NATIONAL REPORT

ON THE IMPLEMENTATION OF THE UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION (UNCCD)

SIERRA LEONE

2004

Table of Content Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

LIST OF ACRONYMS AND ABBREVIATIONS

ADB	African Development Bank
ADF	African Development Fund
BASED-SL	Bolstering Agriculture Sector Development in Sierra Leone
BSAP	Biological Strategy Action Plan
CBD	Convention on Biological Diversity
CBOs	Community Based Organisations
CCSL	Conservation Society of Sierra Leone
CHECSIL	Commonwealth Human Ecology Sierra Leone
CITES	Convention on International Trade in Endangered Species.
COPs	Conference of Parties
CPRs	Common Property Resources
CRS	Catholic Relief Service
CSO	Central Statistic Office
DEP	Department of Energy and Power
EFA	Environmental Foundation for Africa
EIA	Environmental Impact Assessment
EPA	Environment Protection Act
EPD	Environment Protection Department
FAO	Food and Agricultural Organization
FD	Fisheries Department
FD	Forestry Department
GDP	Gross Domestic Product
GEF	Global Environment Facility
GOSL	Government of Sierra Leone
GPACD	Global Plan of Action to Combat Desertification
IBAs	Important Bird Areas.
IMBO	Institute of Marine Biology and Oceanography
MAF&MR	Ministry of Agriculture, Forestry and Marine Resources

MAFFS	Ministry of Agriculture, Forestry and Food Security
MDG	Millennium Development Goal
MEP	Ministry of Energy Power
MLHCPE	Ministry of Lands, Housing Country Planning and the
MMR	Ministry of Mineral Resources
MPSSL	Maritine Protection Service of Sierra Leone
MTCA	Ministry of Tourism and Cultural Affairs
NAO	National Authorizing
NEAP	National Environmental Action Plan
NEP	National Environmental Policy
NEPB	National Environment Protection Board
NGOs	Non-Governmental Organizations
NRM	Natural Resource Management
OREINT	Organization for Research and Extension of Intermediate Technology
PRSP	Poverty Reduction Strategy Paper
SALWACO	Sierra Leone Water Company
SSL	Statistic Sierra Leone
UK	United Kingdom
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change.
US	United States
WSD	Water Supply Division
WSPA	World Society for the Protection of Animals

EXECUTIVE SUMMARY

The United Nations Convention to Combat Desertification (UNCCD) was adopted in June 17th 1994 and it came into force in 1996. Sierra Leone (GOSL) ratified the UNCCD in September 25 1997. The Convention requires all country parties to 'prepare an action programme (NAP) within the framework of harmonizing and identifying complementarities within other national development programmes'.

The Environment Protection Department in consultation with development partners and other stakeholders drafted a proposal for the formulation of a National Action Plan (NAP) to Combat Desertification and Land Degradation in Sierra Leone and submitted it to the UNCCD secretariat for funding. The NAP will address the issues raised by the three conventions; United Nations Convention to Combat Desertification and Land Degradation (UNCCD); the Convention on Biological Diversity (UNCBD) and the United Nations Framework Convention on Climate Change (UNFCCC). The secretariat through CILSS (Permanent Interstate Committee for Drought in the Sahel) reviewed the document in line with the proposals submission deadline of June 2005. It was suggested that certain portions of the implementation process, which are already obsolete be expunged from the document and those, which should be initiated locally should commence.

Funds for the implementation of the NAP will be sourced from the UNCCD secretariat, the Global Mechanism and other international donor organizations. Furthermore, as most countries have started the implementation of their NAP's and reporting to the Secretariat, it was advised that Sierra Leone prepare its report for submission to the CRIC III meeting by May 2005.

The preparation of the Country report as part of the process of the implementation of the NAP followed the implementation framework designed for the NAP. The coordinating bodies; The National Coordinating Committee, The Provincial Coordinating Committee, the District Coordinating Committee and the Chiefdom Coordinating Committee were

responsible at their various levels for overseeing the activities involved in the drafting of the report.

A national consultant with specific TOR was contracted for the period to help collate the various diagnostic studies conducted at regional level. The general objective of the study was to carry out a diagnostic study for the identification of causes, symptoms and effects of land degradation with a view to elaborate the national action plan. A well-designed semi-structured questionnaire was administered to professional from line departments, farmers, NGos, CBOs, women's groups, councilors/Town Councils. The regional consultants conducted their research nationwide and the membership of the PCC contributed to ensure that the final report adequately reflects the status of natural resource management in relation to land degradation in the region.

Sierra Leone has a land area of approximately 7.2 million hectares (72,000km2).
5.4 million hectares is cultivable, 4.3 million hectares are low fertile arable upland and 1.1 million hectares of more fertile arable swamps (Lands and Water Division, 1999).65% of the country was closed humid tropical forest now only 5% of this closed humid tropical forest now exists.

Logging (both legal and illegal) is the major direct cause of land degradation in Sierra Leone. In the East and South of the country, chain saw operators operate with reckless abandon resulting in the destruction of most of the still remaining 365,000 ha estimated secondary forest. Timber from the forest is mostly domestically used in the furniture industry. Fuel wood collection a primary use of forest resources also contributes significantly to land degradation. An estimate of the total biomass consumptions differs, however Hunter (1987) estimates it at approximately 2.3 million m3 for 1989. This figure may have doubled given the projected increase in years and the effects of the just concluded rebel war.

Public awareness on the environmental issues remains critical in the far back for proper resource conservation and utilization. Poverty still needs to be addressed to reduce the dependence on primary resources from the forest for their livelihoods. Furthermore,

particular attention is focused on law enforcement as a barrier to effective resource conservation in Sierra Leone.

Reduction in yields is evidenced in most parts of the country. Most farmers need to apply fertilizers on their crops to realize appreciable yields. This is a burden on peasant farmers who are mostly poor and cannot afford the cost of fertilizers.

Agriculture and forestry sector activities are responsible for approximately 50% of the land degradation evidenced. Slash and burn and logging within these sectors are the major contributing factors.

Policies for land management generally fail to address the root causes of land degradation which stem from colonial imbalances in land distribution, lack of incentives for conservation, insecure tenure and failure to provide for a diversified rural production system.

It is still difficult to assess the exact magnitude of land degradation given the poor data base. However, the rather qualitative information available points to an accelerated rate of land degradation. It is hoped that the implementation of the NAP will address the issues of databases and bridge information gaps currently affecting the environment sector in the country.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Physiographic and Demographic Setting

Sierra Leone is located on the West Coast of Africa and covers an area of 72, 325 km2. It lies between latitudes 6 55 N and 10 00 N and longitudes 10 14 W and 13 17 W. It has a north-south distance of 331 Km and an east-west distance of 326 Km. It is bounded in the north and north-east by the Republic of Guinea, on the south-east by Liberia and on the west by the Atlantic Ocean.

The country is divided into four main physical regions. These are the Coastal plains, the Interior Plains, the Interior Plateaux and the Freetown Peninsula Mountains and hills, each of which can be subdivided into a number of ecosystems. The coastal plains are relatively gentle and consist of estuarine swamps, beach ridges, alluvial plains and coastal terraces. The Interior Plains rise gently from an elevation of 40m in the west to 200m. They are extensive, extending from the coastal terraces in the west to the east of Sierra Leone and occupies approximately 43% of the land area. They are separated from the Interior Plateaux region by a distinct escarpment. They are made of flat treeless grasslands known as bolilands, undulating plains and isolated hills.

The Plateaux region which ranges in altitude from 200m to 700m is found in the north-east and south-eastern part of the country and consists of undulating high relief and rolling plains and hills. The highest mountains are found in the north and north east of the country such as the Loma Mountains and Tingi Hills respectively. The highest peak in the Loma Mountains is the Bintumani which rises to 1945m while the Sankan Biriwa on the Tingi Hills rises to 1805m. All the ecosystems of the Plateaus and Interior Plains account for 84% of the total land area of Sierra Leone, and have a flat to gently rolling topography. West of these two mountains, is the Freetown Peninsula, which consists of dissected mountainous Peaks with Sugar Loaf and Picket Hills being the highest.

They developed from basic and ultra-basic rocks, and hills of acid rock origin. Soils are moderately to well drained, and low in fertility. The Freetown Peninsula has ranges of hills, which make it to be unique in the sub-region.

Sierra Leone has a tropical humid climate with two distinct seasons, namely the wet season staring from May-October and the dry season from November to April, each lasting for about six months. Diurnal temperatures vary from 25 degree to 34 degree Celsius although they could be as low as 16 degree Celsius at night during the harmattan. The average monthly temperatures are around 26 degree Celsius.

Rainfall varies both in space and time. The mean annual variability is about 20 %. The average annual rainfall varies from about 2500mm in the drier areas of the north- west and north-east of the country to about 3000mm in the southeast and about 5000mm in the Freetown Peninsula. The rainfall pattern is uinmodal with most of the rainfall occurs from late April to early November. The wettest months in most parts of the country are July and August. The heavy rains in the wet season usually result to high discharges and runoff which ranges from 20 5 to 40 % of the total annual rainfall. Rivers overflow their banks during this period, though greatly reduced in the dry season from November to March. The heavy rains and maritime influence leads to high humidity. Relative humidity is usually about 90 % in the wet season but drops to about 20 % inland in the harmattan during dry season. Pan evaporation is generally less than 2.0mm day due to high diurnal humidity. Normal wind speed averages 8 knots throughout the year. There is plentiful of sunshine which varies substantially with the amount of cloudiness averaging 6-8 hours per day during the dry season and 2-4 hours per day during the wet season.

The coastline is about 560 Km long and the shelf covers an area of 30,000Km2. The drainage system comprises many rivers running from north to south which include the Great Scarcies, Little Scarcies, Rokel, Jong, Moa, Sewa and Mano.

Broadly speaking, Sierra Leone can be classified into seven vegetation types, and these include moist rainforest, semi-deciduous, montane, savannah, farmbush, mangroves and swamp forests.

At present, the country is covered with more of mosaic secondary forests and farmbush which arise from the slash-and –burn agricultural practices. The moist and semi-deciduous forests are found in the protected areas especially on tops of mountains and slopes. The woodland savanna is restricted to the northern part of the country and is increasingly subjected to frequent bushfires. Swamps are found in the coastal creeks, estuaries of the Scarcies, Sierra Leone, Sherbro and Malan Rivers. Mangroves extensively cover the Atlantic coastline. Based on this classification, the country has the following six major ecosystems: Forest, Montane, Savanna, Agricultural, Wetlands and Freshwater and Coastal and Marine.

The population of Sierra Leone increased from about 2.2 million in 1960 to 4.2 million in 1991. It was estimated to be 4.9 million in the mid-2000 growing at the rate of about 2.6 per annum. In 2001 the mid-year population was estimated at 5.43 million. Although the growth rate is relatively low compared to most Sub-Saharan countries, the population density is relatively high (58 persons per square kilometer).

There is a marked regional and district variations in population density. The Freetown Peninsula in the western area where the capital city of Freetown is located has the highest density. Kono and Kenema districts in the east and Bo district in the south are also densely populated. The western area and these districts therefore carry the bulk of the population. The most sparsely populated district is Koinadugu district in the northern part of the country. Bonthe, Pujehun, and Moyamba in the Southern Province have lower populations than Port Loko, Kambia, Magburaka and Makeni in the north, Kono, Kailahun and Kenema in the east. The Western Area's density remains the highest while Koinadugu district retained the least position.

The variations in population density mean that population pressure has had different impacts on different parts of the country in terms of natural resources utilization. At the regional level, the northern region has the largest percent of vacant land that can be put under cultivation. However, this region is the least endowed in land resources. The eastern and southern regions though endowed with substantial natural resources are experiencing greater population pressure than the north. Freetown and its environs due to rapid urbanization as a result of out migration during the civil conflict have experienced greater population pressure than any other region in the country.

Though the next country's population census will be conducted in December, 2004 there is some evidence of population increase, which is having an impact on the ecologically delicate fragile land areas that are cleared annually for cultivation.

It has been estimated that 74.2 percent of the total land area is arable and suitable for cultivation of crops on sustainable basis, while the non-arable lands (25.8%) cannot yield any economic returns when cultivated. As result of this, when this data is considered along side with the demographic data such as man-land ratio, it can be concluded that Sierra Leone is experiencing population pressure on land resources.

Rural life is generally at a subsistence level and over two-thirds of the population live in absolute poverty. Life expectancy is very low, estimated at forty-two years and infant mortality rate is one of the highest in the world. This situation has been worsened by the past ten year civil conflict, exacerbated by increasing urbanization, population pressure on the available natural resources, inappropriate domestic policies and market failures. Illiteracy is very high and large sections of the population remain unemployed, especially among the youths. In consequence, Sierra Leone is now classified as one of the poorest and least developed countries in the world based on the United Nations Social Development Index.

1.2 Overview of Land degradation

Land degradation, which commonly denotes a loss of land productivity, is perceived to be a serious global environmental problem. Evidence on the physical extent of land degradation is patchy especially in developing countries. An early study to map the land base globally was the "Land Resources for Future Populations Project" undertaken by the Food and Agricultural Organization (F.A.O.). The purpose of the project was to highlight the question of the overall food production capacity of each and every country, considering soils, climate, technology and land degradation. A global loss of productivity of rain fed crop land of 29 percent for the period 1975 – 2000 was projected if present trends were to continue. The most serious losses were reported for Africa and Central America (FAO 1984). The global assessment of desertification provided by the United Nations Conference on Desertification (UNCOD) was, to some extent, a

re-statement of the earlier F.A.O. estimates of land degradation. The outcome was the launching of a Global Plan of Action to Combat Desertification (GPACD).

As a result of international conferences held, it is now generally accepted that desertification is largely a combination of human activities with occasional runs of dry years leading to visible expressions. As a result, desertification is not only common in arid and semi-arid areas, but also in other regions.

The United Nations Convention to Combat Desertification (UNCCD) was adopted in June 17th 1994 and it came into force in 1996. The Convention requires all country parties to "prepare an action programme within the framework of harmonizing and identifying complementarities within other national development programmers".

The Government of Sierra Leone (GOSL) ratified the UNCCD in September 25, 1997 with the Department of Environment in the Ministry of Lands, Country Planning and the Environment (MLHCPE) designated to coordinate and oversee all action plans and strategies to combat desertification. In the next five years strategies and action plans will be introduced and successfully implemented along the line with other national development efforts that are geared towards sustainable management and use of natural resources, and poverty reduction. These efforts are clearly spelt out in the Millennium Development Goals (MDG), the Sierra Leone National Vision 2025 and the Draft Poverty Reduction Strategy Paper (PRSP).

The natural resource base that is largely impacted by land degradation in Sierra Leone is categorized into renewable and non-renewable. As a result of biophysical and anthropogenic forces, these resources occur in 8 major ecological zones: Savannah, Complex Lophira, Coastal Tree Savannah and Swamp Grasslands, Bolilands, Closed High Moist Tropical Forests and Mangrove Swamps. Non-renewable resources found in these areas have been used both commercially and subsistently in terms of products and services.

In the forest zones of the south and east the replacement of the original vegetation cover by cultivated and secondary vegetation of various types has led to a general increase in land

degradation. Similarly in the savannah zones human activities are contributing immensely to land degradation translating what would have been a benign process under a natural vegetation cover into a serious problem in many areas. There are also extensive protected areas including forest reserves, national parks, game reserves and wildlife sanctuaries that are impacted.

Non-renewable resources such as minerals occur in most areas. Before the war the contribution of mining to export earnings was very high. Diamond has been an important mineral and diamond mining is a major cause of much of environmental degradation. With interest in the production expected to increase, there is a resultant increase in the amount of environmental degradation as a result of this mining activity.

Sierra Leone is one of the world's largest producers of rutile and bauxite with mines located in three districts of southern Sierra Leone. Before the war these mines operated without compliance to policies related to Environmental Impact Assessment (EIA). Full EIA studies have now been undertaken for the resumption of mining of bauxite and rutile. Despite this, there is vast expanse of land that needs urgent attention for rehabilitation, restoration of vegetation cover and agricultural productivity.

Small-scale gold and diamond mining are carried out in about six districts in the country. Most of the methods of production are crude but in some areas miners use implements such as hand tools, water pumps and screens.

The socio-economic implications of the degradation processes are quite alarming. Acute shortage of both timber and fuel wood is foreseen while deforestation is robbing the country of numerous shrubs, herbs of food and medicinal value, as well as valuable plant genetic resources.

A shortage of fuel wood especially in the savannah woodlands is critical. In this region people have resorted to producing charcoal from the stunted lophira trees. Mention must also be made of the effects of deforestation in general and bush burning which is rampant. In much of the north and some areas further south, fire has continued to be the main agent of degradation. This

allows farmers to continue cultivating annual crops even when the market for food crops is finite and prices tend to fluctuate.

In the forested areas in the south and east, independent chainsaw operators account for a significant proportion of trees felled in and outside forest reserves.

It is also well documented that the increasing population pressure over the years has induced shortened fallow periods leading to land degradation. Of greater importance is the northern region where bush fallow periods have decreased to less than five years with grass fallows replacing bush fallows. There are yet no studies available in Sierra Leone that examines the impact of the shortened fallow periods on soil. A possible conclusion is that land degradation is leading to falling crop yields.

Pastoralism, though not clearly defined in Sierra Leone, is of fundamental importance. The most important factor that initiates movement in the dry season is non-availability of foliage and water for drinking. The implication of this situation is that once new pastures are found in an area, there is a rapid invasion of the area by cattle herders during which process the grasses are all eaten up by the animals. It should also be noted that herders especially in the north are in the habit of bush burning which contributes to erosion. Grasses are set ablaze in the dry season so that there may be an early flush of grass for the animals when the rains come.

Other important socio-economic impacts of pastoralism in the north are animal disease dispersal and water pollution. These have had serious impact on human health. It is widely known that veterinary care given to cattle herders in the country is either minimal or non existent. Lack of such care allows the spread of disease pathogens by skin contact and by oral transfer to water bodies where the diseases are picked up by rural communities who drink the water. Among the pathogens are tapeworm, hookworms, round warms, fleas and mites. Mites cause scabies in both cattle and man.

Large and small-scale mining activities in Sierra Leone are raising a wide range of issues related to land degradation, health and safety of the mining communities. Before the war the Sierra

Rutile Ltd. and SIEROMCO Ltd. had severe impacts through the loss of vegetation, soil erosion and contamination of water sources. Surface water pollution in the form of suspended matter caused by runoff from earthmoving and other mining activities was significant. The well defined drainage patterns of the Jong River in the southern region has been disturbed as a result of creation of tailings, ponds, dams and construction of haulage routes. Other impacts expected to occur if measures are not taken include risk of flooding of settlements surrounding the mine sites, siltation and dislocation of villages.

In the Kono District where Koidu Holdings have been operating, the blasting of Kimber lite has not only threatened the health and safety of the communities, but caused a significant environmental damage. Small scale mining has also created similar impacts including deforestation and land degradation. The creation of stockpiles and stagnant waters abandoned by miners has caused the aesthetic deterioration of the landscape. Very often, these excavated areas have produced breeding grounds for mosquitoes and death traps for local communities in these areas.

Other minor socio-economic impacts associated with mining activities include: abandonment of fishing grounds and associated livelihood pursuits, worsened rural underdevelopment, and embitterment of the affected communities in the mining areas.

CHAPTER TWO

2.0 CURRENT STATE OF NATURAL RESOURCES MANAGEMENT

2.1 Overview

Sierra Leone is well endowed with substantial natural resources of croplands, forests, rangelands, freshwater, wetlands (swamps), biodiversity, wildlife, extensive fisheries and mineral resources-diamonds, gold, rutile, bauxite, iron ore, chrome ore etc. These resources have continued to determine the path and pattern of economic growth in the country, depending mainly on how they are being valued, used and managed which in turn depends on the economic policies and institutions in place.

It is a truism that the exploitation of these resources during the colonial period and twenty years after Independence from 1961 to 1980 resulted in steady economic development in the country. However, starting from the early 1980s to recent years the exploitation of these resources has not been effectively managed to the benefit of the country and has contributed very little to reducing poverty and the development of the country. Therefore, the irrational use of the environment and natural resources over the years resulted in environmental degradation and the deterioration in the quality of the urban environment.

2.2 Status of Natural Resources

2.2.1 Land resources

Sierra Leone has a land area of approximately 7.2 million hectares (72,000km2). About 5.4 million hectares of this total are cultivable of which about 4.3 million hectares are low fertile arable upland and 1.1 million hectares of more fertile arable swamps (Lands and Water Division, 1999).

The agricultural sector which provides employment and exporting earnings in the country relies on land as basic input for crop cultivation, which in turn is affected by how well farmers

maintain the soil, water and living resources. The combined effects of poor farming practices such as shifting cultivation, recurrent bushfires and overgrazing, increasing population and ensuing shorting of fallow periods of land have been recorded as contributing factors to soil erosion resulting to land degradation, which is perceived as widespread in Sierra Leone (World Bank, 7 February 1994). Although land degradation affects the agricultural productivity and the mainstay of the majority of the country's population there has not been a comprehensive national quantitative assessment to determine the extent and nature of the problem, cost estimate and possible strategies/priorities for intervention.

2.2.2 Forests biodiversity

Information available has shown that Sierra Leone is climatically a forested country and over sixty percent of its land was originally covered by closed high forest of most evergreen and semi – decisions types. Today the country has lost nearly 70% of its forest cover, with less than five percent of the original forest remaining in isolated forest reserves on tops of mountain and hillsides, particularly at Gola (77,044 hectares), Kambui (21, 213 hectares) , Dodo Hills (21,185 hectares), Nimini (15,557 hectares), Freetown Peninsula (14,089 hectare), Tama (17,094 hectares) Tonkoli (47,656 hectares), Kasewe (2,333 hectares), Loma (33,200 hectares), Sanka Biriwa (11,885 hectares), Kuru Hills (7,001 hectares and Kangari Hills (8,573 hectares). There is also a number of smaller forest reserves scattered throughout the country (Interagency Fact Finding United Nations Mission to Sierra Leone, November 1999). At present, the forest resources are confronted with increasing deforestation due to the rapidly growing population and consequent demand for more agricultural land and urban requirement for timber and fuelwood, mining for mineral and recurrent bush fires, with past legislation favouring such anthropogenic activities at the expense of forest conservation. The demand for biomass energy from fuel wood is increasing with the rapid growth of the population. Over 75% of the domestic energy needs of the country are obtained from woody biomass. It is estimated that between 349,000 and 56,000m3 of fuel wood is used per year and this demand is expected to increase at a rate of about 2% per annum. Current practices of the production, transformation and end use of the biomass are inefficient and unsustainable.

In the north, 18 percent of the country is covered with savanna woodland and mixed tree savanna ecosystem types. Although the savanna – woodland region is less impacted by human activities than the forest mosaic due to agricultural use, it is increasingly being subjected to frequent fires, agricultural and hunting pressure.

2.2.3 Bolilands

Running from the uplands in the north to the mangrove estuarine systems along the coast are seasonal wetlands called bolilands. They are important habitats for a diversity of migratory water fowl and water dependent amphibian and mammal species, and grazing lands for buffalo and waterbuck. However, these bolilands are threatened by conversion to rice cultivation and are subject to recurrent anthropogenic bush fires in the dry season.

The lake ecosystems of Lake Mape, Lake Mabesi and Lake Sonfon with excellent habitats for many water fowl and waders as well as game species are also under threat.

2.2.4 Minerals (mining activities)

Mining activities undertaken by large mining companies to exploit the country's minerals are a major cause of deforestation and land degradation through loss of forest cover of large areas, soil erosion, siltation and contamination of river systems and tidal creeks and displacements of villages. Heavy siltation of river beds and tidal creeks reduce coastal coral and fish populations that feed and breed in it. Small scale or artisanal mining of diamonds and gold in the east and northern parts of the county is also a major cause of loss of forest cover of large areas and land degradation. In both large and small scale mining the top soil is generally lost. The extent to which the land and forest cover has been damage and what is required to rehabilitate and restore mined out areas to support agriculture or forest cover is still unknown. Therefore, there is urgent need to undertake an assessment for the development of a comprehensive rehabilitation programme for the small scale mining areas.

2.2.5 Water resources

Although Sierra Leone is a tropical country and has ten rivers, majority of the population do not have access to portable water supply. Data available from the 1985 National Population Housing Census (CSO, 1993) revealed that 44% of the population obtained their drinking water supply from rivers, 37% from wells and only 16 % from pipe – borne.

At present, potable water supply systems exist in Freetown and Makeni in the North while the existing provincial water supply treatment facilities are dysfunctional due to lack of spare parts, fuel, chemicals and lubricants as well as to physical damage on both provincial water supply installations and rural water supply schemes by fighters during the past ten years civil conflict. It is estimated that 400 drinking wells sources and five provincial water supply facilities (in Bo, Makeni, Kenema, Koidu and Lungi international airport) have been damaged during the civil conflict.

The use of streams and rivers as outlets for sewage and solid waste disposal and mining of minerals, the over crowded and congested living conditions of urban areas particularly Freetown, coupled with the high reliance on pit latrines has increase the incidence of water – borne diseases.

2.2.6 Coastal, fisheries and marine resources

Sierra Leone has extensive and rich marine resources comprising the marine fisheries (pelagic and dermersal) as well as crabs, shrimps, lobsters, turtles, cuttle fish, squids etc. The coastal and marine resources form a strong and valuable base which contributes significantly to the national economy. Fishery resources contributed 11 percent of the Gross Domestic Product (DGP) in 1987/88 and this contribution can be increased if the fishery sub- sector is properly managed.

The fisheries resource is exploited by the industrial and artisanal operations. The industrial operation uses sea stretching from the border of the in– shore zone to the 200 miles territorial

water limit while artisanal fishing operates inland and in-shore fisheries, that is from zero to 5 miles of the coastline.

The industrial fleet is made up primarily of foreign vessels from countries such as China, Greece, Italy and Russia. There are also a number of local companies involved in this sector, such as the Sierra Leone Fishing Company Limited, Marine Development Company limited and Okeky Agencies Limited. The artisanal sector provides employment for about 20,000 fishermen and some 80,000 processors, transporters and traders. Estimates of fisheries yields are widely divergent. Ndomahina and Chaytor (1991) quote estimates of 100,000 to 700,000 tons per annum and an FOA study arrived at an annual sustainable yield of 100,000 to 150,000 tons (FD, 1991).

However, the fisheries sector is saddle with major problems of over exploitation of fisheries resources and lack of data and accurate information to determine the extent of the fisheries resources. Also, the management of fisheries through monitoring, control and surveillance of the industrial and artisanal fishing activities is currently ineffective. A comprehensive assessment of the fisheries resources is therefore needed. Regular programmes for estimation and improvement in the reporting mechanisms on fish catches can reduce the current uncertainties about catch assessment and the extent of over fishing. Also, there is an urgent need for effective surveillance of industrial fishing which seems to attract increasing numbers of international vessels.

The coastal resources also include mangroves, sand beaches, several river estuaries and fresh water bodies, cliffs, wildlife, cultural and historical sites and landscape. Sierra Leone is endowed with some 172, 000 hectares of mangroves covering about 825 kilometers of coastline and extending 30 to 50 kilometres in the estuaries of the Scarcies Rivers (34,234 hectares), Yawri Bay (24,505 hectares) and Sherbro River (99,854 hectares), (World Bank, 7 February 1994). The mangrove ecosystem serves as a very important ecological function and provides habitat to a diversity of fauna, wood for construction, fuel wood and charcoal, and reduces coastal and river erosion. It is also an ideal breading ground and nursery area for many species of prawns and sea fish, and supports thousands of migratory and shore birds (CCSL, 1993). Mangrove root system builds up land by sequesting silt and organic matter and purifies water by filtering out heavy metals and organic waste. These mangroves along the coastal creeks have been heavely

deforested due to farming, fuelwood collection for fish smoking, housing construction and urban sprawl.

There is currently no clear policies and programmes for coastal area management. Data on the extent of mangrove deforestation and land use patterns are scarce and hardly available. There is therefore an urgent need for the development of an integrated coastal zone management plan for the protection of coastal and marine resources.

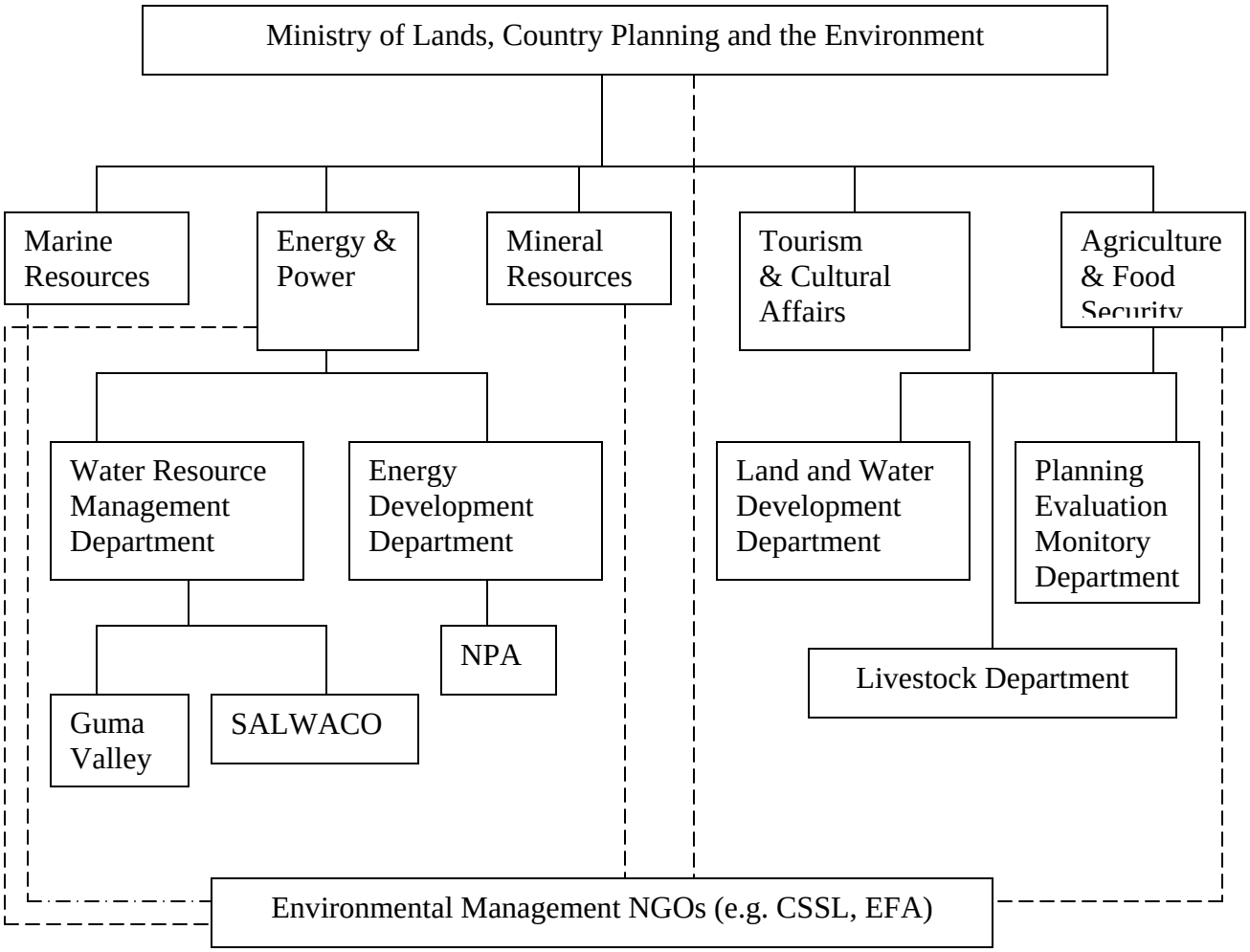
CHAPTER THREE

3.0 INSTITUTIONAL ARRANGEMENT AND LEGAL FRAMEWORK

3.1 National Institutional Arrangements

A number of institutions in Sierra Leone are involved in the development and implementation of the land degradation policy and related sector policies in ensuring proper management of the environment and sustainable use of natural resources throughout the country. Some of these are presented in Figure I below, followed by a description of these institutions.

FIGURE 3.1 ORGANOGRAM FOR NATURAL RESOURCE MANAGEMENT INSTITUTIONS



3.1.1 *Ministry of Lands, Country Planning and the Environment*

This ministry is the main environmental resources authority. It carries out its mandate through three departments, which include Surveys and Lands, Country Planning and the Environment. The National Environment Protection Board (NEPB) and the State Lands Committee help to facilitate the work of the Ministry in matters relating to land and the environment.

The Ministry is the lead agency for the implementation of the United Nations Conventions on Biological Diversity (UNCBD), Climate Change (UNFCCC) and Combating Desertification and/or Land Degradation (UNCCD). The department acts as the focal point for all national and international environmental issues relating to Sierra Leone and has the responsibility to coordinate and monitor the implementation of all environmental policies, programmes, projects and activities. It is empowered under the EPA to put in place all necessary mechanisms and environmental standards and legislation to protect and manage the environment and its natural resources.

The ministry has representation on the Boards and Committees of government line ministries and related institutions in order to promote effective collaboration and cooperation for proper environmental and natural resources management. Within the EPD, there is the National Environment Protection Board (NEPB) which facilitates coordination, cooperation and collaboration among government ministries, local authorities and other government agencies in all matters relating to environmental protection and management. NEPB also review Environmental Impact Assessments (EIA) and make appropriate recommendations and advises the Minister of Environment on areas of environmental protection and control requiring special or additional measures to abate the likely harmful consequences to the environment.

3.1.2 *Ministry of Agriculture, Forestry and Food Security (MAFFS)*

The mandate of the Ministry spreads across crop development and improvement policies, and related services. The Ministry exercises mandate over the environment through such departments as Agriculture, Land and Water Development, Planning, Evaluation, Monitoring and Statistics and the Livestock Unit.

The ministry under the Forestry Division (FD) executes provisions of the Forest Law and Management Act for all state and some chiefdom forests. In a recent move to ensure food security the Agriculture Division in collaboration with the Forestry Division has developed a framework called Bolstering Agriculture Sector Development in Sierra Leone (BASED-SL) and one of its key components is to "enhance sustainable utilization , conservation and productivity of forest resources" to arrest deforestation and supply the needs of people living in urban centres. This key component also make provision of collecting baseline data on forest reserves and forest biodiversity, monitoring and protection of improved forest trees, establishing a mechanism for harvesting and replenishing of forest resources on a sustainable yield basis, protecting watersheds, and developing wildlife sanctuaries, promoting agro-forestry and community woodlots, promoting aforestation/reforestation and put in place measures ensuring erosion and bushfire control. The Wildlife Conservation Branch which is under the Forestry Division and supervised by the Director of Forests has the mandate to manage all of the nation's protected areas and implement the provisions of the Wildlife Conservation Act and enforcement of laws contained therein.

3.1.3 *The Ministry of Mineral Resources (MMR)*

This ministry controls all mining activities in the country. In recognition of the negative impact of mining on the environment and concerns expressed by the public, the ministry has developed a new mining policy and legislation, which make provision for the rehabilitation of mined out areas and ensuring "that prospecting, exploration, mining and processing of mineral resources

proceed in an environmentally sound manner". The mining code stipulates that large and medium scale mines develop and submit an Environmental Impact Assessment (EIA) prior to the application for a mining license. The EIA must clearly state the appropriate steps/mitigation actions to be taken to mitigate damage caused by mining activities on the environment. The ministry contributes to the management of natural resources through provision of grants to local communities for the rehabilitation of mined out areas.

3.1.4 *The Ministry of Fisheries and Marine Resources (MMR)*

This Ministry manages, develops and conserves all fisheries and marine resources. The fisheries Management and Development Act of 1988 (GOSL, 1988) and the Fisheries Regulation of 1990 prescribe the preparation of management and development plan, specific procedures for licenses, and measures for conservation, enforcement and surveillance.

The management of marine and coastal resources is shared between the Department of Fisheries and Marine Resources, the Institute of Marine Biology and Oceanography of the University of Sierra Leone at Fourah Bay College and Maritime Protection services of Sierra Leone (MPSSL). The performance of these institutions is very low due to very low conviction rate of vessels charged with violating regulations and fixed fines at levels that make them ineffective as a deterrent (MPSSL, 1992).

3.1.5 *The Ministry of Energy and Power (MEP)*

The Water Supply Division (WSD) in the ministry, the Guma Valley Water Company and the Sierra Leone Water Company (SALWACO) have the responsibility to provide and conserve water and the control of water quality. The Department of Energy and Power (DEP) is responsible for the national energy policy, the development of energy resources and the promotion of energy conservation.

3.1.6 *Ministry of Tourism and Cultural Affairs (MTCA)*

The MTCA supervises the National Tourist Board and the National Museum on tourist promotion and development. It also liaises with relevant ministries/departments regarding the

preservation of ancient monuments and relics and environmental protection for tourism and eco-tourism.

3.2 Local and Private Sector Institutional Arrangements

Sierra Leone, which has just emerged from a decade-old civil conflict, cannot immediately initiate an assessment of natural resources management. This may be due to the poor resources available to government agencies and the pernicious degradation of the environment by rural communities.

However, the government and NGOs and local communities have over the years initiated activities that are **providing** the nature of natural resources management interventions. Problems that are identified have been under scrutiny in these initiatives, including the poor level of resources available to the different sectors.

Various personalities and village level organisations throughout the country have a direct impact on the use and management of natural resources. The relative importance and effectiveness of these individuals/bodies vary greatly between one natural resource and the other. They are however all concerned with some aspect of NRM.

Individuals/organizations found in most villages and towns that are of direct relevance to the use of forest resources include:

traditional authorities, i.e. the Chiefs and Elders

Village Development Committees which provide linkages between traditional authorities;

Producer Associations, Farmers Associations etc.;

Market Women's Associations;

Mutual Support Groups for farming activities;

Fire volunteer squads.

While some villages are headed by a "Headman" with little land resource holding responsibilities, there are other chiefs with vast land resource holding responsibilities. The

importance of these authorities in natural resource issues vary widely, but generally the Village or Town Chiefs play key role in natural resources management. Chiefs have the responsibility to ensure that concession holders and developers in mining, timber production, palm wine production, sand extraction etc pay royalties. There is however little evidence that these Chiefs carry out actions to ensure the conservation of the resources.

Village Development Committees operate in response to directives from government, NGOs and Community Based Organizations. (CBOs). They generally organize communal labour initiatives often with plans for the management of natural resources. Farmers Associations are widespread and assume responsibilities for a wide-range of farming activities.

Fire Volunteer Squads are formed and operate in many communities. In the dry season, fire is the dominant causal factor in the changing use of land. As a result, fire is one of the issues that stimulate the highest degree of consensus and opinion.

The new dispensation to decentralize planning and administration to a local level will reinforce the Local Government Council's role in:

ensuring the enforcement of bush fire laws;
initiating tree planting campaigns;
prompt payment of royalties and surface rents to land owners whose lands are mined out;
regulating Chainsaw Operators;
prohibiting clearing and cultivation of riversides and
prohibition of planting on marginal areas.

Formidable women organizations that have link with natural resources management also exist since they access a variety of forest products. They see the need for controlled harvesting of resources and have the ability to enforce rules about who could harvest much and when.

Non-Governmental Organizations (NGO's) in Sierra Leone have supported communities to address sustainable use of natural resources. They have done through encouraging communities to maintain forest reserve areas, promoting community biodiversity; supporting livestock production and management and park management

3.2.1 *Non-Governmental Organization (NGOs)*

There is a strong NGO sector in Sierra Leone responsible for creating public interest in environmental issues. The most active NGOs on the ground in areas related to environmental and natural resources management are:

The Conservation Society of Sierra Leone (CCSL), which promote the conservation and sustainable use of Sierra Leone's natural resources through research, education, advocacy and support to site management groups. CCSL also undertake campaigns for the protection of wildlife, parks and sanctuaries.

The Environmental Foundation for Africa (EFA) mission in Sierra Leone is to restore and protect the environment and its natural resources. It has acquired experience in terms of operation in conflict zones, humanitarian and refugee operations, post-conflict reconstruction and rehabilitation.

The Commonwealth Human Ecology Council (CHEC-SIL) promotes conservation of the ecology through education and disseminates environmental information through the mass media. It also supports the Government of Sierra Leone (GOSL) in promoting, through education, policy implementation and project execution.

The Organization for Research and Extension of Intermediate Technology (OREINT) promotes self-sustaining rural development through the promotion of agriculture and appropriate technology to enhance and improve the socio-economic status of the people in rural areas.

Green Scenery and Friends of the Earth are other local NGOs that are actively involved in tree planting and awareness raising campaigns on the protection and management of the environment and natural resources.

3.2.2 *Academic Institutions*

The University of Sierra Leone has a Faculty of Environmental Sciences at Njala University College with four academic departments focusing on teaching and research activities on the environment. A number of other institutions are involved in environmental and natural resources data gathering, monitoring, and evaluation. These include the Institute of Marine Biology and Oceanography (IMBO), Institute of Population Studies at Fourah Bay College and the Division of Community Health (College of Medicine and Allied Health Sciences).

3.3 The Legal Framework

The country has a number of sectoral laws relating to environmental protection and management. In addition to the National Environmental Policy and the Environment Protection Act, comprehensive sectoral legislations that cover Surveys and Lands, Minerals and Mining, Agriculture, Forestry, Fisheries, Factories, water supply etc, are described below:

3.3.1 The National Environmental Policy

In 1990, the government with the support of the World Bank prepared three national documents on the protection and management of the environment and natural resources, namely the National Environmental Policy (NEP), National Environmental Action Plan (NEAP) and the National Environment Protection Act, 2000 (NEPA).

The National Environmental Policy (NEP) which was approved by cabinet in1990 and revised in 1994 (GOSL, 1994) aimed at achieving sustainable development in Sierra Leone, through sound environmental and natural resources management.. The policy objectives are to:

Secure for all Sierra Leoneans a quality of environment adequate for their health and well-being;

Conserve and use the environment and natural resources for the benefit of present and future generation; restore, maintain and enhance the ecosystems and ecological processes essential for the functioning of the biosphere; to preserve biological diversity, and uphold the principle of optimum sustainable yield in the use of living natural resources and ecosystems; Raise public awareness and promote understanding of the essential linkages between the environment and development and to encourage individual and community participation in environmental improvement efforts

The NEP also contain sector policies on land tenure, land use and soil conservation; forests and wildlife; biological diversity and cultural heritage; mining and mineral resources; air quality and noise; sanitation and waste management; toxic and hazardous substances; coastal and marine resources; working environment; energy production and use; settlements, recreational space and greenbelts and public participation. One of the major strategies which government is now pursuing to achieve the goals of the NEP is *"to make as priority Environmental Impact Assessment (EIA) of proposed activities which may significantly affect the environment and the use of a resource*.**"**- (GOSL, 1994).

The NEP also has a specific goal and policy for water resource management which ensures adequate quantity and acceptable water quality to meet domestic, industrial, transportation, agricultural and fisheries by accelerating programmes for the utilization of water for the various uses and expending water quality management, monitoring and assessment programmes. Although laws prohibiting pollution of water bodies exist they are hardly enforced.

3.3.2 The Environment Protection Act: 2000

The Environment Protection Act (EPA) of 2000, which was enacted into law on the 28th February 2000 established the Environment Protection Department (EPD) and authorized the Director of EPD and Minister of the Environment to administer and monitor the implementation of the Act. The Act makes provision for the development of an Environment Impact Assessment (EIA) for certain types of projects to be undertaken within Sierra Leone, which include agriculture, mining, construction, waste disposal, and exploitation of hydraulic resources. In

compliance with the Environment Protection Act, the EIA document to be submitted by the Developer must clearly give information on the project of its possible impacts on the ecosystem and its locality; social, economic, and cultural effects that the project is likely to have on the people and society. Information on how the consultative process with the communities; interested parties, and Government Ministries to be carried out; actions or measures taken to avoid, prevent, change, mitigate, or remedy the likely effects on the natural resources, people and society of the project area; plans for decommissioning the project; and other information for proper review of the potential environmental impact of the project should also be provided in the EIA document.

Once submitted, the Director will solicit comments on the EIA report from professional associations, governmental ministries, non – government organization (NGOs) and the public. Following a two – week public comment period, the Director will submit the EIA document and the comments to the National Environment Protection Board. The Board may provide recommendations to further assess the likely environmental impacts, and/or disapprove the EIA in cases where the proposed alternatives are expected to have significant adverse effects on the environment or natural resources, individual, or society.

Upon approval of the EIA document, licenses are issued for a twelve – month period or a time specified by the Director of Environment. Once the license is issued, the Director is to undertake effective monitoring of the project's activities and its environmental impacts to verify compliance. The Minister of Environment may prescribe fees for the license if the terms and conditions of the license are not in compliance with the Environment Protection Act or where there is a substantial change in the project's operations resulting in an adverse effect on the environment. At the expiration of this period, the Director has the authority to renew or revoke the license.

In issuing a license for a project based on an EIA, the Minister also has the authority to establish regulations for national environmental standards pertaining to the use of natural resources, water quality, effluent limitation, air quality, wastes, atmospheric and ozone protection, noise control,

pesticide residues, and odours. Internationally banned chemicals are prohibited in Sierra Leone, as well as the discharge of any hazardous substances into the air, land, and water.

3.3.3 The Mines and Minerals Act: 1994

The Mines and Minerals Act of 1994, which came into operation on 4 March, 1994 addresses mining leases and licenses requirement for open – pit and industrial mining. When a Proponent/Miner applies for a mining lease, information on the period of time for which the lease is sought; estimated mineral deposits, reserves, and mining conditions; mining treatment options and those selected for use in the mining project; specific details of the mining operation such as the schedule, nature of production, potential environmental and social impacts, forecast of capital investment, operating costs and revenues, and the anticipated source of financing, proposed mitigation programs and marketing arrangements for the sale of the mineral production should be provided and forwarded to the Director of Mines in the Ministry of Mines and Mineral Resources.

Other requirements under the Mines and Minerals Act include illegal exploitation and disposed of any radioactive mineral except under and in accordance with the terms and conditions granted by the Minister of Mineral Resources.

3.3.4 The New Forestry Act of June 1988

The Act contains Special Protection Provisions under which the Minister is empowered to declare any area to be a “protected area for purpose of conservation of soil, water, flora and fauna”. The legislation stipulates that no person may cut, burn, uproot or destroy trees that are in protected areas or trees that have been declared as being protected. The section of the law states that any forest officer designated by the Chief Conservator/Director of Forest may issue a license authorizing the holder to fell and extract a protected tree.

Wildlife conservation Act under this Act empowers the Minister to declare an area as strict nature reserve, Natural Park or Game Park. In such areas, activities specified in the Act are prohibited “unless duly authorized.

3.3.5 Draft National Policy and Land Commission Act, 2004

Currently, a comprehensive Land Policy and Lands, Commissions Act are being formulated by the Ministry of Lands, Country Planning and the Environment. The draft land policy document is intended to serve as a useful guide for the smooth administration and management of Land. The policy provides the framework to ensure equity in access to land and to provide security to tenure in order to maintain a stable environment of the country’s sustainable, social economic development.

The Lands Commission Act is to establish a commission with its composition and functions and for other purposes including the management of state lands, the execution of a comprehensive programme for the registration of title to land through out Sierra Leone.

In spite of this seemingly impressive array of environmental laws, the legislation has not fully provided a platform for sustainable use of our natural resources and proper management of the environment. This can be attributed to the following reasons:

Lack of implementation, enforcement and compliance;

Potential conflicts of interest within sectors by not linking environmental and natural resources management responsibility with other development interest;

The relative absence of an autonomous Environmental Protection Agency vested with both advisory and executive authority at all levels of government to design, monitor and implement environmental polices;

Lack of a mechanism that ensures environmental and natural resources management issues in the sectoral ministries and line agencies provide information to the main Environment Department to carry out effective monitoring of environmental policies that are to be implemented by the former.

3.4 Environmental Programmes and Projects under the Rio conventions

As contracting party to the United Nations Convention on Biological Diversity (UNCBD) in 1994, the Government of Sierra Leone through the Ministry of Agriculture, Forestry and Food Security in collaboration with the Ministry of Lands, Country Planning and the Environment with assistance from the Global Environment Facility (GEF) developed the Biodiversity Strategy and Action Plan (BSAP) and Country Report to the CBD Conference of Parties (COPs) which assessed the threats to the nation's biodiversity and of the sustainability of the use of biological resources in Sierra Leone.

Currently, the implementation of the project document entitled "Enabling Sierra Leone's capacity to fulfill its obligation to the United Nations Framework Convention on Climate Change is in progress. The working group on Green House Inventory has submitted its report while the working group on impact vulnerability and adaptation will submit its report in February, 2005. The working group on mitigation analysis will last for six months. Upon completion of the project and submission of project report, government would implement adaptation or mitigation strategies to abate impact of climate change to our natural resources and human health.

At present also, the Ministry of Lands, Country Planning and the Environment in collaboration with government line ministries and NGOs has prepared a country report that focuses on national policies and strategies for effective environmental management and minimize land degradation through education and awareness. Sierra Leone is yet to develop a National Action Plan to minimize land degradation in the country.

CHAPTER FOUR

4.0 NATURE AND EXTENT OF LAND DERADATION IN SIERRA LEONE

4.1 General context

The Land area of Sierra Leone covers some 72,000 sq km. Land is central to development in Sierra Leone since the livelihoods of 70-80% percent of the population are dependent on agriculture (Moyo 2000). Generally, human activities claimed to be responsible or contributing to land degradation in Sierra Leone include unsustainable agricultural land use, poor soil and water management practices, deforestation, removal of natural vegetation, fuelwood consumption and to a lesser extent overgrazing and urbanization.

The expansion of agriculture involves the conversion of sometimes marginal lands, or clearance of important natural habitats such as forests and wetlands. Such conversions have been the major driving force behind land degradation. Agriculture, however not only provide subsistence crops for a large proportion of the population but also provide cash crops for export facilitating economic growth. These demands are often conflicting and make coherent policy development and implementation a complex and difficult task.

Deforestation, both for commercial timber and to make room for agriculture, is the major concern and represents an enormous loss of natural economic wealth to the nation. Selective vegetation removal during logging and woodfuel collection contributes towards forest quality and biodiversity loss which inevitably lead to land degradation.

Loss of natural habitats has reduced vegetation cover and exposed soils to wind and water erosion. Wind and water erosion is extensive in many parts of the country and according to a recent regional study about 25% of our land is prone to water erosion (Reich and others 2001). Soil erosion reduces the productivity of land requiring the application of huge amounts of chemical fertilizers which our poor farmers cannot afford and so get very low yields.

Land tenure which is not a severe problem in Sierra Leone as compared to other countries in the continent will emerge as a serious source of conflicts if the current perceived rate of land degradation is not curbed. This will occur especially when farmers begin to move from degraded and less productive lands to equally marginal lands.

Policies for land management generally fail to address the root causes of land degradation which stem from colonial imbalances in land distribution, lack of incentives for conservation, insecure tenure and failure to provide for a diversified rural production system. The Ministry of Lands Country Planning and the Environment is currently putting the final touches to a new land policy which is expected to address some of these anomalies.

Peace and political stability are vital to improving resource and food security, as shown by the low per capita food production in Sierra Leone which is just emerging from a ten year civil conflict since resource security is necessary to implement and sustain conservation programmes.

The United Nations Convention to Combat Desertification (UNCCD) maintains that land degradation is interwoven with poverty and that addressing this problem requires the participation of the resource users at their community level, and where possible provides them with alternative livelihood.

In line with the UNCCD goals and strategies the survey results discussed in this chapter were obtained from a nation wide consultative process with key stakeholders at all levels and attempts to give a comprehensive but slightly qualitative insight into the current nature and extent of natural resource degradation in the country.

4.1.2 Survey Objectives and methodology

The general objectives of the study include:

- To carry out a diagnostic study for identification of causes, symptoms and effects of land degradation in Sierra Leone with a view to elaborate the National Action Plan; and

- To sensitize the entire population on land degradation issues to minimize environmental degradation in the country.

A total of 200 questionnaires were administered countrywide through to professionals from line Ministries, farmers, NGO's, CBO's, Women's Group, Councilors from District/Town Councils and the displaced. Table 4.1 shows the methodology used to distribute the questionnaires. In addition, interviews, grassroots consultations, field observations, meetings with interest groups and Local Coordinating Organs, and desktop research provided additional information for the process.

Table 4.1 Questionnaire Distribution Methodology

Departments/NGO/CBO	**Number of Questionnaire per Region**			
	West	**North**	**South**	**East**
Mineral Resources	10	4	10	4
Agriculture	10	4	10	8
Development and Economic Planning	4			
Lands, Country Planning and the Environment	2	4	4	
Health				
Forestry	10	4	8	8
NGO's	20		8	8
Farmers Associations	12	4	8	4
CBO's	4		8	4
Town Councils and District Councils	8		4	4
TOTAL	**80**	**20**	**60**	**40**

4.2 Nature and Extent of Land Degradation in Sierra Leone

The general approach used is to explain the findings under four broad categories viz;

- Causes (direct and indirect) of land degradation
- Symptoms of land degradation
- Sector impacts on land degradation; and
- Suggested land degradation measures

4.2.1 Causes (direct and indirect) of land degradation

The Initial Assessment of Environmental Problems, Sierra Leone and the Global Forestry Policy Project (GFPP) National Policy and Advocacy Project in Sierra Leone-Causes of Forest Loss and Degradation and Issues of Unsustainable Forestry in Sierra Leone- identified twelve or more direct causes of land degradation in Sierra Leone.

Table 4.2.1 Direct cause of Land degradation in Sierra Leone

CAUSE	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Logging	24	25	125	25	199	199	1st
Mining	20	47	87	19	173	173	3rd
Wild bush fire	40	35	34	3	112	112	9th
Expansion of Settlements	19	39	65	23	146	146	6th
Shifting cultivation	13	59	60	4	136	136	7th
Refugee Camp Activity	25	38	57	2	122	122	8th
Firewood Collection	8	45	101	28	182	182	2nd
Infrastructure	41	50	18	0	109	109	10th
Charcoal Production	20	43	95	14	172	172	4th
Pollution (Waste disposal)	21	42	42	3	108	108	11th
Tobacco Growing	14	7	5	1	27	27	13th
Tree Crop Plantation	55	40	47	5	147	147	5th
Animal Grazing	37	25	14	0	76	76	12th
Others	0	0	0	0	0	0	14th
TOTAL	**337**	**495**	**750**	**127**	**1709**		
% Ranking	**19.7**	**29.0**	**43.9**	**7.4**			

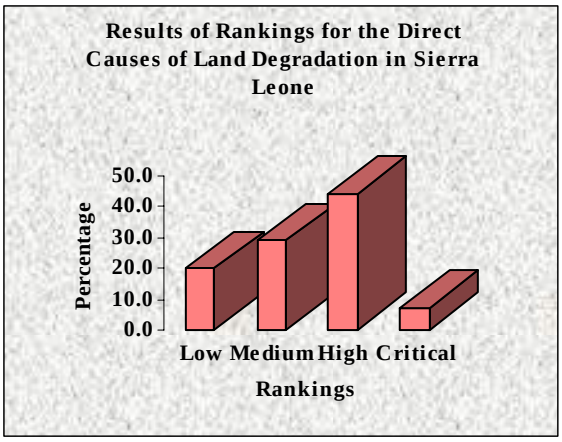


Figure 4.2.1 Results of Rankings for the Direct Causes of Land Degradation in Sierra Leone

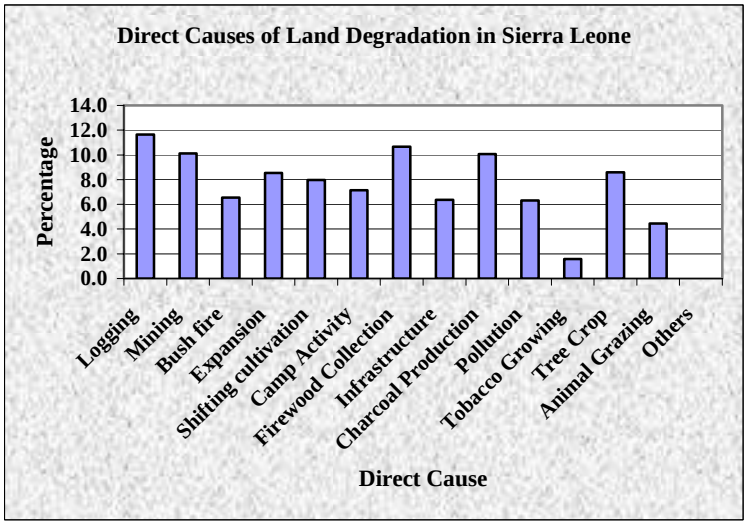


Fig. 4.2.2 Bar chart illustrating the Direct Causes of Land Degradation in Sierra Leone

Table 4.2.1and figure 4.2.2 above indicates that logging both legal and illegal contributes highest to land degradation nation wide. Logging is closely followed by firewood collection, mining and charcoal production. This confirms the findings of other recent studies such as the National Forest Policy and Advocacy Project and the Initial Assessment of Environmental Problems in Sierra Leone. Global and regional studies such as the Global Environment Outlook 3 are in consonance with the fact that logging (Illegal and Legal) is the major factor responsible for land degradation in the region. Results of rankings in Fig 2.1 also show that most direct causes were ranked high indicating that people attach significance to most of the causes identified. The regional analysis in Appendix II show region specific causes but these generally follow the national trend.

Indirect causes (Table 4.2.2, Fig. 4.2.3 and 4.2.4) investigated amongst others include poverty, poor administration, enforcement, and low public awareness. Poverty as has been mentioned is the driving force for unsustainable natural resource utilization in most countries. In Sierra Leone, over 60% of the population lives below the poverty line and dependence on natural resources drive the population into the forests. The study also reveals that the recent civil war has also contributed to some extent to land degradation. Refugees are generally displaced and poor and are mostly dependent on food aid for their daily meals. However, they very quickly turn on the natural resources in their vicinity to augment food rations and other basic necessities. In most cases when they do so they do it with vengeance, resulting in the destruction of all natural resources close to their camps. This is quite evident in the bareness of lands around refugee camps throughout the country.

In Sierra Leone, Law enforcement in general is perceived as a serious problem. In the context of NRM the situation becomes more complex. People inadvertently tend to misuse natural resources because they fall within common property and laws governing these resources are either non-existent or are not enforced. The National Environment Protection Act 2000 seeks to correct some of these anomalies; however the development of byelaws and regulations to monitor natural resource use is still an impediment to the successful implementation of the Act. Moreover, the establishment of an Environment Court envisaged within the framework of the PRSP will be a right step in the right direction.

Table 4.2.2 Indirect Causes of Land Degradation in Sierra Leone

Indirect cause	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Weak institutions	40	58	56	14	168	70	6th
Misdirected Subsidies	19	67	35	21	142	56	5th
Corruption	16	14	96	21	147	117	2nd
Poor Administration	51	65	8	7	131	15	10th
Enforcement	77	30	38	16	161	54	9th
Undervaluation of resources	10	74	30	34	148	64	7th
Low Public Awareness	32	35	88	24	179	112	3rd
Extreme Poverty	6	41	86	38	171	124	1st
Inadequate and un-enforced labor rights	44	36	49	12	141	61	8th
Civil Conflict	42	42	84	16	184	100	4th
Total	**337**	**462**	**570**	**203**	**1572**		
% Ranking	**21.4**	**29.4**	**36.3**	**12.9**			

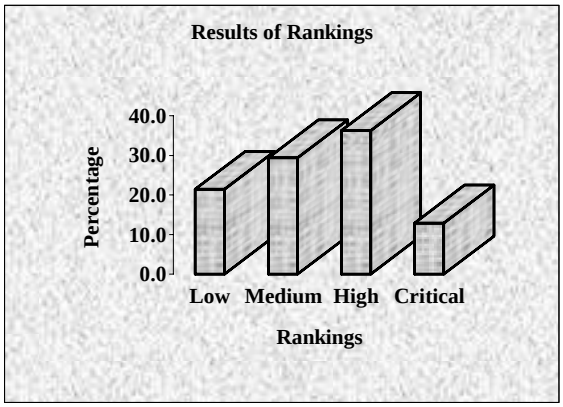


Fig. 4.2.3 Result of rankings for the indirect causes of Land Degradation in Sierra Leone

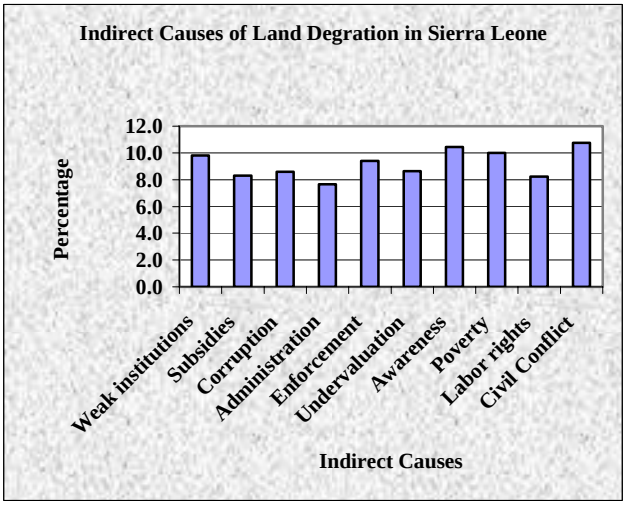


Fig. 4.2.4 Results of rankings for the indirect cause of Land Degradation in Sierra Leone

4.3 Symptoms of Land Degradation in Sierra Leone

The survey examined the major signs and symptoms of degraded lands in the country. Symptoms identified include reduction of yield, increased erosion, reduction in fallow periods, and loss of biodiversity amongst others. Reduction in crop yield emerged as the most recognized sign of land degradation nation wide. Deforestation and poverty are also prominent amongst the signs alluded to in the survey. Table 4.3 and fig 4.3.1 and 4.3.3 illustrate the findings at national scale. The regional analyses are included in appendix II.

Table 4.3 Symptoms of Land Degradation in Sierra Leone

Symptoms	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Reduction in crop yield	6	54	97	11	168	108	5th
Reduction in fallow periods	17	46	90	23	176	113	3rd
Land use conflicts	30	12	75	8	125	83	8th
Siltation of river bed	48	27	41	5	121	46	11th
Deforestation	4	31	110	30	175	140	1st
Increased erosion	16	42	82	19	159	101	6th
Increased Poverty	0	35	84	33	152	117	2nd
Abandoned mined out areas	26	50	42	14	132	56	10th
Loss of Biodiversity	7	45	54	31	137	85	7th
Loss of Ground cover	20	37	96	14	167	110	4th
Decrease of Palatable grasses	48	50	31	3	132	34	12th
High rate of rural-urban migration	27	39	66	5	137	71	9th
Others	0	0	0	0	0	0	13th
Total	**249**	**468**	**868**	**196**	**1781**		

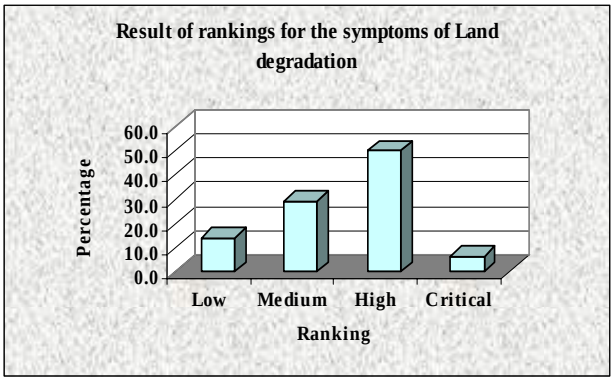


Fig. 4.3 1 Result of rankings for the symptoms of Land degradation

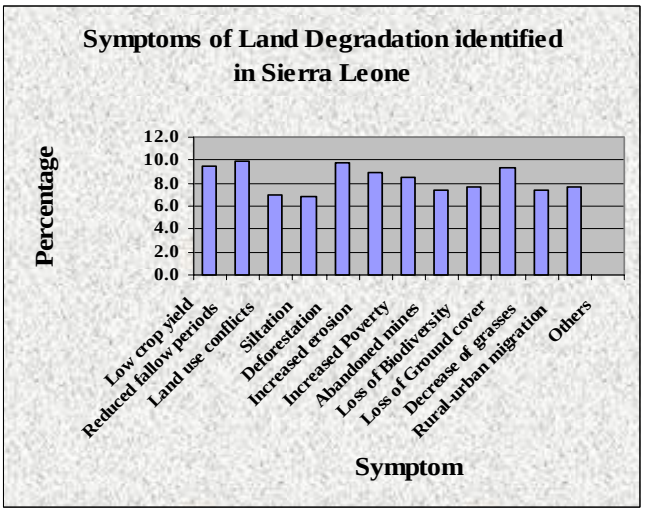


Fig. 4.3.2 Symptoms of Land degradation in Sierra Leone

4.4 Impact of sector activities on Land Degradation in Sierra Leone

Various sector activities impact on the natural environment and their influence mostly determines the direction of conservation and management initiatives. The sectors discussed are agriculture, forestry, mining, fisheries, manufacturing, energy, tourism and transport. The agricultural sector ranks the highest, with the impacts of mining and logging coming next in order of significance. Results of rankings in Fig 4.4 also show that the impact of the various sectors were ranked high indicating that people attach significance to sector activities on the environment. The regional analysis in Appendix II show region specific impacts but in general follow the national pattern.

Table 4.4 Impact of sector activities on Land Degradation

Sector	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Agriculture	9	44	109	7	169	116	1st
Forestry	13	60	60	13	146	73	3rd
Mining	20	27	64	22	133	86	2nd
Fisheries	58	31	18	1	108	19	5th
Manufacturing	24	26	7	0	57	7	7th
Energy	29	34	51	7	121	58	4th
Tourism	35	28	2	1	66	3	8th
Transport	6	15	15	0	36	15	6th
Others	0	3	0	0	3	0	9th
Total	**194**	**268**	**326**	**51**	**839**		
% Ranking	**23.1**	**31.9**	**38.9**	**6.1**			

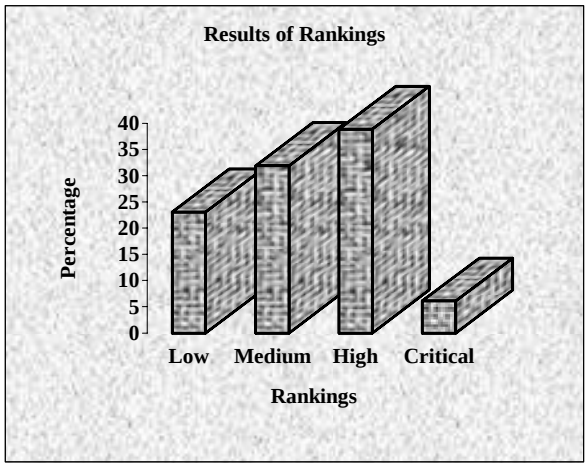


Fig. 4.4.1 Results of rankings for the impact of various sector activities on Land degradation in Sierra Leone.

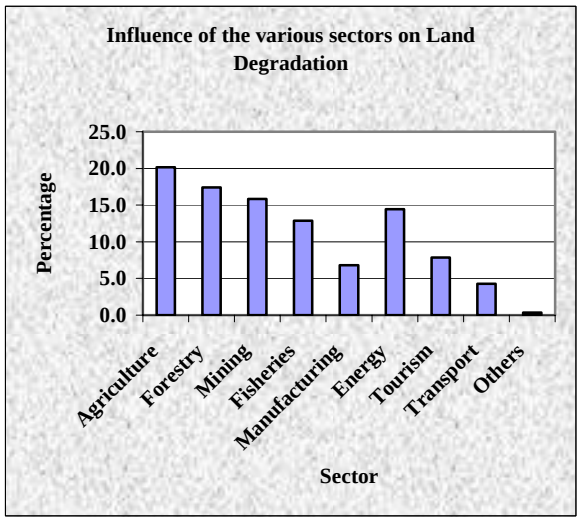


Fig. 4.4.2 Sector activity contribution to Land degradation in Sierra Leone.

4.5 Land degradation reduction measures

Land degradation reduction measures investigated in the survey include development and implementation of a National Environmental awareness Programme, proper land use planning at all levels, adoption of good farming practices, capacity building and institutional strengthening of all institutions in NRM, and reafforestation amongst others. The results in Table 4.5 and Fig. 4.5 point out that the environmental consciousness for all in natural resource use is the key to abating land degradation in the country. In Sierra Leone as in other developing nations, people inadvertently tend to

misuse natural resources because they fall within common property and laws governing these resources are either non-existent or are not enforced.

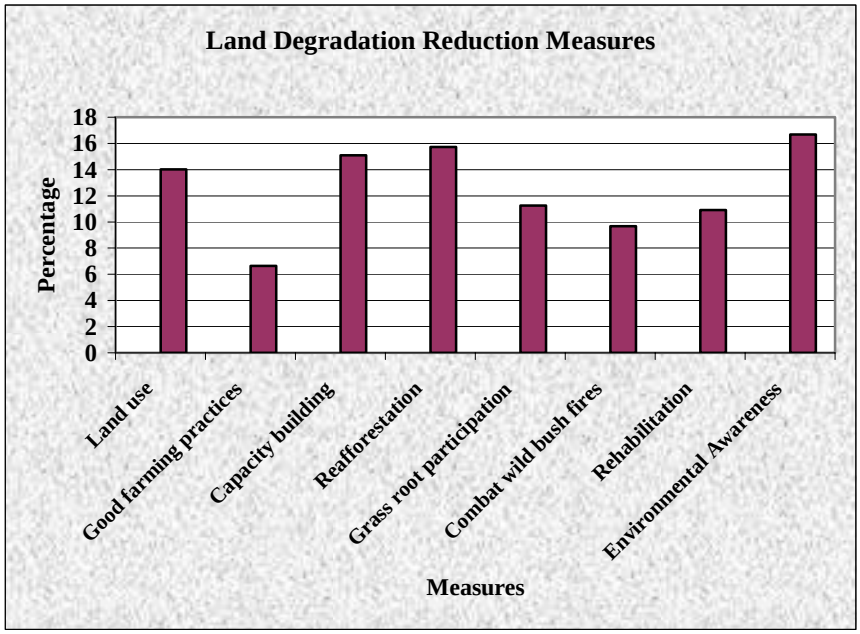
The division of Forestry in the Ministry of Agriculture, Forestry and Food security is responsible for management of all forests in the country. Despite its tireless effort to conserve and protect the forests there still remain substantial gaps within the system which are responsible for the current status of forest degradation in the country. More emphasis should be placed on sustainable reafforestation programmes both at national and local level.

Most institutions involved in NRM within the country are weak and lack the capacity to initiate, implement, and effectively monitor natural resource management programmes. The Environment department in the Ministry of Lands, Country Planning and the Environment is the overall body responsible for the coordination and monitoring of all environmental management issue both national and international. However, the department still lacks the required manpower both skilled and unskilled, logistics and other facilities needed to grapple with the myriad of environmental problems in the country. This is a very serious obstacle and urgent measures should be taken to address this issue.

Table: 4.5 Land degradation reduction measures

Land Degradation reduction Measure	Score	Percentage
Proper Land use planning at all levels	668	14.0
Adoption of Good farming practices	317	6.6
Capacity building and institutional strenghtening	719	15.1
Reafforestation	750	15.7
Grass root participation in decision making in NRM	537	11.3
Develop program to Combat wild bush fires	461	9.7
Rehabilitation of mined-out areas	520	10.9
National Environmental Awareness program	795	16.7
Total	**4767**	**100.0**

Fig. 4.5 Bar chart illustrating land degradation reduction measures suggested.



CHAPTER FIVE

5.0 FRAMEWORK FOR THE IMPLEMENTATION OF THE NATIONAL ACTION PLAN (NAP)

This section sets out to present a framework for a National Action Plan based on national goals for sustainable natural resources utilization.

5.1 Projects and Programmes complementing the NAP Process

Though the country went through political instability for ten years, it was able to undertake programmes and projects that support sustainable natural resources management. This is summarized in table 5.1 below.

Table 5.1: Selected Project / Programmes implemented for Sustainable Resources Management over the past five years.

Proj/Prog	Objective	Activities	Implementation Strategies	Implementing Agencies	Donor/ Funding Agencies	Stake-holders	Duration
1. Important Bir Areas (Conservation Project (IBA)	Carryout practica conservation activities i out important bird area (IBA). Promote sustained long term conservation o IBAs. Strengthened NGO-Government Partnership fo biodiversity conservation. Promote greate involvement of othe stakeholders especiall the local communities i the management of IBA	Awareness raising and sensitisation of communities. Reforestation through tree planting. Advocacy and lobbying Training of local communities Organising local communities into groups to monitor sites. Awareness Raising. Reforestation	Established national liaison committee Developed memorandum of understanding between CSSL, and the Forestry Division of the Ministry of Lands, Country Planning, Forestry and the Environment. Established database Developed guidelines for organising local communities into sites support groups. Develop educational materials-posters, Newsletters etc.	CCSL, Forestry Division and UNDP	GEF	GOSL, NGOs Local communities adjacent to IBAs	Five Years
(2) Regent No.2 River biodiversity conservation and community development project.	To ensure the proper management of Western Area Forest Resources. To raise awareness among stakeholders about the importance of the Natural Resources.	Awareness raising. Establishment of Eco-tourism and research facilities. Protection of Important Landmarks Monitoring human activities in the forest	Production of promotional materials. Radio/TV programmes. Community Development activities	Conservation Society of Sierra Leone(CSSL)	Special self help project US Embassy	Natural Resource Users e.g Charcoal burners, woodcutters, hunters etc.	1 (One) year

	To establish for Eco-tourism To protect important land marks and Natural resources of the forest						
Proj/Prog	**Objective**	**Activities**	**Implementation Strategies**	**Implementing Agencies**	**Donor/ Funding Agencies**	**Stake-holders**	**Duration**
(3). Chimpanzee Rescue/Rehabilitation and Protection of Forest Reserve Programme	To protect the Chimpanzees and their habitat/forest reserve. To implement CITES regulations and national wildlife laws for the protection of Chimpanzees classified as endangered species. To provide sanctuary for confiscate animals with the Freetown Forest Reserves. To protect the Congo Dam catchment areas	Preserve Western Area Forest, Chimpanzees and other animals. Hold seminars/workshops to educate the community on the preservation and conservation of the forest. Confiscate illegally kept animals and provide safe sanctuary. Provide income alternatives to poachers. Sensitize school children on sites visits	Collaboration with Forestry Division, implementing and law enforcement agencies of Sierra Leone.	Wildlife unit of the Forestry Division and Conservation Society of Sierra Leone.	European Union IPPL WSPA Step by step personal funding raising activities.	Project staff, the community students, Researchers, the Endangered species e. g Chimpanzees	40-50
(4) Restoration of Lion Mountains	To Restore the lost biodiversity on the Lion Mountains. To facilitate the community	Identification of degraded and Nursery sites by MAF&MR. Soil collection, Potting, tending of young	The involvement of youths in restoration programmes Training youth groups in Nursery and plantation	Catholic Relief Services (CRS)	The local,CRS, Forestry Division and the	3(three) years	

	participation in Afforestation. To gainfully employ youth groups. To raise seedlings and plants in degraded sites. To offer training programmes to participating youth groups.	seedlings. Planting of tree seedlings in the field Fire protection in the plantation. Harvesting of trees sustainably by community, supervised by Forestry staff	establishment. Payments of youths for every seedling raised and planted. The involvement of forestry experts in training and supervision of Nursery planting activities		communities		
Proj/Prog	**Objective**	**Activities**	**Implementation Strategies**	**Implementing Agencies**	**Donor/ Funding Agencies**	**Stake-holders**	**Duration**
(5) Gola Rain Forest conservation Programme	To establish representative conservation areas of faunal and floral populations To maintain sustainable level of production of timber and non-timber forest products for economic development both protective and environmental roles of the forest. Maintain and conserve	Division of Forest Reserves into zones. The purchase and assemblage of working tools and labour on site. Sensitisation of the committee living around the forest	Forestry Division, CSSL	Royal Society for the Protection of Bird Life International and other conservation organization, UK	Local communities, Conservation Society of Sierra Leone, Bird-Life International and other conservation organizations	On going	

	forest biodiversity system Satisfy the needs of local communities						
(6) ADB Funded Sierra Leone Artisanal Fisheries Development Project	To increase household and national food security and incomes from sustainable exploitation of fisheries resources. To increase artisanal fish production in a sustainable and environmental friendly manner	Development of artisanal fisheries. Provision of credit facilities. Carry out institutional strengthening and capacity building in the public sector. Strengthening the rational management of fish resources. Establish a PMU Unit for proper project implementation	Re-establishing fishing and related activities to enable people engage in income generating activities. Recruit a credit specialist at NDB and organise poor Fisher folks. Processors and Traders in groups to enable them get access to credit facility.	ADF,GOSL	Artisanal fisher folks	5 years	11,900.90(UA'000)
Proj/Prog	**Objective**	**Activities**	**Implementation Strategies**	**Implementing Agencies**	**Donor/ Funding Agencies**	**Stake-holders**	**Duration**
(7) Sierra Leone's National Biodiversity Strategy and Plan(BSAP) Project	To assist Sierra Leone in developing a National Biodiversity Strategy and Action Plan(BSAP). To	Define the current status of biodiversity of the country to ensure conservation, sustainable use and equitable sharing. To build on the existing knowledge base to elaborate the BSAP through participatory	Establishment of steering committee and planning team to supervise the BSAP project. Stock taking and Assessment of biodiversity and biological resources based on existing	Hire the services of national and international consultants experienced in biodiversity issues. Conduct familiarization	UNDP GOSL	GEF	2004 - 2025

		planning and stakeholder consultation. To allow Sierra Leone to meet its obligations under the conservation on biological diversity(CBD) by preparing its first country report to the conference of parties(COPS)	information. Identification and analysis of strategy options for conservation, sustainable use and benefit sharing to meet the objectives of the CBD. Planning and Preparation of a national strategy and action plan preparation of the first national Report and its submission to COPs	tours to all biodiversity stakeholders in the country. Provide training by organizing 2 national workshops involving key biodiversity stakeholders			
(8) Mud Stove Programme at Displaced Camps	To reduce the rate of deforestation in the Western Area To increase the awareness of people about environmental impacts of the deforestation To increase their willingness and readiness for tee planting activities to control the environmental degradation around the camps. To provide efficient means of cooking to the displaced persons	Construction of 89 kitchens and 658 mud stoves for displaced persons at Grafton and Clay Factory displaced camps. Provide training workshops for 346 participants in the construction use of mud stoves Construction of one house cum office for forest guards and ranger at Grafton	Conduct sensitisation programme at the camps. Provide education on Forest protection activities through lectures and video shows to attract their attention about deforestation and other environmental problems.	Forestry Division, FAO	University NAO	Grafton and Clay Factory displaced persons, Staff of Forestry Division.	6 Months

5.2 STRATEGIES REQUIRED FOR NATURAL RESOURCES MANAGEMENT

From the foregoing discussion of the various aspects of land degradation, the following strategies are summarized.

5.2.1 Short Term Strategies

Agriculture

Encourage the practice of inland valley swamps and other wetlands cultivation

Encourage the practice of tree crop cultivation in the uplands

Apply the practice of Alley crop farming

Implement Agricultural Policies and avoid frequent changes of policies to ensure sustainable agriculture.

Vegetation

Conserve the nations vegetation by:

- coordinating matters relating to natural resource conservation;
- formulating a policy for natural resources management;
- monitoring programmes, projects and the activities related to natural resources conservation and management
- Enforcing international treaties relating to conservation and management.

Common Property Resources (CPRs)

- Limit Access to and use of CPRs;
- Bring about surveillance by local communities on movements into CPRs;
- Embark on full mapping of protected areas in the country;
- Update and revise the protected areas and introduce Collaborative Forest Management between Communities and the Forestry Department.

Grazing

- Encourage sedentarisation of cattle herders through the establishment of grazing reserves;
- Improve the health of livestock and control the spread of animal diseases;
- Eliminate conflicts between cattle herders and cultivators in the north.

Mining

- Drastically effectuate the Mines and Minerals Act to ensure the restoration of the landscape by full implementation of EIA through out project cycles;
- Encourage land reclamation in artisanal mining areas;

Land Tenure

- Actualize the Draft National Land Policy and Lands Commission Act;
- Reduce land fragmentation in all agricultural activities;
- Reform and implement all land use Acts to make it easier for all Sierra Leoneans acquire land.

General

- Empower the civil society to address the issue of sustainable natural resources management;
- Strengthen Institutions and build capacity for natural resources management;
- Ensure the security especially of poor people by reducing their vulnerability to risks in marginal areas where natural resources exist.

5.2.2 Long Term Strategies

Other actions and options for ensuring sustainable natural resources, while maintaining a quality environment in Sierra Leone in the long run are identified below:

Empower Civil Society to Address the Issue of Sustainable Development

NGOs in Sierra Leone have supported multiple interventions that can build and empower organizations with representations at local, regional, and national levels. They have done this through the coordination of activities, provision of loans and technical advice, and strengthening links between farmers and other bodies so as to ensure access to materials and assistance.

The design of actions to empower the civil society has to start with a long-term donor commitment, followed by a gradual withdrawal of the international NGOs involvement in activities.

Government will intensify and support advocacy activities for women through NGOs, allowing them to have access to and participate in the utilization and management of natural resources.

Pilot projects will be undertaken by local communities on lands identified by these communities whereby the communities will become legal owners and main beneficiaries of the forest. Emphasis will be on forest production and control of resources.

It is crucial that off-farm employments in the rural sector should increase since this will reduce the level of unemployment in these areas. The government is therefore obliged to develop programmes that are environmentally friendly and create employment in the rural areas that will support agriculture, which is the mainstay in rural economies. Some of these programmes and projects will be targeted at women through encouraging them to participate from planning to implementation. Modalities for the implementation of such programmes and projects will be bottom-up at a local level.

Institute and enhance Environmental Impact Assessments

The natural environment is very vital for long-term development planning. Increased productivity can only be significant under certain guiding principles. Of paramount importance is the protection of the natural resources to prevent land degradation and loss of biodiversity.

The long-term objective is the sustainable management in the process of exploitation to prevent environmental degradation. This should be achieved by re-instating policies and guidelines for environmental and natural resources management. Government should ensure that all development projects are subject to Environmental Impact Assessment (EIA). Projects such as mining, fishing, manufacturing, road construction must be subject to E.I.A. This reveals areas where appropriate mitigative projects may be identified to offset any negative environmental consequences. Screening should be done to identify the linkages between development and environmental quality.

It is also crucial that monitoring and evaluation of projects be ensured. The Department of the Environment has developed guidelines and procedures for E.I.A in Sierra Leone which must be enforced.

Strengthen Institutions and Build Capacity for Environmental Management

The main priority areas for action on capacity building include the following. Firstly, government should establish a database on experts and institutions concerned with environment. Secondly, much work needs to be done to improve the information base and the capacity to collect and retrieve data that are related to environmental problems. Thirdly, there is need to develop curricula to incorporate Environmental Education (EA) at all levels of education and training. There is need to enhance public participation in environmental management, particularly involving NGOs, women, youth groups and community level organizations.

The main actors in capacity building include central and local government departments, the private sector, universities, local and international NGOs, donor agencies, financial institutions, and private investors. The main instruments include the provision of training and resource centres, network of consultants and institutions, partnerships etc. The promotion and coordination of capacity building should be under the purview of the Department of Environment. These should include: listings, newsletters, website notice boards of capacity building initiatives and directory of experts in environmental management.

CHAPTER SIX

6.1 PROPOSED MONITORING PLAN FOR MITIGATING RESOURCE DEGRADATION.

A fundamental component of NRM in Sierra Leone is the performance monitoring that will provide the necessary quantitative performance against the regulatory framework. This will become an NTM tool that will allow for periodic and objective evaluation of NRM.

Integrating monitoring plans for mitigating resource degradation has the following advantages:

- Increases people awareness of policies that have to do with natural resources management;
- Creates an enabling environment that will credit to NRM;
- Assures an adequate and up-to-date NRM database for management awareness and decision making.

The key element in the monitoring will be the use of indicators primarily designed to assess NTM. These indicators will monitor changes and trends over time. No core indicators can be used for possible monitoring but the following that are related to natural resources utilization are proposed.

- Land tenure rights;
- Access to natural resources;
- Number of people solely depending on natural resources for their livelihoods conflict in the use of Natural Resources;
- Level of subsistence within communities;
- Nature and extent of marginal areas where natural resources occur;
- Level of exploitation of NTM in marginal areas;
- Access to and use of natural resources;
- Level of participation in NRM by local communities;
- Level of social capital within the community for NRM.

The above indictors that are listed will be used to do a content analysis using data from relevant publications of government agencies and other related documents such as the World Development Reports and World Resources.

6.2 Institutional Frame for Monitoring NRM

There are existing institutions responsible for data collection and analysis nation wide. Statistics Sierra Leone (SSL) is responsible for collection of data for all government programmes. It does so in collaboration with line ministries and other agencies.

The monitoring activities will be planned to ensure that the objectives of NRM in Sierra Leone are met. It will also establish a database to confirm the criteria and standards of national and international bodies.

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CHAPTER SEVEN

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

Sierra Leone has a very rich natural resources base that continued to determine the path and pattern of economic growth in the country. In ensuring proper environmental and natural resources management in the country, Government of Sierra Leone established various institutions and developed related sectoral policies and legislations..

Survey results discussed in the preceding chapters indicate that logging, which is closely followed by firewood collection; mining and charcoal production is the main factor responsible for land degradation in the country. Over 60% of the rural population lives below the poverty line and depend largely on natural resources around them particularly the forests for their livelihood sustainability. Timber harvesting, firewood collection and charcoal production are the major sources income for their livelihood. The ten-year civil conflict exacerbated the situation resulting to the massive over exploitation and destruction of natural resources as evident in the bareness of lands around refugee camps throughout the country. Reduction in crop yield, increase erosion, reduction in fallow periods, biodiversity loss, and deforestation are the major signs and symptoms of land degradation in the country.

The impacts of the various sector activities on the natural environment show a general pattern with agriculture ranked as highest sector followed by forestry; mining and energy contributing to land degradation nationwide. 80% of the population depends largely on slash-and burn agriculture practices to cultivate food crops.

Despite the instability, Government, in collaboration with private institutions and Environmental Non-governmental Organizations was able to undertake eight major programmes and projects that support sustainable natural resources management However, there are still institutional weaknesses and the existing environmental policies have not been implemented for proper management of the environment in the country. Policies for land management generally fail to address the root causes of land degradation,

which the current draft land policy is expected to address. The non-existence of byelaws and regulations to monitor natural resource use is an impediment to the successful implementation of the acts on environmental protection and sustainable use of natural resources.

Though the institution responsible for the management of all forests in collaboration with other government departments has made tireless efforts to conserve and protect the forests there still remain substantial gaps which are responsible for the current status of forest degradation in the country. The institutions generally lack the capacity to implement and effectively monitor their natural resources management programmes. There is little manpower, logistics and other facilities available to grapple with the myriad of environmental land degradation problems in the country. There is also a relative absence of a proper mechanism to ensure effective coordination and monitoring of the implementation of environmental policies, programmes and activities of government line ministries, Non-governmental Organizations (NGOs) and Community Based Organizations (CBOs).

Massive environmental education and awareness raising as well as active environmental outreach programs for community people, especially women are urgently required. Effective promotion of environmental awareness and reforestation programs, institutional
strengthening and capacity building; proper land use planning as well as grass root participation are the major measures that can be implemented to reduce land degradation in Sierra Leone.

7.2 RECOMMENDATIONS

In a bid to ensure the successful implementation of the UNCCD in Sierra Leone, the issues raised below should be addressed;

- Review and update environmental policies and legislations with input from relevant stakeholders and local communities in the NAP implementation process.
- Reinforcing the environmental policies and laws to ensure strict complaince.
- Strengthening the institutional capacity of national institutions and Environmental NGOs and other key stakeholders that are involved in the NAP implementation.

- Engage in environmental education and awareness raising programmes for communities emphasizing the role of the UNCCD in sustainable utilization of natural resources.
- Government institutions to increase people awareness of policies and laws that have to do with natural resources management.
- Rural communities should be empowered to develop suitable alternatives of livelihood such as agro-forestry, vegetable gardening, alley crop farming alternative energy sources etc.
- Develop massive reforestation programmes focusing on establishment of community forests and woodlots.
- The new land policy should consider land tenure arrangements to foster secure tenure and promote equity in land distibution.
- Government to encourage the rural communities to adopt environmentally friendly agriculture activities.
- Encourage the practice of inland valley swamps and wetlands cultivation of our food crops.
- Set up a framework for the effective monitoring of all natural resources management projects and programmes.

Légende

Classes d'occupation du sol à dominante arborée

- Forêt de montagne
- Forêt dense dégradée
- Forêt dense humide
- Mangrove
- Mosaïque forêt / savane

Classes d' occupation du sol à dominante agricole

- Agriculture irriguée

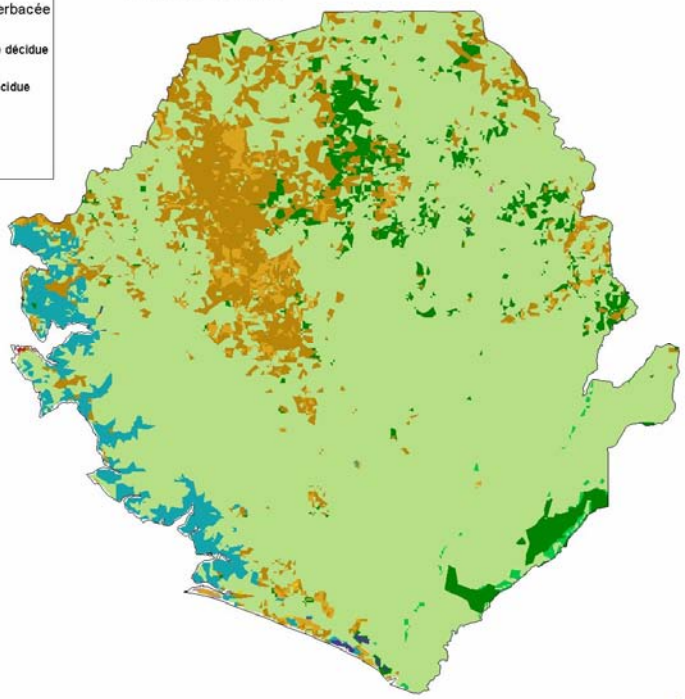
Classes d'occupation du sol à dominante arbustive ou herbacée incluant de l'agriculture

- Savane arborée à arbustive décidue
- Savane boisée décidue
- Savane herbacée dense décidue

Autres ccupations du sol

- Eau
- Villes

SIERRA LEONE
OCCUPATION DU SOL

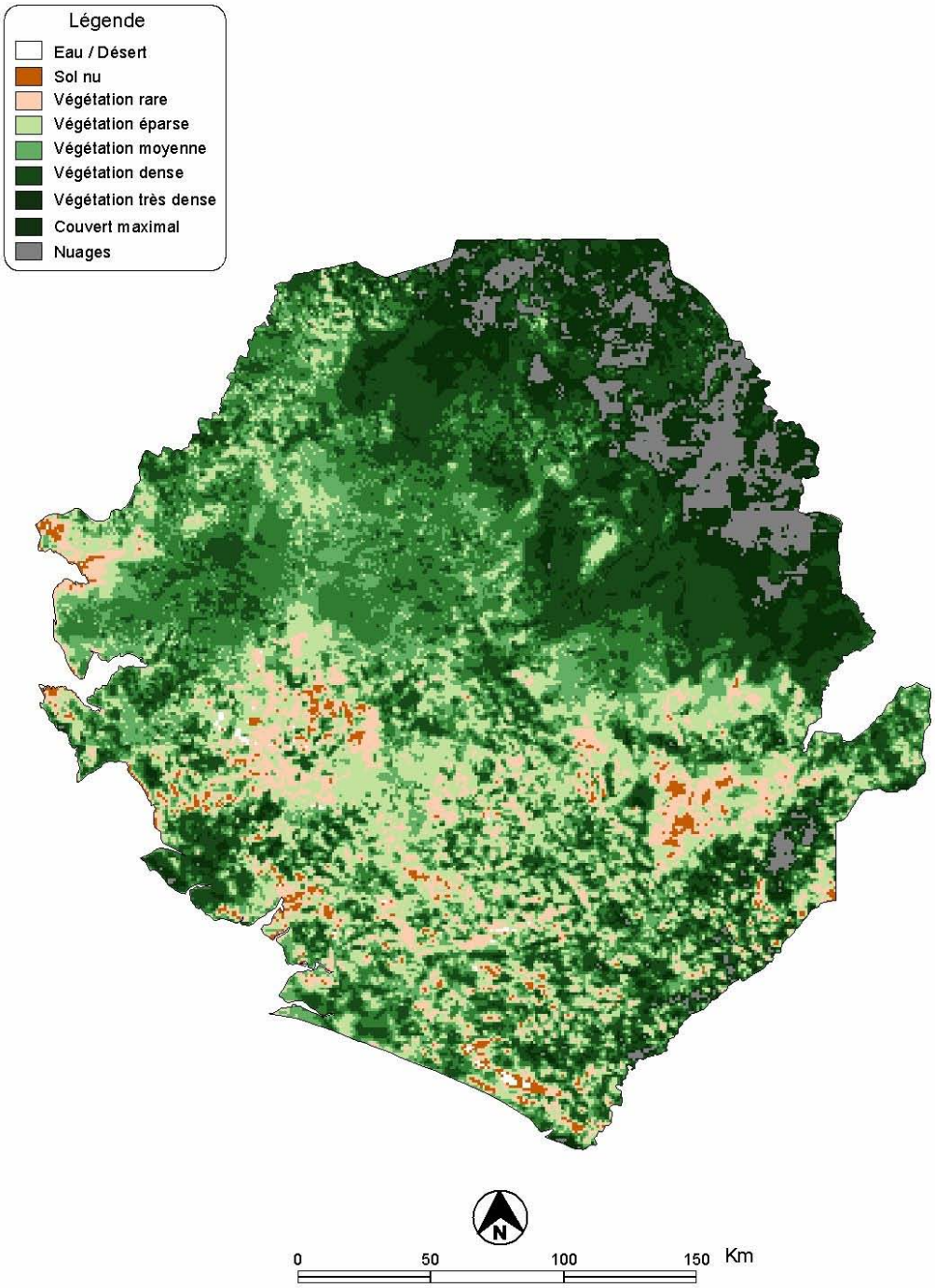


Types	Superficie (ha)	Pourcentage
Agriculture irriguée	2650.11	0.04%
Eau	6265.95	0.09%
Forêt de montagne	519.14	0.01%
Forêt dense dégradée	23562.62	0.33%
Forêt dense humide	347197.27	4.90%
Mangrove	266321.06	3.76%
Mosaïque forêt / savane	5443748.66	76.88%
Savane arborée à arbustive décidue	165131.64	2.33%
Savane boisée décidue	822835.73	11.62%
Savane herbacée dense décidue	1985.31	0.03%
Villes	444.85	0.01%
Total	**7080660.34**	**100%**

Information sur la carte :

La classification de l'occupation du sol a été obtenue par analyse des données de l'instrument SPOT-VEGETATION acquises en l'an 2000

SIERRA LEONE
IMAGE INDICE DE VEGETATION (NDVI)
AU 30 MAI 2004



Sources : SPOT-VEGETATION.
Les données VEGETATION sont acquises à l'aide de l'instrument "VEGETATION" embarqué à bord des satellites SPOT 4 et SPOT 5.

REFERENCES

African Development Bank, 1995	Country Environmental Profile Sierra Leone
Aqua Terra Consulting, 2003	Environment and Social Impact Assessment Report
Bah, M.A., 2002	Review of Existing Programmes and Projects for Biodiversity Conservation, Sustainable use and efficient use of benefits
Bomah, A. K., 2003	Biodiversity Loss and livelihood sustainability in the Freetown Peninsula Forest
Bomah, A. K., Bassir Franklin, 2004	Incorporating Poverty-Environment Linkages into the National Poverty Reduction Strategy (PRSP)
Government of Sierra Leone, 1994	Mines and Minerals Acts
Government of Sierra Leone, 1994	National Environmental Action Plan, Volume One
Government of Sierra Leone, 1994	National Environmental Policy
Government of Sierra Leone, 2000	National Environment Protection Act
Government of Sierra Leone, 1988	National Forestry Act
Government of Sierra Leone, 2004	National Land Policy
Government of Sierra Leone, 2004	Proposed Strategies and Actions for Biodiversity Conservation (Biodiversity Strategy and Action Plan)
Government of Sierra Leone, 2000	Report on the Environmental and Socio-economy Impacts of Sand Extraction at the Lakka Beach
Government of Sierra Leone, 2003	Sierra Leone National Recovery Strategy Assessment, Final Report
Government of Sierra Leone, 2003	States and Trends in Biodiversity Conservation in Sierra Leone
Institute of Marine Biology and Oceanography, 2002	Management Plan for Sand Extraction in Sierra Leone
Johnson, M. J. 2003	An Investigation into How to Rationalize and Institutionalize EIA in Sierra Leone

Koroma A. P., 2004	Causes of Forest Loss and Degradation and Issues of unsustainable Forestry in Sierra Leone
Koroma A.P., 2004	The Global Forest Policy and Advocacy Project in Sierra Leone
Ministry of Lands, Country Planning And the Environment, 2001	Case Studies of the Impact of Natural Resources Management on Sierra Leone's Environment and Economy
Sankoh, S. K., 2001	Report of the Scientific Investigation on the Environmental Effects of Sewage Discharge and Solid Waste Dumping into the Sierra Leone Estuary.
United Nations Environment Programme (UNEP), 2002	Global Environment Outlook
World Bank, 1994	Sierra Leone Initial Assessment of Environmental Problems

APPENDIX II

REGIONAL ANALYSIS

Western Area

Table:1 Direct causes of Land Degradation in the Western Area (Sierra Leone)

CAUSE	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Logging	4	5	38	3	50	41	3rd
Mining	5	9	31	3	48	34	5th
Wild bush fire	4	6	12	0	22	12	8th
Expansion of Settlements	0	7	22	21	50	43	1st
Shifting cultivation	5	16	0	0	21	0	10th
Refugee Camp Activity	3	7	13	0	23	13	7th
Firewood Collection	0	8	25	17	50	42	2nd
Infrastructure	6	9	3	0	18	3	9th
Charcoal Production	0	12	26	10	48	36	4th
Pollution (Waste disposal)	3	22	15	0	40	15	6th
Tobacco Growing	0	0	0	0	0	0	11th
Tree Crop Plantation	28	17	0	0	45	0	11th
Animal Grazing	12	9	0	0	21	0	11th
Others	0	0	0	0	0	0	11th
TOTAL	**70**	**127**	**185**	**54**	**436**		
% Ranking	**16.1**	**29.1**	**42.4**	**12.4**	**100.0**		

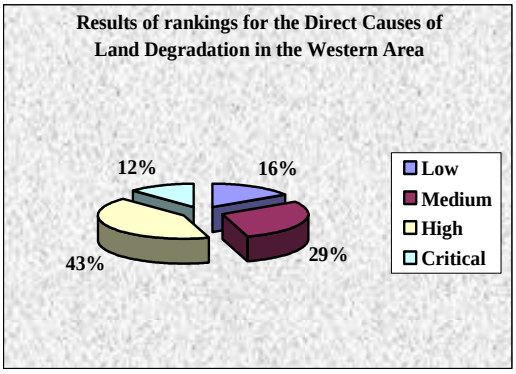


Fig.1 Result of rankings for the direct of land Degradation in the Western area

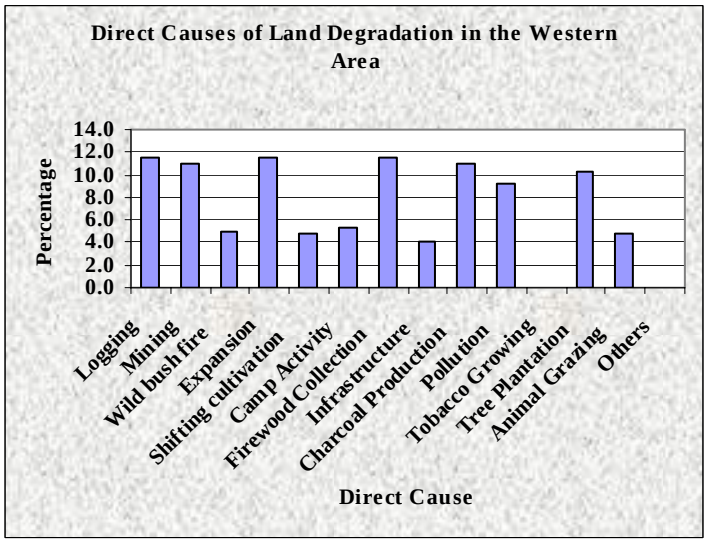


Fig.2 Direct causes of land Degradation in the Western area

Western Area

Table: 2 Indirect causes of Land Degradation in the Western Area (Sierra Leone)

INDIRECT CAUSES	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Weak institutions	10	22	8	1	41	9	6th
Misdirected Subsidies	0	32	0	6	38	6	10th
Corruption	0	0	38	4	42	42	1st
Poor Administration	30	12	8	2	52	10	5th
Enforcement	36	0	8	0	44	8	7th
Undervaluation of resources	6	23	12	4	45	16	4th
Low Public Awareness	8	6	32	2	48	34	3rd
Extreme Poverty	4	30	2	5	41	7	9th
Inadequate and un-enforced labor rights	24	6	4	4	38	8	7th
Civil Conflict	4	4	32	4	44	36	2nd
Total	**122**	**135**	**144**	**32**	**433**	**176**	
% Ranking	**28.2**	**31.2**	**33.3**	**7.4**	**100.0**		

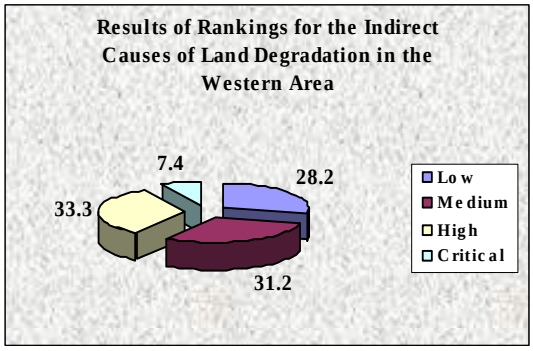


Fig.3 Result of rankings for the indirect of land Degradation in the Western area

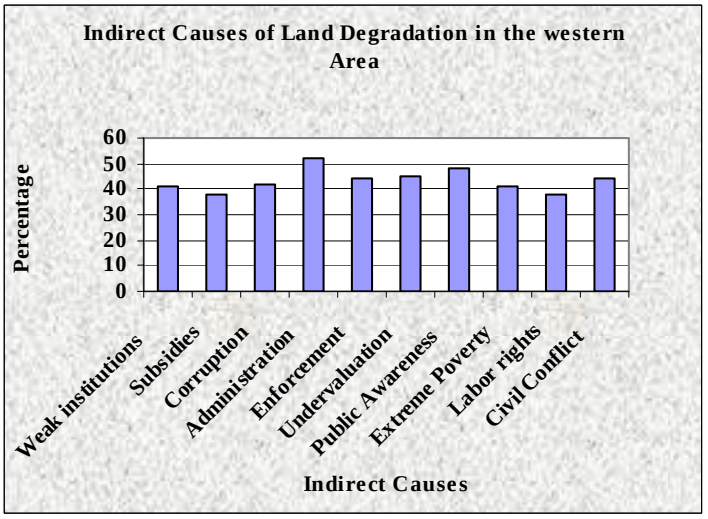


Fig.4 Indirect causes of land Degradation in the Western area

Western Area

Table 3. Symptoms of Land degradation in the Western Area (Sierra Leone)

Symptoms	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Reduction in crop yield	0	33	6	0	39	6	11th
Reduction in fallow periods	0	28	15	0	43	15	9th
Land use conflicts	2	24	24	0	50	24	6th
Siltation of river bed	2	28	14	2	46	16	8th
Deforestation	0	10	32	8	50	40	3rd
Increased erosion	0	2	30	12	44	42	2nd
Increased Poverty	0	15	18	10	43	28	5th
Abandoned mined out areas	12	0	6	0	18	6	11th
Loss of Biodiversity	0	14	28	6	48	34	4th
Loss of Ground cover	0	0	38	6	44	44	1st
Decrease of Palatable grasses	12	20	10	0	42	10	10th
High rate of rural-urban migration	12	12	24	0	48	24	6th
Others	0	0	0	0	0	0	13th
Total	**40**	**186**	**245**	**44**	**515**		

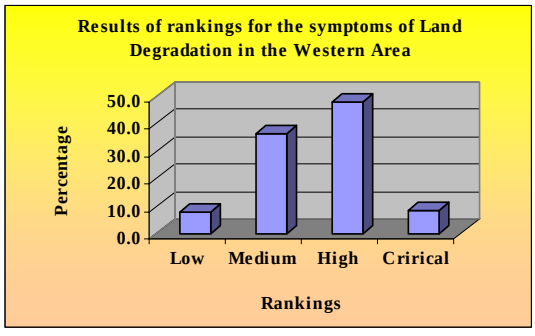


Fig. 5 Results of rankings for the symptoms of Land Degradation in the Western Area

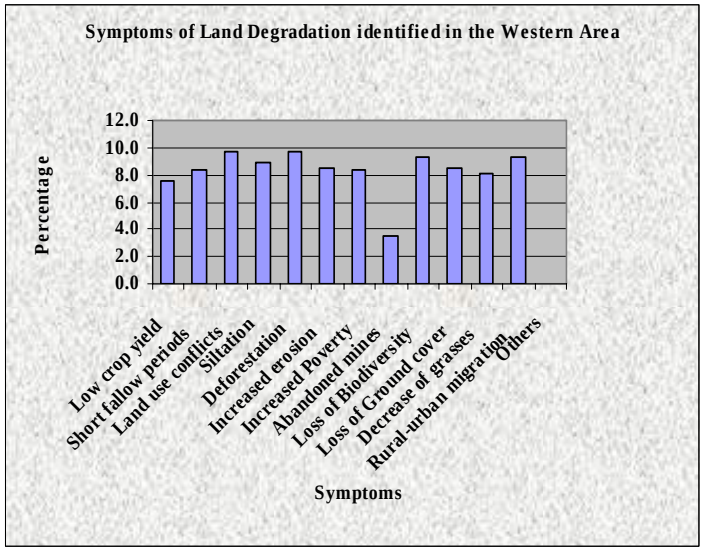


Fig. 6 Symptoms of Land degradation observed in the Western Area

Western Area

Table: 4. Suggested Land degradation reduction measure for the Western Area (Sierra Leone)

Land Degradation reduction Measure	Score	Percentage
Proper land use planning at all levels	232	16.5
Adoption of Good farming practices	108	7.7
Capacity building and Institutional Strengthening	223	15.9
Reafforestation Programmes	258	18.4
Grass root participation in Environmental Management	105	7.5
Programs to Combat wild bush fires	90	6.4
Rehabilitation of mined-out areas	100	7.1
National Environmental Awareness campaign	286	20.4
Total	**1402**	**100.0**

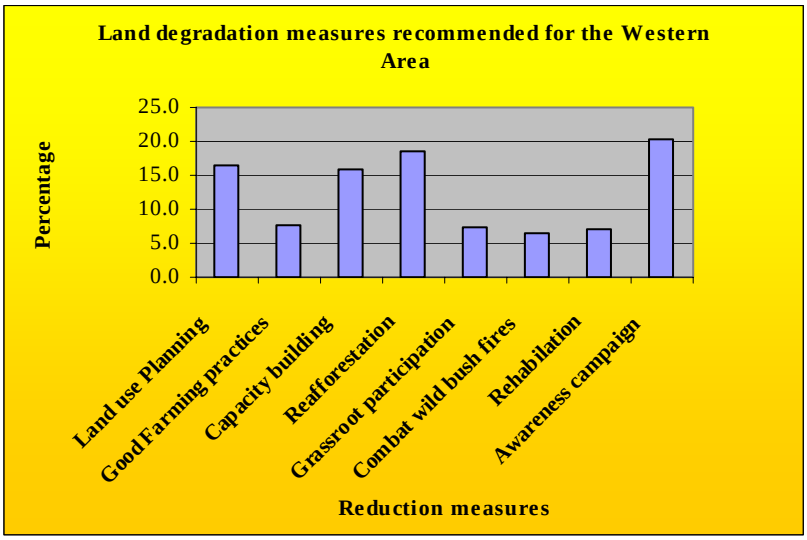


Fig. 7 Land degradation reduction measures suggested for the western area

Southern Province

Table: 5 Direct causes of Land Degradation in the Southern Province (Sierra Leone)

CAUSE	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Logging	8	4	26	7	45	33	1st
Mining	0	15	29	0	44	29	2nd
Wild bush fire	16	11	3	0	30	3	8th
Expansion of Settlements	2	22	11	0	35	11	5th
Shifting cultivation	1	18	13	3	35	16	3rd
Refugee Camp Activity	7	16	8	0	31	8	7th
Firewood Collection	5	20	6	8	39	14	4th
Infrastructure	7	10	1	0	18	1	9th
Charcoal Burning	8	15	11	0	34	11	5th
Pollution (Waste disposal)	7	8	1	0	16	1	9th
Tobacco Growing	0	0	0	0	0	0	11th
Tree Crop Plantation	13	6	0	0	19	0	11th
Animal Grazing	12	0	0	0	12	0	11th
Others	0	0	0	0	0	0	11th
TOTAL	**86**	**145**	**109**	**18**	**358**	**127**	
% Ranking	**24.0**	**40.5**	**30.4**	**5.0**	**100.0**		

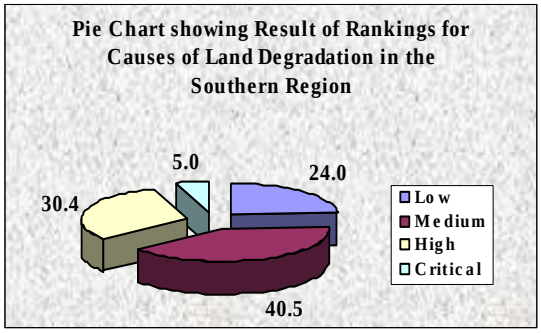


Fig. 8 Results of rankings for the symptoms of Land Degradation in the Southern Province.

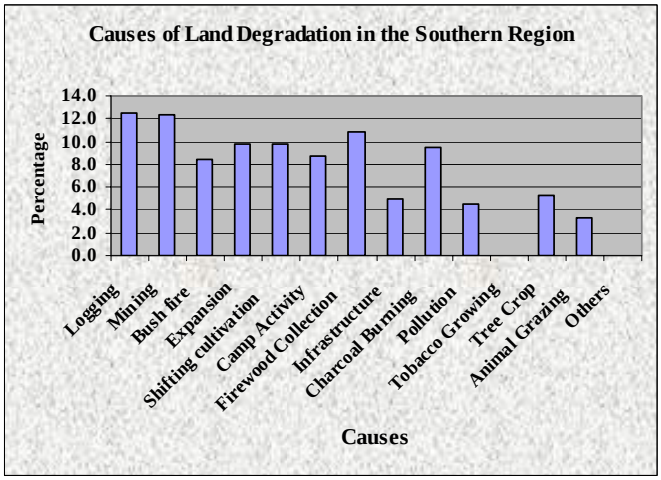


Fig. 9 Symptoms of Land degradation observed in the Southern Province.

Southern Province

Table: 6 Indirect causes of Land Degradation in the Southern Province (Sierra Leone)

CAUSE	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Weak institutions	16	15	3	7	41	10	8th
Misdirected Subsidies	10	11	14	6	41	20	6th
Corruption	3	3	22	11	39	33	3rd
Poor Administration	13	10	2	3	28	5	9th
Enforcement	0	7	10	11	28	21	4th
Undervaluation of resources	11	28	4	0	43	4	10th
Low Public Awareness	5	8	17	18	48	35	2nd
Extreme Poverty	0	8	24	18	50	42	1st
Inadequate and un-enforced labor rights	4	3	14	6	27	20	6th
Civil Conflict	7	1	10	11	29	21	4th
Total	**69**	**94**	**120**	**91**	**374**	**211**	
% Ranking	**18.4**	**25.1**	**32.1**	**24.3**	**100.0**		

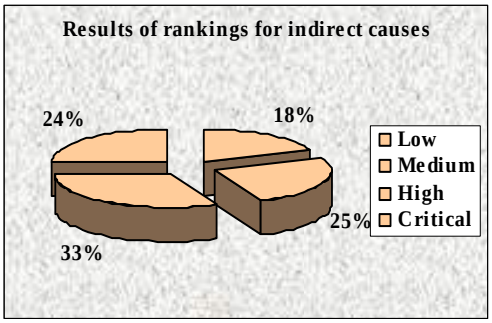


Fig. 10 Results of rankings for the indirect causes of Land Degradation in the Southern Province

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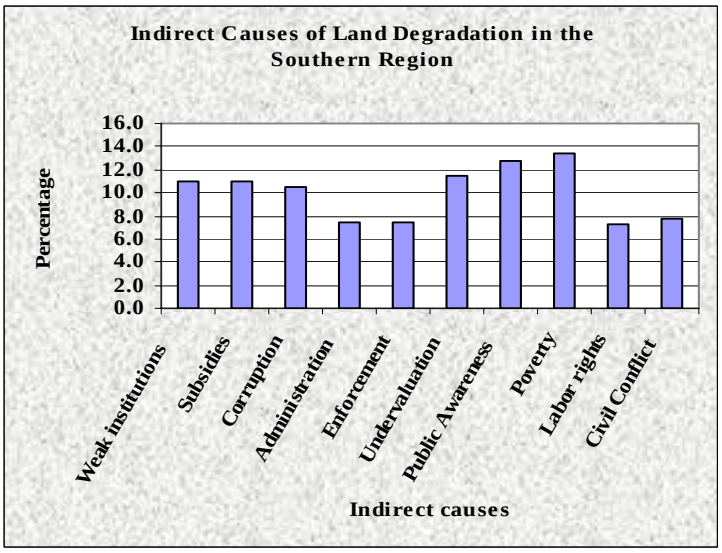

Fig. 11 Indirect causes Land degradation observed in the Southern Province.

Southern Province

Table 7. Symptoms of Land degradation in the Southern Province (Sierra Leone)

Symptoms	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Reduction in crop yield	5	5	37	3	50	40	1st
Reduction in fallow periods	12	5	21	12	50	33	3rd
Land use conflicts	16	12	13	5	46	18	8th
Siltation of river bed	7	10	14	1	32	15	9th
Deforestation	4	8	24	6	42	30	6th
Increased erosion	16	19	7	1	43	8	11th
Increased Poverty	0	14	26	9	49	35	2nd
Abandoned mined out areas	0	10	22	11	43	33	3rd
Loss of Biodiversity	5	9	12	19	45	31	5th
Loss of Ground cover	13	21	8	1	43	9	10th
Decrease of Palatable grasses	20	5	4	2	31	6	12th
High rate of rural-urban migration	2	10	21	3	36	24	7th
Others	0	0	0	0	0	0	13th
Total	**100**	**128**	**209**	**73**	**510**	**282**	

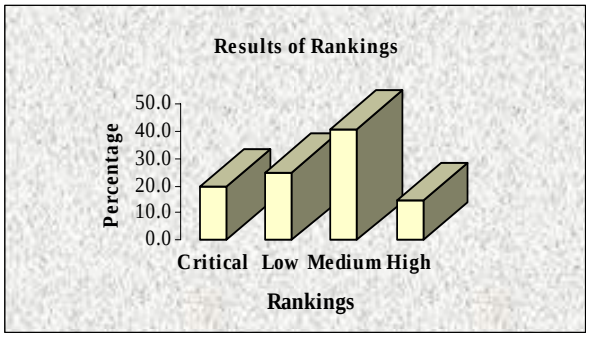

Fig. 12 Results of rankings for the symptoms of Land Degradation in the Southern Province

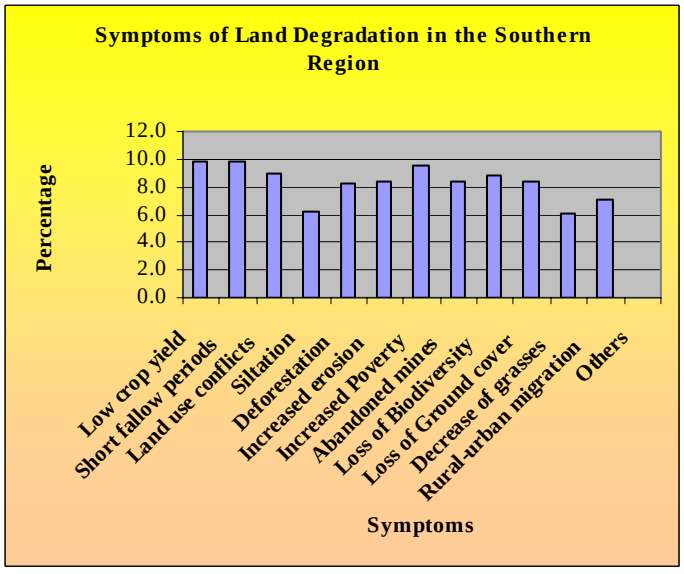

Fig. 13 Symptoms of Land degradation observed in the Southern Province.

Southern Province

Table: 8 Impact of sector activities on Land degradation in the Southern Province (Sierra Leone)

Sector	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Agriculture	0	18	26	0	44	26	2nd
Forestry	2	13	9	8	32	17	3rd
Mining	4	5	17	13	39	30	1st
Fisheries	17	12	2	0	31	2	4th
Manufacturing	8	0	0	0	8	0	Nil
Energy	8	3	1	1	13	2	4th
Tourism	13	0	0	0	13	0	Nil
Transport	0	6	0	0	6	0	Nil
Service	0	3	0	0	3	0	Nil
Total	**52**	**60**	**55**	**22**	**189**	**77**	

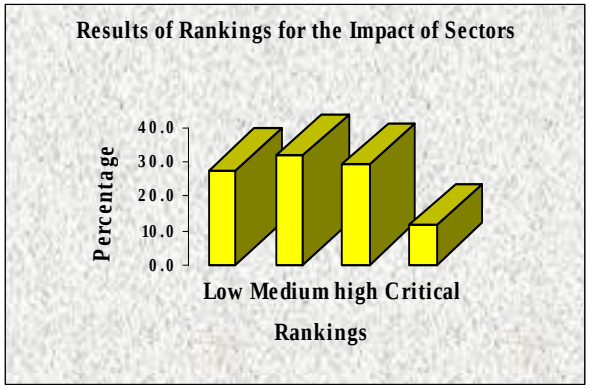

Fig. 14 Results of rankings for the impact of sector activities on Land Degradation in the Southern Province

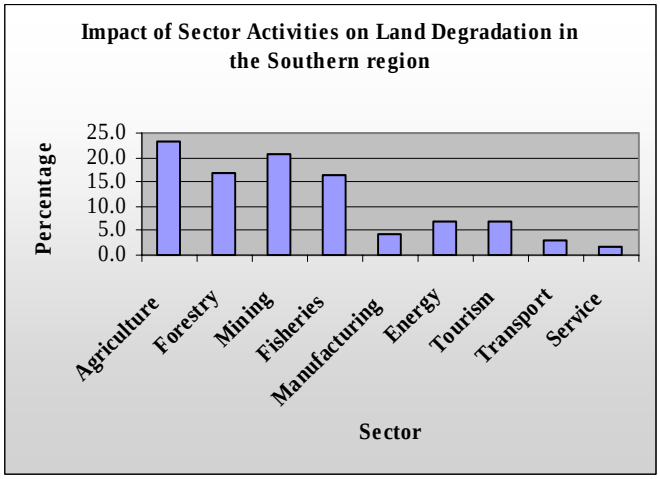

Fig. 15 Impact of sector activities on Land degradation Southern Province

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Southern Province

Table: 9. Suggested Land degradation reduction measure for the Southern Province (Sierra Leone)

Land Degradation reduction Measure	Score	Percentage
Proper Land use planning at all levels	242	13.3
Adoption of Good farming practices	199	10.9
Capacity building and institutional strenghtening	262	14.4
Reafforestation programmes	252	13.8
Grass root participation in environmental management	235	12.9
Program to combat wild bush fires	129	7.1
Rehabilitation of mined-out areas	205	11.2
National Environmental Awareness Campaign	300	16.4
Total	**1824**	**100.0**

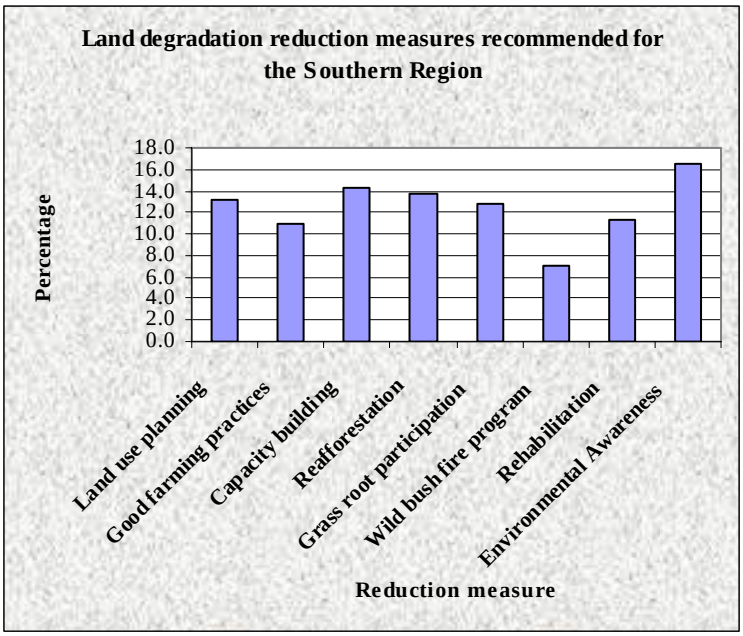

Fig. 16 Land degradation reduction measures recommended for the Southern Province

Eastern Province

Table: 10 Direct causes of Land Degradation in the Eastern Province (Sierra Leone)

Direct Causes	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Logging	4	7	27	12	50	39	3rd
Mining	8	12	18	7	45	25	7th
Wild bush fire	19	15	6	1	41	7	11th
Expansion of Settlements	9	12	21	1	43	22	8th
Shifting cultivation	4	9	30	0	43	30	6th
Refugee Camp Activity	4	11	33	0	48	33	5th
Firewood Collection	1	8	41	0	50	41	2nd
Infrastructure	18	15	9	0	42	9	10th
Charcoal Burning	6	7	35	2	50	37	4th
Pollution (Waste disposal)	3	6	12	2	23	14	9th
Tobacco Growing	0	0	0	0	0	0	12th
Tree Crop Plantation	3	4	41	1	49	42	1st
Animal Grazing	9	8	0	0	17	0	13th
Others	0	0	0	0	0	0	13th
Total	**88**	**114**	**273**	**26**	**501**		

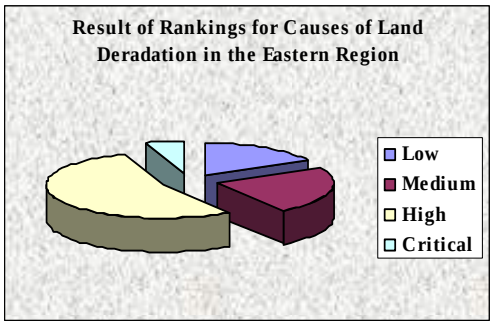

Fig.17 Result of rankings for the direct of land Degradation in the Eastern Province

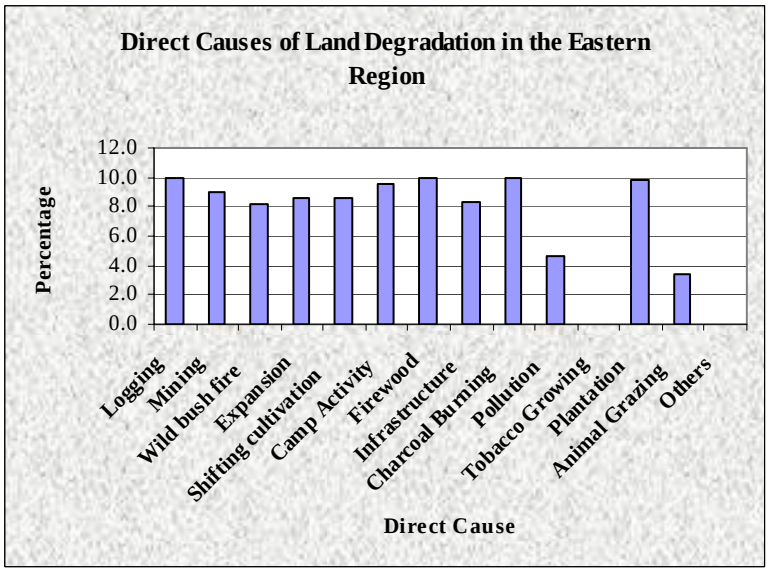

Fig.18 Direct causes of land Degradation in the Eastern Province

Table: 11 Indirect causes of Land Degradation in the Eastern Province (Sierra Leone)

Indirect causes	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Weak institutions	6	8	30	3	47	33	3rd
Misdirected Subsidies	0	17	41	8	66	49	2nd
Corruption	11	0	20	2	33	22	4th
Poor Administration	11	17	20	2	50	22	4th
Enforcement	28	17	4	0	49	4	9th
Undervaluation of resources	20	13	3	0	36	3	10th
Low Public Awareness	13	14	14	0	41	14	8th
Extreme Poverty	0	0	37	13	50	50	1st
Inadequate and un-enforced labor rights	10	10	16	0	36	16	7th
Civil Conflict	18	15	17	0	50	17	6th
Total	**117**	**111**	**202**	**28**	**458**	**230**	
% Ranking	**25.5**	**24.2**	**44.1**	**6.1**	**100.0**		

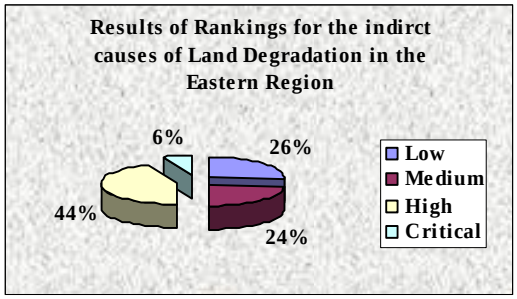

Fig.19 Result of rankings for the indirect cause of land degradation in the Eastern Province

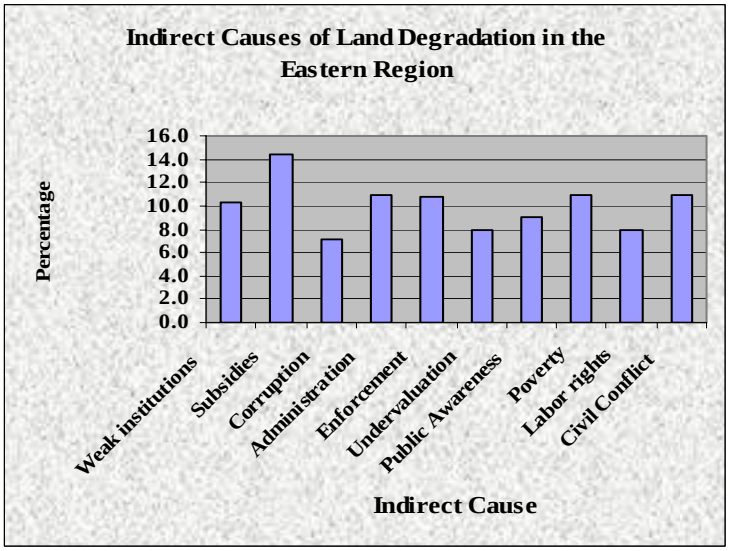

Fig.20 Indirect causes of land Degradation in the Eastern Province

Eastern Province

Table 12. Symptoms of Land degradation in the Eastern Province (Sierra Leone)

Symptoms	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Reduction in crop yield	0	0	28	6	34	34	3rd
Reduction in fallow periods	0	3	25	7	35	32	5th
Land use conflicts	1	8	18	3	30	21	8th
Siltation of river bed	22	5	6	0	33	6	9th
Deforestation	0	6	23	13	42	36	2nd
Increased erosion	0	6	18	5	29	23	7th
Increased Poverty	0	0	24	14	38	38	1st
Abandoned mined out areas	2	26	3	0	31	3	10th
Loss of Biodiversity	0	8	31	3	42	34	3rd
Loss of Ground cover	0	7	25	5	37	30	6th
Decrease of Palatable grasses	8	10	0	0	18	0	11th
High rate of rural-urban migration	9	10	0	0	19	0	11th
Others	0	0	0	0	0	0	11th
Total	**42**	**89**	**201**	**56**	**388**		

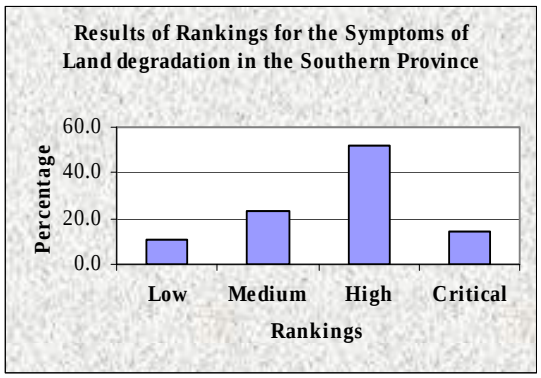

Fig. 21 Results of rankings for the symptoms of Land Degradation in the Eastern Province

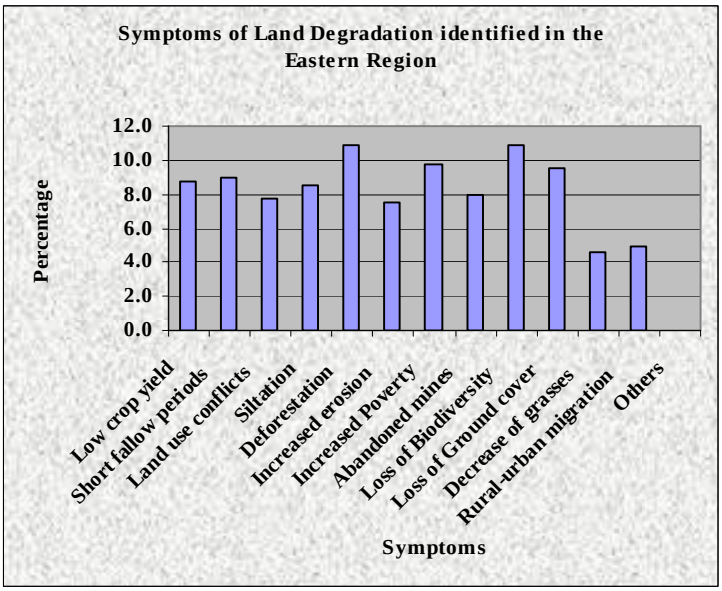

Fig. 22 Symptoms of Land degradation observed in the Eastern Province.

Eastern Province

Table: 13 Impact of sector activities on Land degradation in the Eastern Province (Sierra Leone)

Sector	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Agriculture	0	3	47	0	50	47	1st
Forestry	0	9	32	0	41	32	3rd
Mining	0	4	35	7	46	42	2nd
Fisheries	27	7	0	0	34	0	5th
Manufacturing	8	0	0	0	8	0	5th
Energy	12	10	21	0	43	21	4th
Tourism	9	0	0	0	9	0	5th
Transport	0	2	3	0	5	3	5th
Service	0	0	0	0	0	0	5th
Total	**56**	**35**	**138**	**7**	**236**		
% Rankings	**23.7**	**14.8**	**58.5**	**3**	**100**		

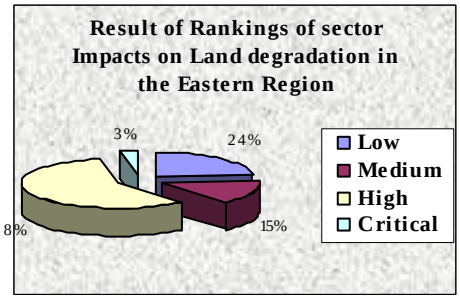

Fig. 23 Results of rankings for the impact of sector activities on Land Degradation in the Eastern Province

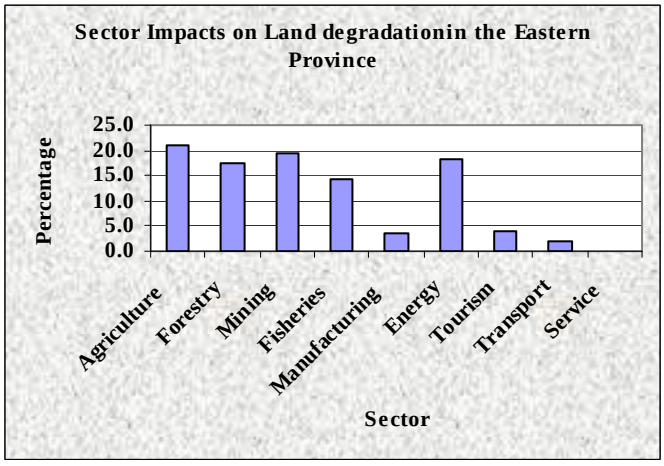

Fig. 24 Impact of sector activities on Land degradation Eastern Province

Eastern Province

Table: 14. Suggested Land degradation reduction measure for the Eastern Province (Sierra Leone)

Land Degradation reduction Measure	Score	Percentage
Land use planning	109	15.0
Good farming practices	85	11.7
Capacity building	86	11.8
Reafforestation	80	11.0
Grass root participation	80	11.0
Combat wild bush fires	79	10.8
Rehabilitation	107	14.7
Environmental Awareness	103	14.1
Total	**729**	**100.0**

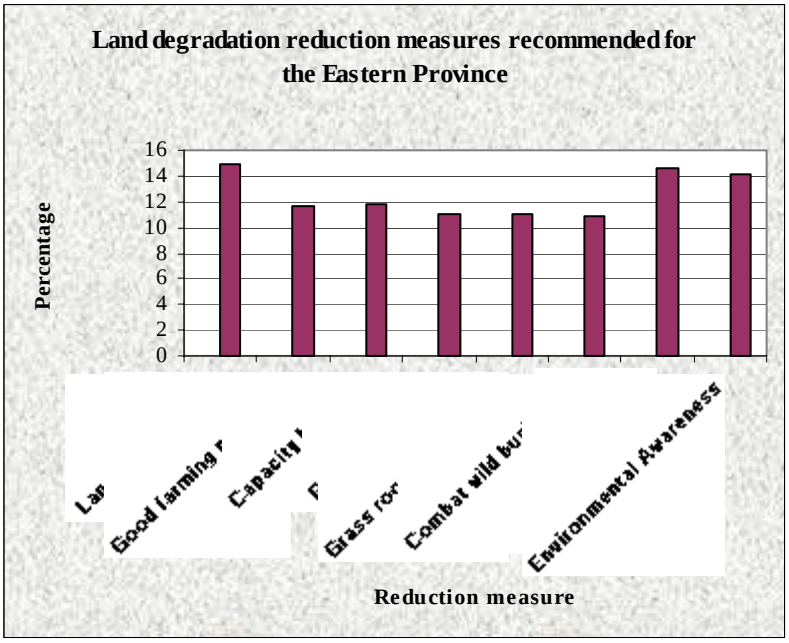

Fig. 25 Land degradation reduction measures recommended for the Southern Province

Northern Province

Table: 15 Direct causes of Land Degradation in the Northern Province (Sierra Leone)

Direct Causes	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Logging	4	9	34	3	50	37	1st
Mining	7	15	9	3	34	12	8th
Wild bush fire	1	3	13	2	19	15	5th
Expansion of Settlements	8	12	10	1	31	11	9th
Shifting cultivation	3	16	17	1	37	18	4th
Refugee Camp Activity	11	4	3	2	20	5	12th
Firewood Collection	2	9	29	3	43	32	2nd
Infrastructure	10	16	5	0	31	5	12th
Charcoal Burning	6	9	24	2	41	26	3rd
Pollution (Waste disposal)	8	6	14	1	29	15	5th
Tobacco Growing	14	7	5	1	27	6	11th
Tree Crop Plantation	11	13	6	4	34	10	10th
Animal Grazing	4	18	14	0	36	14	7th
Others	0	0	0	0	0	0	14th
TOTAL	**89**	**137**	**183**	**23**	**432**		
% Ranking	**20.6**	**31.7**	**42.4**	**5.3**	**100.0**		

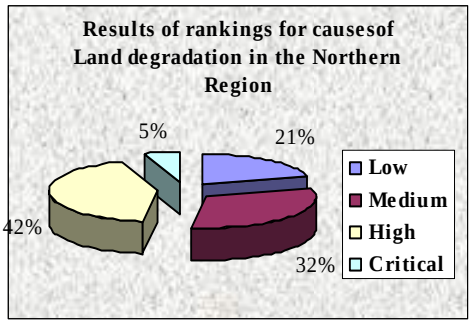

Fig.26 Result of rankings for the direct of land Degradation in the Northern Province

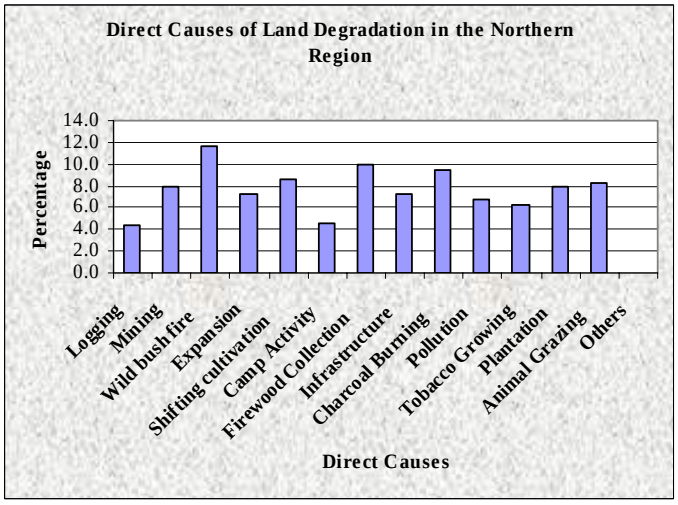

Fig.27 Direct causes of land Degradation in the Northern Province

Northern Province

Table: 16 Indirect causes of Land Degradation in the Northern Province (Sierra Leone)

Indirect Causes	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Weak institutions	8	13	15	3	39	18	7th
Misdirected Subsidies	9	7	20	1	37	21	3rd
Corruption	2	11	16	4	33	20	6th
Poor Administration	7	23	8	0	38	8	10th
Enforcement	13	6	16	5	40	21	3rd
Undervaluation of resources	9	10	20	1	40	21	3rd
Low Public Awareness	6	7	25	4	42	29	2nd
Extreme Poverty	2	3	24	12	41	36	1st
Inadequate and un-enforced labor rights	6	12	15	2	35	17	8th
Civil Conflict	13	11	9	1	34	10	9th
Total	**75**	**103**	**168**	**33**	**379**		
% Ranking	**19.8**	**27.2**	**44.3**	**8.7**	**100.0**		

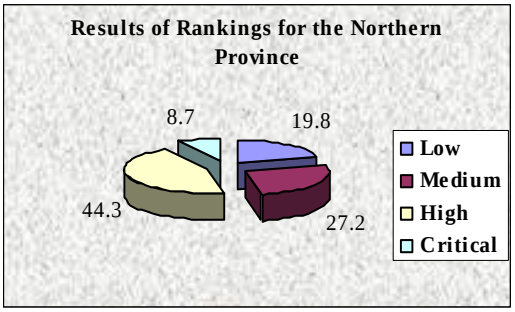

Fig.28 Result of rankings for the indirect causes of land Degradation in the Northern Province

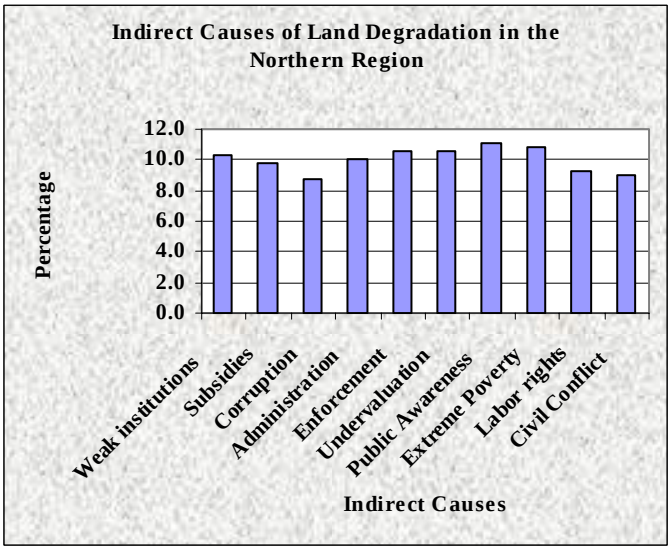

Fig.29 Indirect causes of land Degradation in the Northern Province

Northern Province

Table: 17 Impact of sector activities on Land degradation in the Northern Province (Sierra Leone)

Sector	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Agriculture	1	12	30	7	50	37	1st
Forestry	7	19	17	5	48	22	2nd
Mining	14	15	10	2	41	12	3rd
Fisheries	6	2	4	0	12	4	6th
Manufacturing	1	2	5	0	8	5	5th
Energy	4	8	9	1	22	10	4th
Tourism	2	1	1	1	5	2	7th
Transport	0	0	0	0	0	0	8th
Service	0	0	0	0	0	0	8th
Total	**35**	**59**	**76**	**16**	**186**		
% Ranking	**18.82**	**31.72**	**40.86**	**8.60**			

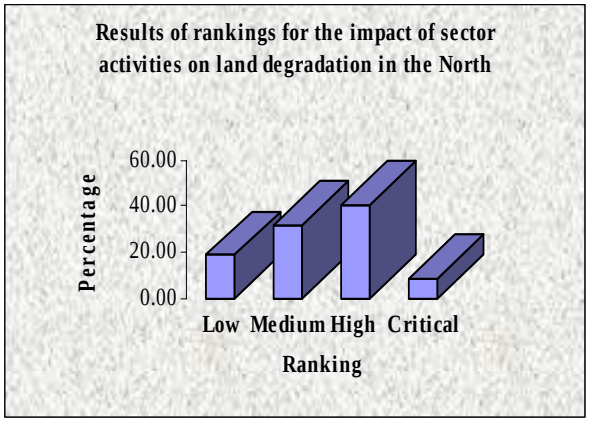

Fig.30 Results of rankings for the impact of sector activities on Land Degradation in the Northern Province

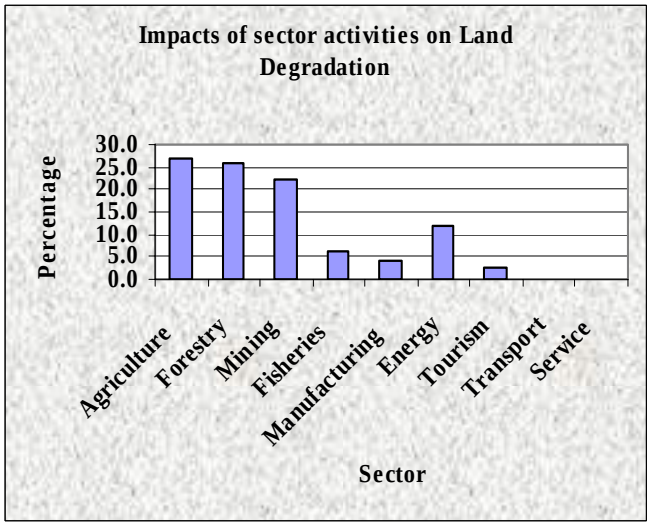

Fig. 31 Impact of sector activities on Land degradation Northern Province

Northern Province

Table: 18 Symptoms of Land degradation in the Northern Province (Sierra Leone)

Symptoms	Low (a)	Medium(b)	High(C)	Critical(d)	Total	Total (C&d)	Ranking
Reduction in crop yield	1	16	26	2	45	28	2nd*
Reduction in fallow periods	5	15	20	4	44	24	6th
Land use conflicts	11	10	20	0	41	20	8th
Siltation of river bed	17	12	7	2	38	9	12th
Deforestation	0	7	31	3	41	34	1st*
Increased erosion	0	15	27	1	43	28	2nd*
Increased Poverty	0	6	26	8	40	34	1st*
Abandoned mined out areas	12	14	11	3	40	14	10th
Loss of Biodiversity	2	14	11	3	30	14	10th
Loss of Ground cover	7	9	25	2	43	27	5th
Decrease of Palatable grasses	8	15	17	1	41	18	9th
High rate of rural-urban migration	4	7	21	2	34	23	7th
Others	0	0	0	0	0	0	13th
Total	**67**	**140**	**242**	**31**	**480**		
% Ranking	**14.0**	**29.2**	**50.4**	**6.5**	**100.0**		

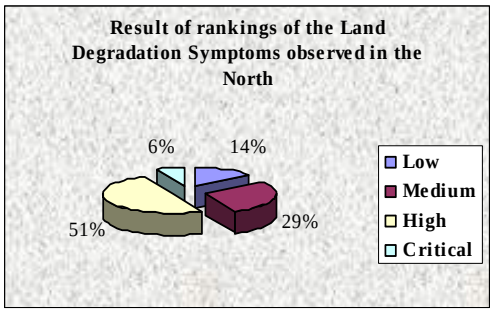

Fig. 32 Results of rankings of the symptoms of Land Degradation in the Northern Province

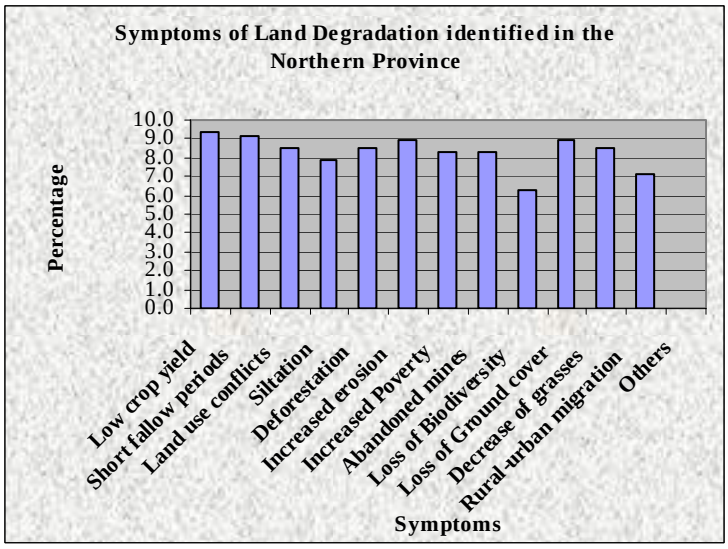

Fig. 33 Symptoms of Land degradation observed in the Northern Province

Northern Province

Table: 19 Land degradation reduction measures recommended for the Northern Province (Sierra Leone)

Land Degradation reduction Measure	Score	Percentage
Proper Land use planning at all level	85	8.6
Adoption of Good farming practices	105	10.6
Capacity building and institutional strenghtening	148	14.9
Reafforestation	160	16.1
Grass root participation Environmental Management	117	11.8
Combat wild bush fires	163	16.4
Rehabilitation	108	10.9
Environmental Awareness	106	10.7
Total	**992**	**100.0**

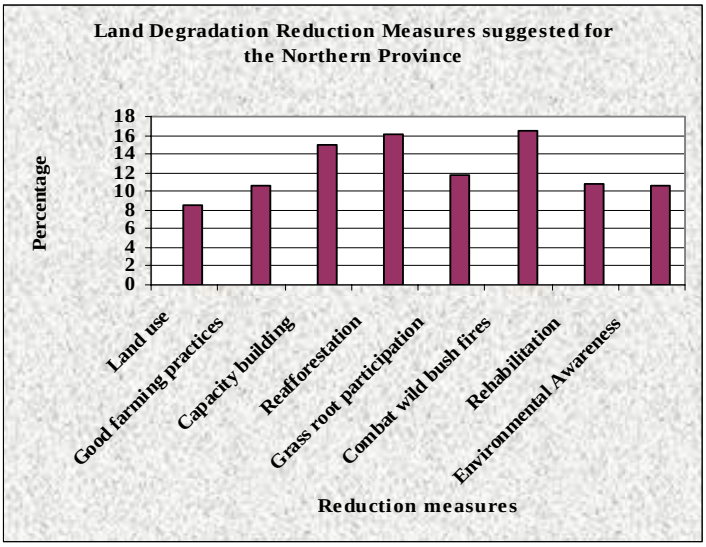

Fig. 34 Land degradation reduction recommended for the Northern Province