p>

	Nimba Massif, along with the Tai-Grebo forest between Ivory Coast and Liberia; the Wonigizi-Ziama Mount in the north between Liberia and Guinea, and the Gola forest with Sierra Leone. A plan of action has also been finalized.		
PoW on Island Biodiversity	Liberia has no program on island biodiversity. It has not been a priority for both stakeholders and government.		Need for rapid assessment of island systems to determine their biodiversity relevance.

Annex III: Programme of Work on Protected Areas

Sapo National Park

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 has assisted in developing the ecological index mentioned in objective 5, and to monitor an area proposed as an extension to SNP.

Mount Nimba Massif

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.

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 drew on the rapid biological assessment index under development.

Table 22: 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

Wildlife

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* have 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 Troglodyte's_troglodytes*, *Pan Troglodyte's verus*, *Pan Troglodyte's vellerosus* and *Pan Troglodyte's schweinfurthi*. Subspecies *Pan Troglodyte's 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:

6. 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.
7. 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.
8. 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.
9. 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.
10. 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.

Table 23: 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**

At the national level, the Wildlife, National Parks, and Recreation Division of the forestry Development Authority is engaged both in wildlife surveys and in identifying threatened animal species. Wildlife surveys which have been supported by Conservation International and Fauna & Flora International have focused primarily on existing protected areas and on proposed extensions to these areas.

Wildlife remains a critical source of proteins to rural Liberians, as well as a source of cash income. Animals are killed and may be eaten locally, or sent raw or smoked to urban areas for sale. Hunting is principally done with firearms, snares and pits, and sold on the roadside or in market places. Most hunting has been for consumption within Liberia; although recently with intense forest loss in Sierra Leone and Ivory Coast, bush meat markets in border areas in these countries are rapidly increasingly supplied from Liberia.

Bush meat and wildlife surveys over the past years have indicated that most Liberians believe wildlife to be inexhaustible. Many local villagers feel that hunting has no impact on wildlife populations. To meet growing demands by 2002, a large-scale commercial bush meat industry emerged in South-eastern Liberia

Conservation Forestry:

Conservation Forest includes biodiversity conservation (at the landscape, site and species levels) and maintenance of the other environmental functions of forests (e.g. soil and water protection). It includes protection of specific forest areas as well as measures to enhance the environmental quality of other forest areas (e.g. through rehabilitation of secondary forests). The aim of forest conservation is to sustain and enhance these functions for current and future generations. Below are discussed areas of Liberia's conservation programs.

Protected Areas

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 primary legal authority for the establishment and management of Protected Areas in the country is Chapter 9 of the 2006 Forestry Law which mandates the FDA to establish a “Protected Forests Areas Network” encompassing at least 30% of Liberia's existing forest areas. This network is comprised of two categories of protected areas. Category 1 areas which consist of natural forests, national parks, nature reserves and strict natural reserves, must be established by legislation. Category 2 areas which are to serve as conservation corridors consist of games reserves, controlled hunting areas, communal forests, buffer zones, and other areas which may be established through FDA Regulations.

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 has assisted in developing the ecological index mentioned in objective 5, and to monitor an area proposed as an extension to SNP.

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 striata*, 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

Transboundary Initiative for the Creation of a Landscape Corridor Between Côte d'Ivoire and Liberia for the creation of the Tai-Sapo Forest Complex

Along the Cavally River that divides Southern Côte D'Ivoire and Liberia there exist remaining fragments of one of the most important ecosystems within the Upper Guinea Forest region. These lowland tropical forests provide habitat for more than a quarter of Africa's mammals, including 12 species of primates, dwindling West African chimpanzee (pro troglodytes) populations and rare endemic species such as the pygmy hippo and the forest elephant. While comprehensive feasibility studies, important national debates and political negotiations have yet to be undertaken to address important questions such as land title, legislation harmonization, remaining forest coverage, and fauna population levels, the establishment of the corridor based on currently available data would protect and consolidate approximately 13,000 km² of remaining forest cover in West Africa.

A workshop structure composed of five working groups was used as the preferred method to facilitate dialogue between over 100 relevant stakeholders from both countries to integrate their technical input as to determine recommendations for the transboundary process, urgent actions to address imminent threats, and facilitate the effective realization of a transboundary corridor in the Tai-Sapo complex.

Following intense working group discussions and open discussion in plenary the following working group-specific resolutions were agreed upon:

Structure and mechanisms:

- Establish a steering committee, consisting of protected area managers, NGOs and donors, which will draft the terms of references for technical committees and supervise their work.
- The three technical committees will focus on economic incentives to conserve biodiversity, landscape management planning including the establishment of corridors and legislation.
- All technical committees will undertake proper stakeholder consultation, gap analysis and targeted studies.
- The recommendations for urgent actions and more long term solutions will form chapters of a transboundary plan.

Legislation:

- Ensure the convergence of the respective national legislations through harmonisation and amendments in a transboundary context.
- Strengthen the enforcement of existing laws through legal and technical measures such as incentives for local foresters, training of magistrates and the participation of all stakeholders.

- Severely sanction illicit activities within the protected area network, such as the bush meat trade, agricultural activities and mining, in the Tai-Sapo corridor.

Payments for Environmental Services:

- Employing payments for environmental services (PES), an emerging conservation tool that provides economic incentives to land managers, can make natural ecosystem conservation an economically viable land use.
- In particular, reforestation and avoiding deforestation in the Tai-Sapo corridor can bring carbon market finance from developed countries to the corridor. Locally, finance from private sector water companies can help protect watersheds and so provide water quality to downstream users.
- Through research into provision of environmental services, community land use decisionmaking processes, and with knowledge and capacity building, pilot PES schemes shall be developed.
- In the long-term, successful implementation can provide a source of sustainable financing for conservation efforts in the Tai-Sapo corridor.

Landscape Planning:

- Ten landscape corridors critical to ensure the ecological sustainability and integrity of the Tai-Sapo complex; focusing on the key species, unique habitats and critical ecosystem functions, were identified.
- Three types of corridors were classified: Existing corridors between protected areas that need monitoring; existing corridors that are highly threatened and need immediate response action and new corridors that need to be created to connect protected areas.

Many of these corridors will require transboundary collaboration.

- Transboundary collaboration and management actions were identified to set up these critical corridors as well as addressing the threats to the Tai-Sapo complex.

Conflict Prevention:

- The establishment of a corridor may create or exacerbate conflicts, such as those related to the lack of institutional coordination or community grievances over lack of access to forest-derived benefits.
- But it may also have peace-building opportunities by promoting dialogue and cooperation at different levels over the shared interests of development and biodiversity conservation.
- Parties and collaborators must devote resources towards identifying these risks and opportunities, employing conflict-sensitive approach.

Visit www.tai-sapo.org for complete details.

SIERRA LEONE & LIBERIA

The Across the River Project is aimed at securing the long-term conservation of forests, their biodiversity and benefits of global carbon storage through national and international partnerships for improved forest governance across the Liberia and Sierra Leone border. It is been funded by the European Union, with additional funds coming from CEPF, USAID/STEWART, VBN, RSPB and BirdLife International.

Across the River was launched on 15th May 2009 by Presidents Ellen Johnson-Sirleaf (Liberia) and Ernest Bai Kroma (Sierra Leone) in the Gola Forest village of Laihenum near Kenema in Sierra Leone. A two day inception workshop was held on 16th - 17th May 2009 to introduce the project and generate common understanding of its implementation strategy. The first project steering committee met on 18th May 2009 to climax the launching.

The project is been implemented by BirdLife International and government and civil society organizations of Liberia (FDA & SCNL) and Sierra Leone (FD & CSSL). Implementation of the project started 1st June 2009 with the hiring of a project manager who took up office in Monrovia, Liberia on 1st July 2009. In-country implementation started 1st July 2009 with preparation and submission of implementing work plan and budget.

The work plan identified a number of actions to be implemented within the first three months of the project in-country operations. The actions focus on establishing a framework for effective project implementation at both national and regional levels.

A National Project Implementation Team (NPIT) was formed to manage the implementation of project actions. The NPIT is made up of active biodiversity conservation partners from government agencies and civil society groups. It meet quarterly to review work progress and approve work plans and budgets.

A FOUR DAY FIELD ASSESSMENT TRIP, TO ESTABLISH CONTACTS WITH LOCAL COMMUNITIES AND IDENTIFY SITES FOR THE ESTABLISHMENT OF FIELD OFFICES, WAS HELD TO THE GOLA FOREST IN LIBERIA. THREE COMMUNITIES (TIMA TOWN, JENNE MANA AND CAMP ALPHA) WERE VISITED AND DISCUSSION HELD WITH RESIDENTS WHICH INCLUDED CHIEFS, ELDERS AND YOUTHS. THE ASSESSMENT CULMINATED INTO AN INTENSIVE WORKSHOP HELD AT THE FDA'S REGIONAL FORESTRY OFFICE IN TUBMANBURG, BOMI COUNTY. DURING THE WORKSHOP THE FOLLOWING IMPORTANT OBSERVATIONS CAPTURED AND REQUIRE FOLLOW UP IN THE COURSE OF PROJECT IMPLEMENTATION:

- Very high local community interest and awareness on issues pertaining to natural resources management and community forestry in particular;
- Rich traditional knowledge and institutional setup in the management of natural resources that include presence of organized or semi-organized civil society organizations (CSOs);
- Very high percentage of youth in the villages; and
- Although there is a refined forestry policy that capture the various uses of forest resources and takes a holistic approach to engage local communities through its concept of the three Cs, more efforts are required to translate the policy vision into important strategies that able to provide the necessary incentives for more community engagement.

The recruitment of rangers and forest guards for deployment to the Gola forest in Liberia began. Initial personnel consisting of 1 park warden, 1 biologist and 5 rangers were employed and are awaiting deployment. Logistic resources to facilitate the deployment and enhance their work are been solicited from various projects including GEF/COPAN.

Progress was also made in training protected area personnel. Criteria were developed for the selection of potential candidates for further training in protected area management. The criteria defined processes in deciding on a candidate for further training in wildlife and protected area management. The College of African Wildlife Management in Tanzania was identified to offer the first training in early 2010.

Consolidation of Protected Area Network (COPAN) is a Global Environment Facility (GEF) funded project that seeks to support the establishment of three protected areas in northwest Liberia, including the proposed Gola Forest Protected Area. COPAN and Across the River have some similarities in approaches and programs. Work plans of the two projects were harmonized and implementation of field activities integrated to optimize synergies to deepen projects impacts.

Fauna and Flora International is managing the Sapo National Park Biodiversity Conservation Project, in collaboration with the Forestry Development Authority. The project is also a Global Environment Facility (GEF) funded program that supports the management of the Sapo National Park and the forest ecosystem of southeast Liberia. It has been implemented for more than four years now and has made some gainful successes that are useful to the implementation of the Across the River Project. The lessons learned and best practices developed through the Sapo Biodiversity project guided the strategies designed for the achievements made thus far.

The Forestry Development Authority has made significant achievements in forest governance and trade (FLEGT). It has entered the European Union's Voluntary Partnership Agreements (VPA) and has put in place structures to facilitate the achievement of the partnership's goals and objectives. The Forest Law Enforcement Division of the Forestry Development Authority was involved in the various consultations held for the project implementation. The United Nations Development Programme (UNDP) and the Forestry Development Authority are collaborating to provide alternative livelihood supports to communities around the East Nimba Nature Reserve in northern Liberia. The Reserve is a trans-boundary protected areas with the Republic of Guinea and Cote d'Ivoire. A grass cutter (cane rat) multiplication program that seeks to improve the capacity of local communities in sustainable agriculture production is currently ongoing. The project has been implemented for almost a year now and had made several successes that are useful in biodiversity conservation in Liberia. These achievements are expected to be replicated in the Gola Forest since indeed the two areas are similar in term of trans-boundary forest conservation.

A major constraint in the project implementation was the delay in the signing of Partnership Agreements and therefore delayed remittance of project funds to partners. The Forestry Development Authority met all requirements and ratified the agreement and waited for BirdLife International to countersign and then effect disbursement of funds. In order to avoid further delaying of activity implementation, the Forestry Development Authority had to pre-finance the implementation of most activities for the quarter.