GEF COUNTRY PORTFOLIO STUDY

SIERRA LEONE (1998-2013)

Final Report

Volume 2

Unedited

June 2014

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TECHNICAL DOCUMENT A

Country Environmental Legal Framework

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Acronyms

CBD	Convention on Biological Diversity
CELF	Country Environmental Legal Framework
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EPA-SL	Environmental Protection Agency – Sierra Leone
GEFIEO	GEF Independent Evaluation Office
HCFC	Hydro-chlorofluorocarbon
LDC	Less Developed Country
MAFFS	Ministry of Agriculture, Forestry and Food Security
MLWRC	Magbosi Land and Water Research Centre
MLCPE	Ministry of Lands, Country Planning and Environment
MMRF	Ministry of Marine Resources and Fisheries
NaCEF	National Commission on Environment and Forestry
NAPA	National Adaptation Program of Action
NBSAP	National Biodiversity Strategy and Action Plan
NEAP	National Environmental Action Plan
NEP	National Environmental Policy
NIP	National Implementation Plan
NLP	National Land Policy
ODS	Ozone Depleting Substances
POP	Persistent Organic Pollutant
ROtI	Review of Outcomes to Impacts
RSPB	Royal Society for the Protection of Birds
SIDS	Small Island Developing State
SLARI	Sierra Leone Agricultural Research Institute
SLM	Sustainable Land Management
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization

1. Introduction

In all Country Portfolio Evaluations (CPEs) conducted by the GEF Independent Evaluation Office a contextual analysis is conducted to provide the legal, policy, and institutional context in which the GEF projects have been developed and implemented. The analysis is based on information of a country's environmental legislation and environmental policies (plans, strategies and others) as well as of the international agreements/conventions signed by the country, presented and analyzed through time, since the start of GEF activities to date.

There are a significant number of national legislations in Sierra Leone that are designed to regulate conduct in the environment and natural resources management areas that were enacted before the onset of GEF activities in Sierra Leone in 1996. Most are still relevant to the situation today. However, they are scattered and piecemeal, and are often difficult for officials to comprehend and operate. They relate to forestry, agro-biodiversity, marine biodiversity, wildlife management, fisheries management, extractive industry and minerals extraction. General environmental management is covered by the National Environmental Policy (NEP) of 1994 and the National Environmental Protection Act (NEPA) of 2000[1] prepared with the assistance of the World Bank. Notwithstanding the level of comprehensiveness of most of these early frameworks, they lack strength because they lag behind current best practices and approaches to resource management and conservation.

2. Institutional Arrangements

Until recently, the key public institutions responsible for forestry and wildlife, biodiversity conservation and environmental protection and management in Sierra Leone were the Forestry and Environment Departments of the Ministry of Agriculture, Forestry and Food Security (MAFFS), Ministry of Lands, Country Planning and Environment (MLCPE), and Ministry of Marine Resources and Fisheries (MMRF). In 2005, however, the Government of Sierra Leone, as per an executive directive, established a National Commission on Environment and Forestry (NaCEF), which took over the responsibilities and oversight of the three Ministries mentioned above. NaCEF was executive in nature and mandated to provide policy advice and be involved in project implementation, environmental monitoring and priority setting. It has now been replaced by the National Environmental Protection Agency (EPA).

Environmental Protection Agency (EPA-SL)

The EPA-SL was established by an Act of Parliament in 2008, amended in 2010, to provide for the effective protection of the environment and for other related matters. Its principal functions include, among others: advising the Minister of Lands and Environment on the formulation of policies on all aspects of the environment and in particular making recommendations for the protection of the environment; co-ordination of the activities of bodies concerned with the technical or practical aspects of the environment and serve as a channel of communication between such bodies and the Minister; co-ordination of the activities of such bodies as it considers appropriate for the purposes of controlling the generation, treatment, storage, transportation and disposal of industrial waste; and promoting effective planning in the management of the environment. The National Climate Change Committee (NCCC) was

[1] Government of Sierra Leone (2000) *The Environment Protection Act*. Available: http://www.sierra-leone.org/Laws/2000-2.pdf

established in May 2011 and was tasked to develop a national climate change policy and related strategy.[2] The EPA-SL, with facilitation from the NCCC, established a National Secretariat for Climate Change (NSCC) in 2012, to provide guidance and direction for the formulation of national climate change policy and strategies in line with the Country's PRSP, the *Agenda for Prosperity (2013-2018)*[3]. The Chief Executive of the EPA-SL is the GEF Political Focal Point and one of its Program Directors is the Operational Focal Point.

Ministry of Agriculture, Forestry and Food Security (MAFFS)

The MAFFS is the main institution responsible for regulating and promoting the development of the agricultural sector. It is mandated with the management of protected areas through the National Forestry Policy of 2004. The Forestry Division is responsible for executing provisions of the Forest Law for all state and some chiefdom forests. The Division is also mandated to encourage management planning in all forests, emphasizing agro-forestry, fuel wood management, watershed protection, collection of baseline data on forest reserves and forest biodiversity, monitoring and protection of improved forests and bush fire control. The Wildlife Conservation Unit has the mandate to manage the Nation's protected areas and implement the provisions of the Wildlife Conservation Act. The Land and Water Development Department has a mandate to create an enabling environment for increased food production through sustainable development and utilization of land and water resources.

Ministry of Lands, Country Planning and Environment (MLCPE)

The MLCPE was established to serve as the main body for the implementation of environmental policy, including the sustainable management of land resources in Sierra Leone. MLCPE is also in charge of overall land administration in the country. The overall policy objectives of the Ministry include the enhancement of balanced land administration, use, planning, management, development and control. It also performs the general role of administering real estate, the territorial inventory (cadastre) and visualization of geographical territorial information (geodesy and cartography).

Ministry of Transport and Aviation (Meteorology Department)

The Meteorology Department is charged with three mutually exclusive functions: (a) to ensure the safety and general welfare of citizens through the timely provision of weather and climatology services; (b) to collect and collate historical meteorological and climate data for record and research proposals; and (c) to honor international obligations. Additional responsibilities were later added, which include: (a) to contribute to the socio-economic (including agricultural, marine, etc.) development of the Country; (b) to ensure maintenance of the quality of the Nation's environment; and (c) to carry out climate change related activities.

Ministry of Mineral Resources (MMR)

The MMR controls all mining activities with the recently established National Minerals Agency (2012). It has developed a mining policy and legislation, which make provisions for the rehabilitation of mined-out areas, ensuring that prospecting, exploitation, mining and processing of mineral resources proceed in an environmentally sound manner

[2] Bah, M. A. (2012) *Overview of Climate Change Policy Development in Sierra Leone.* Presentation. Available: http://www.gcca.eu/sites/default/files/GCCA/Workshop_Western-Eastern%20Africa_Presentation3_SierraLeone_Momodu%20Alrashid%20Bah.pdf

[3] Government of Sierra Leone (2013) *The Agenda For Prosperity: Road To Middle Income Status (2013-2018)*. Available: http://www.sierra-leone.org/Agenda%204%20Prosperity.pdf

Sierra Leone Agricultural Research Institute (SLARI)

The SLARI was established by an Act of Parliament in 2007. SLARI is an independent agricultural institution with the responsibility to develop valuable technologies that can address the problems facing the farming, fishing, forestry and livestock sectors. SLARI has four core functions: (a) to conduct agricultural research; (b) to generate information and knowledge; (c) to strengthen capacity; and (d) to promote advocacy. When fully operational, SLARI is planned to comprise of eight research centers, including the Magbosi Land and Water Research Centre (MLWRC), charged with contributing to food security and wealth by enhancing long-term productivity of land and water resources.

Private sector

The private sector does not currently have the capacities for effective management of natural resources. These limitations within the private sector limit opportunities for both wholesale outsourcing of management responsibilities and 'public private partnerships' (PPPs). Until recently, no conscious efforts were made by the Government to include the private sector in resource management except under licensed exploitation.

Universities

The Universities have an acceptable level of human and technical resources to assist in developing and managing, effectively and sustainably, the natural resources of the Country. The two main universities, Fourah Bay and Njala, run courses in agriculture, forestry, wildlife and fisheries management, and conduct environmental studies and research into various aspects of natural resources management. Lack of financial resources, however, has limited the extent to which they can engage.

International and local non-governmental organizations (NGOs)

International and local NGOs have committed resources to natural resources management in Sierra Leone and are actively involved in decision-making, policy formulation and implementation of programs towards wildlife protection and biodiversity conservation. In general, capacity among local NGOs is low compared to their international counterparts, most of which work through local organizations. Prominent NGOs working in the environment and natural resource sectors include the Environmental Foundation for Africa, Friends of the Earth Sierra Leone, the Conservation Society of Sierra Leone (a Birdlife international partner in Sierra Leone), Birdlife International, Conservation International, and the Royal Society for the Protection of Birds (RSPB) (an international birdlife partner in the UK). Unfortunately, there is a dearth of information on the existence and capacity of community-based organizations (CBOs) in rural Sierra Leone.

3. Legislation on Biodiversity

Legislations relating to biological resources have traditionally been split amongst a number of statutes, many of them covering other materials with little to do with the area of conservation. However, this has changed as international concern for and the political importance of the conservation of natural resources has gained momentum. In Sierra Leone, this has been substantiated by the enactment of the Environment Protection Act (2000), in which an attempt was made to make provision for the effective protection of the environment and the institutional and administrative machinery for its implementation. This has since been updated by the National Environment Protection Act (NEPA) of 2008.

Legislation dealing with biological diversity, all of which except the NEPA were enacted before the GEF began supporting Sierra Leone, can be classified under three categories.

a) Laws dealing with agro-biological diversity;
b) Laws dealing with forestry biological diversity; and
c) Laws dealing with coastal and marine biological diversity

The Provinces Land Act Cap 122 (1960) on land tenure, the Wildlife Conservation Act (1972), the Forestry Act (1988) and the Fisheries Management and Development Act (1996) form the current basis for the conservation of biodiversity in the Country. Some of the provisions of these legislations are insufficient, obsolete and crucially the institutions set up to implement them lack the human resources capacity to effectively implement the provisions contained therein.

Agro-Biological Diversity

There are several piecemeal legislations on agriculture but notable amongst them is captioned "An ordinance for the control and Preservation of Agricultural Produce" (1946). Shortly after its enactment, several rules and regulations were promulgated to fulfill the legislation's intended purpose. These rules include: the Plant Pests Import Rules; Plant Pests Inspection of Crop Rules; Movement of Rice Restriction Rules; Noxious Weed Control Rules; Cocoa Movement Control Rules; and the Locusts Destruction Rules. Apparently this ordinance and its related rules were enacted primarily for the control and preservation of agricultural produce with very little or no provision for the conservation of agricultural lands. In 1960, this ordinance and its piecemeal regulations were embedded in Cap 185 and incorporated into the laws of Sierra Leone in 1960. This ordinance empowered the Governor to make rules for the effective control and preservation of agricultural produce subject to the approval of Parliament. The Director of Agriculture was the titular head of the Department of Agriculture for the implementation of these regulations. This ordinance remained in force until enactment of the Produce Inspection Rules and the Plant Phyto-sanitary Import Rules in 1974 and 1975 respectively. These latter legislations made minor amendments regarding the nomenclature and designation of officials, licenses for and penalty provisions of Cap 185. In spite of these minor amendments, Cap 185 is still regarded as the substantive law governing the control and preservation of agricultural produce in Sierra Leone.

Forest Biological Diversity

The second category of legislation dealing with biodiversity in Sierra Leone relates to forestry and wildlife conservation. The relevant legislation in this respect is the Forestry Ordinance Cap 189 (1960). This legislation consolidated the 1942, 1946 and 1955 forestry rules. Under this legislation the Chief Conservator of Forests was entrusted with the task of forest management to be assisted in the exercise

of his functions by the tribal authority of the respective chiefdoms in which the forest reserves are situated. This legislation established 42 forest reserves throughout the country. Laws relating to bush fire prevention were also enacted in 1932 and the provisions contained therein are now incorporated in Cap 190 (1960). The wild animals – birds and fish – preservation legislations were also enacted and are now incorporated in Cap 194 (1960). Cap. 194 made provisions for the prohibition of hunting in protected forests except with a valid license, it further requires holders of licenses to observe native rights and to deposit security in order to ensure compliance with the dictates of the license. The legislation entrusted the Director of Forestry together with other officials of the Forestry Department with the task of preserving the forest reserves. Cap 194 also contains mandatory provisions prohibiting the exportation of wild animals from Sierra Leone except through the port of Freetown.

This was the state of the law on forest biodiversity until the Wildlife Conservation Act (1972) was enacted. The title of this legislation describes it as "Being an Act to make further and better provisions for the control of fauna and flora of Sierra Leone and to give effect to the Convention Relative to the Preservation of Fauna and Flora in their Natural State (1933)" as amended by the International Convention for the Protection of Fauna and Flora of Africa of 1953. This legislation established significant provisions for the conservation of wildlife ranging from the constitution of strict nature reserves, national Parks, and prohibition of hunting generally, except with a valid License and/or permit. The Act also contains enforcement and penalty provisions. This legislation marked a tremendous development for the conservation of wildlife in Sierra Leone and it is the current law on the conservation of wildlife in the country.

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

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

Coastal and Marine Biological Diversity

Legislation dealing with fisheries and fishing industries abound, but the notable and earliest amongst them was enacted in 1932, the Fisheries Control and Preservation Act. Now incorporated in Cap 195 (1960), the provisions in this legislation include the requisite licenses fees for motor fishing vessels, prohibition on the use of certain trawl nets, provisions relating to prohibited areas for fishing, measurement of baselines, and enforcement. It is worth noting that Cap 195 was the prevailing law on the control and preservation of fisheries from its inception until 1988. With the passage of time this legislation became obsolete and the need was felt for a new legislation to rid the Country of its anachronisms and obsolescence. This eventually led to the enactment of the Fisheries Management and Development Act of 1988 and the Fisheries Regulations of 1990. This legislation and its subsequent regulations, to a large extent, made a partial improvement to the conservation of marine resources.

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

GEF Support

In fulfilling Sierra Leone's obligations under the Convention on Biological Diversity, the Government has prepared the National Biodiversity Strategy and Action Plan (NBSAP) with GEF support (GEF ID 1289), which outlines two broad categories of biodiversity conservation strategies:

- **Sectoral strategies**, which cover wildlife, forests, biological diversity, agricultural biological diversity, inland water biological diversity and marine and coastal biological diversity.
- **Cross-sectoral strategies**, which cover policy, legislation, capacity building, public participation, planning, monitoring, sustainable use principles, incentive opportunities, research and training, public education, impact assessment, access to technology, information exchange, benefit distribution, indigenous knowledge and financial resources.

4. Legislation on Land Degradation and Sustainable Land Management

Important legislative actions related to land degradation, sustainable land management (SLM) and natural resource management in Sierra Leone are the National Environmental Policy (2002), the National Environmental Action Plan (2002), the National Land Policy (2004) – all of which were prepared with support from the World Bank – the National Energy Policy and Strategic Plan (2009), and the Mines and Minerals Act (2009).[4] In 2002, the National Steering Committee submitted the First National Report on the implementation of the UNCCD to the Conference of Parties (CoP).

National Environmental Policy (NEP)

The NEP (2002) is the background document for environmental management efforts in the country. It defines the general principles and approaches that should be adopted by any sector of government, the private sector or individual that is undertaking any activity that may affect the environment. As it relates to sustainable land management, the NEP sets out the objective to achieve sustainable development in Sierra Leone through sound environmental management. The overall goal has a strong orientation towards sustainable land management (SLM). It is to use available land in such a way that its quality is conserved so as to enhance its potential for continuous productivity and to prevent degradation.

The NEP objectives include encouragement for the adoption of a land tenure system that ensures security of tenure with a view to promoting the conservation of agricultural and forest land; to improve the traditional system of shifting cultivation and encourage alternative farming systems; to re-organize traditional grazing systems so as to limit environmental degradation from over-grazing, to establish irrigation schemes which significantly reduce salinization and acidification; to regulate agriculture mechanization in order to reduce soil erosion; to developing sustainable agro-forestry techniques for use by farmers in the rural areas and to encourage soil improvement measures.

National Environmental Action Plan (NEAP)

The NEAP (2002) offers concrete actions for integrating environmental issues into development planning. It consists of a series of reports and recommendations on natural resources management, urban management, gender and the environment, and environmental information, education and training. It ranks categories of environmental interventions, prioritizes environmental problems and ranks the actions according to their contributions to sustainable development. The NEAP lays emphasis on tenure arrangements as they affect the sustainable management of land. It maintains that tenure security is perhaps the single most important incentive to prudent management of land resources. It sees insecurity of tenure as resulting in abuses and/or misuses of land. The issue of conservation is linked to the duration of tenure. Tree and soil conservation require that the custodians of lands have an incentive to invest in their long-term future: to plant trees, to build terraces where needed, and to conserve water demand, sacrificed today so that benefits will be yielded in the future

National Land Policy (NLP)

The NLP (2004) is to ensure "the judicious use of the nation's land and its natural resources by all sections of the Sierra Leone society". The policy framework ensures "equal opportunity of access to land and security of the people in order to maintain a stable environment for the country's sustainable social

[4] GEF (2007) *Project Document: Capacity Building for Sustainable Land Management in Sierra Leone (GEF ID 3510)*.

and economic development". Implementation of the Land Policy within the domain of SLM involves "ensuring sustainable land use and enhancing land capacity and land conservation". Because of the sensitivity surrounding land issues however, there has been slow progress in the implementation of the NLP.

National Energy Policy

The main goal of the policy is "to meet the energy needs of the Sierra Leone population by establishing efficient energy production…and end user systems in order to contribute to social and economic development in an environmentally sustainable manner". In Sierra Leone, the unsustainable harvest of wood fuels from forest areas is a major contributing factor to local deforestation. The strategies towards household energy include: measures that will obviate the need for wasteful use of land to reduce the pressure on scarce forest resources; measures that focus on reforestation; and awareness raising campaigns to improve environmentally friendly production and domestic utilization of technology.

The Mines and Minerals Act

This Act (2009) demonstrates a significant awareness that mining activities adversely affect the environment and recognizes the need for mitigating actions to redress the degradation caused by mining. Mining activities undertaken by large mining companies are a major cause of deforestation and land degradation through loss of forest cover across large areas, soil erosion, siltation and contamination of river systems and tidal creeks, and displacement of villages. Heavy siltation of riverbeds and tidal creeks reduces coastal coral and fish populations. Small scale or artisanal mining of diamonds and gold in the eastern and northern parts of the County is also a major cause of forest cover loss and land degradation. The Act requires the rehabilitation of mined over lands. The Government has now set up a special fund, the Consolidated Fund, from fees and taxes imposed on mine operators for the reclamation of mine spoils.

GEF Support

The GEF co-financed the UNDP executed project, "Capacity Building for Sustainable Land Management in Sierra Leone" (GEF ID 3510), which aimed to reform certain legislation under the following:

- **Outcome 2:** Sustainable Land Management is mainstreamed into policies, laws, programs, budgets and regulatory frameworks. The main outputs under this component related to a) defining the legal and/or regulatory framework for participatory SLM systems for mangroves, wooded savannas, woodlots and fallows including participatory fire management of fallows as appropriate, and b) the integration of SLM/participatory forest management into university curricula. The finalization of the NAP would provide inputs for the needed reforms. Policy, budgetary and procedural mainstreaming would secure internal funding allocations to SLM.

- **Output 2.2:** Community-based forest and fire management laws and regulations would be developed. Near the mid-point of the project, and based on the project field experience, proposed changes to the legal and regulatory framework for participatory forest and fire management would be submitted to the Government to provide a strong basis for the widespread replication of community-based forest and fire management.

However, as indicated in the ROtI (see Technical Document C), none the outputs and outcomes above had been achieved by the end of the project in December 2012.

5. Legislation on Persistent Organic Pollutants (POPs)

The status of the twelve POPs listed in the annexes of the Stockholm Convention on Persistent Organic Pollutants are listed in Table 1 below.

Table 1. Legal Status of POPs in Sierra Leone

Compound	Legal Status	Date of effect
Aldrin	Banned *	28 August 2000
Chlordane	Banned *	28 August 2000
DDT	Banned *	28 August 2000
Dieldrin	Banned *	28 August 2000
Endrin	Banned *	28 August 2000
Heptachlor	Banned *	28 August 2000
Mirex	Banned *	28 August 2000
Toxaphene	Banned *	28 August 2000
Hexachlorobenzene	Banned *	28 August 2000
PCBs	Banned *	28 August 2000
Dioxins and Furans	No inventories and measurements have been conducted	

The bans were apparently approved by the Cabinet of Ministers on June 20th 2000.[5] However, there is no evidence that the Cabinet decision has been promulgated into law. With the assistance of GEF, the National Implementation Plan (NIP) was produced in 2008 (GEF ID 2486). As part of the NIP preparation process, UNIDO contracted the services of an environmental lawyer to assist Sierra Leone in drafting a legislation that is specific to industrial and agricultural chemicals. This would enable the Country to implement the provisions of the Stockholm Convention, which it acceded to on September 26th 2003. The National Implementation Plan (NIP) was aimed to reduce or eliminate the use of POPs by 2025. The NIP Action Plan has a section on the institutional policy and regulatory framework which calls for:

- Enacting laws to govern POPs chemicals management
- National POPs Centre, including laboratory, equipment, logistics, etc.
- Harmonization of policies at sub-regional level to enhance regional inspection at entry points
- Development of a national monitoring plan for effective evaluation
- Domestication of the Stockholm Convention into the national legal instruments
- Capacity building, recruitment and training
- Financial resource mobilization (at national and international levels)
- Technical assistance provision under the Multilateral Environmental Agreements (MEAs)

However, since the development of the NIP, no action seems to have been taken in promulgating any laws on POPs.

[5] GEF (unknown) *Project Document: Enabling activities to facilitate early action on the implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) in Sierra Leone (GEF ID 2486)*

6. Legislation on Ozone Depleting Substances (ODS)

None of the GEF interventions in Sierra Leone relate to legislation on ODS. Sierra Leone's ODS regulations were originally issued in 2008 as a section in the Environment Protection Act. A subsequent revision, incorporating further control measures on the phase-out of ODSs, including HCFCs, came into force on April 1st 2011. The regulations identify the following measures:

- Restriction on imports and exports of controlled substances
- Controls on applications for permits
- Control on storage facilities and disposal of controlled substances
- Prohibition of venting of controlled substances into the atmosphere
- Control of toxic and hazardous substances
- Entry of premises and protection of officers.

The regulations are implemented by, *inter alia,* the Environment Protection Agency (EPA), the National Revenue Authority, the Standards Bureau, the Ministry of Agriculture, Forestry and Food Security (MAFFS), the Ministry of Trade and Industry, the Police Force, and the Refrigeration Engineers Technicians Association. The Hydro-chlorofluorocarbon (HCFC) phase-out management plan was launched in June 2012 by the Ozone Department of the EPA-SL. Furthermore, the EPA-SL has also formed a committee that will work towards this phase-out in the country.[6]

7. International Environmental Agreements

Sierra Leone is a signatory and a party to various regional and international treaties and agreements, which are related to the environment and natural resources management. The country became a signatory to most of the Conventions before the commencement of GEF support in 1996. In many cases, accession to the conventions is a prerequisite for GEF funding eligibility. Key international conventions to which Sierra Leone is a signatory or has ratified are listed in Table 2 (also see Figure 1).

Table 2. International Environmental Conventions and Protocols

Convention or Protocol	Date
United Nations Framework Convention on Climate Change (UNFCCC)	June 22nd 1995 (rat.)
United Nations Convention to Combat Desertification (UNCCD)	Sep 25th 1997 (rat.)
Convention on Biological Diversity (CBD)	-
Stockholm Convention on Persistent Organic Pollutants (POPs)	Sep 26th 2003 (acc.)
Vienna Convention for the Protection of the Ozone Layer	Aug 29th 2001 (acc.)
Montreal Protocol on substances that Deplete the Ozone Layer	Aug 29th 2001 (acc.)
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	-
United Nations Convention on the Law of the Sea (UNCLOS)	Dec 12th 1994
Convention on the Protection of the World Cultural and Natural Heritage	Jan 7th 2005 (rat.)
Convention on International Trade in Endangered Species of Wild Fauna and Flora	Oct 28th 1994 (acc.)

[6] Dumbuya, I. (2013) 'Environment Protection Agency sets Committee to help phase-out Hydro-chlorofluorocarbons in Sierra Leone'. *Standard Times Press*. Available: http://standardtimespress.org/?p=3480

Ramsar Convention on Wetlands (contracting party)	April 13th 2000
Convention on the African Migratory Locust	1962
Abidjan Convention for Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region	1981
Bamako Convention on the Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa	Dec 9th 2003 (sig.)

8. The Evolution of the Legal Framework and GEF Support

Figure 1 shows the chronological relationship between GEF interventions and national policies and commitments to international conventions and agreements. The country has yet to sign the Basel and Rotterdam Conventions

The ten year civil war between 1992 and 2002, disrupted most government programs, including GEF activities, so there was a break in activities between the signing of the United Nations Framework Convention on Climate Change (UNFCCC), United Nations Convention on Biodiversity (UNCBD) and the United Nations Convention to Combat Desertification (UNCCD) between 1995 and 1997, and the signing of most of the other conventions and protocols starting in late 2001.

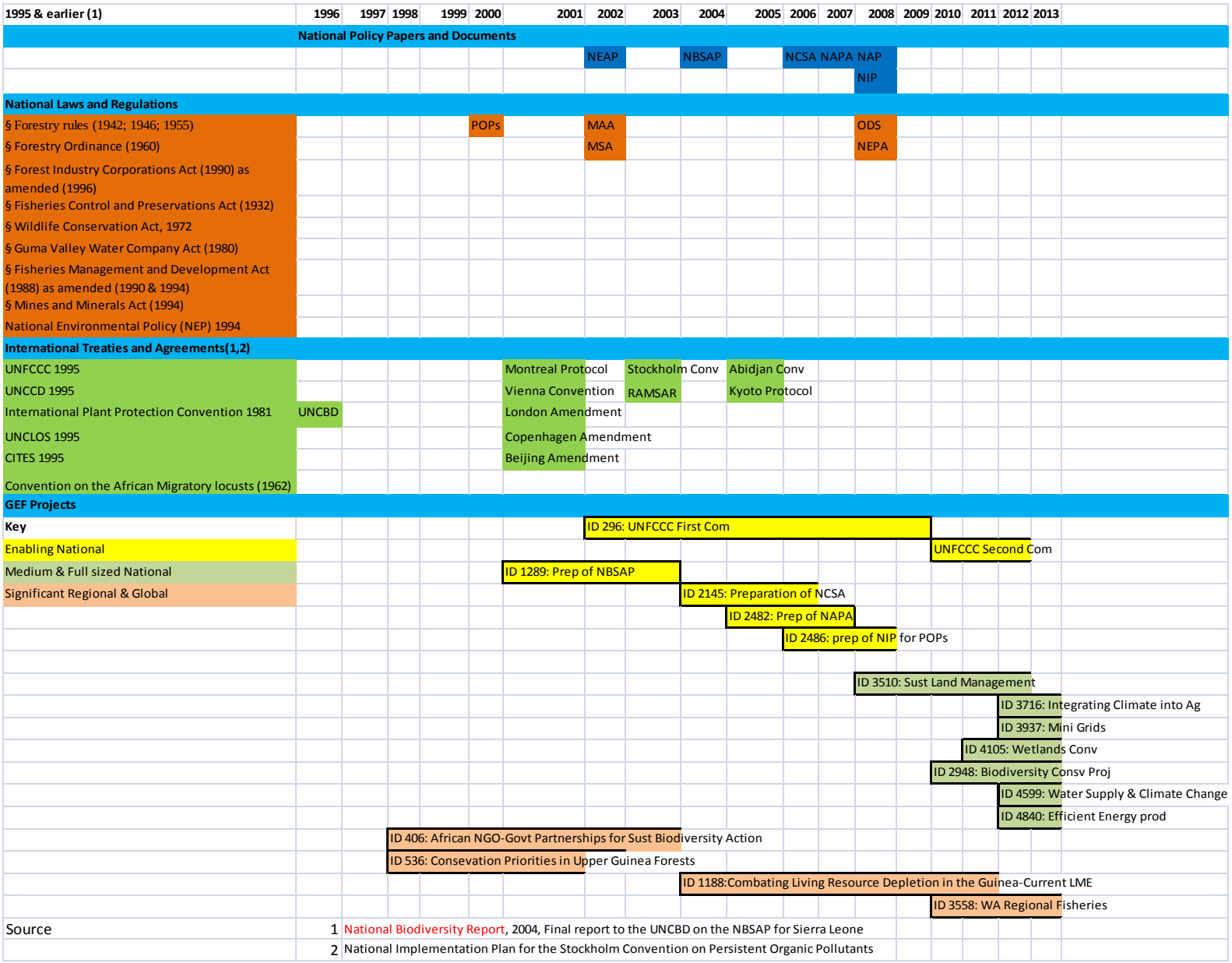
The GEF began its support to Sierra Leone in 1996, with the pipeline entry of the project to support preparation of the First National Communication to the UNFCCC (GEF ID 296). However, because of the disruption caused by the Civil War, the project could not become effective and start implementation until the end of the war in 2002. That and the other GEF enabling activity projects were therefore implemented after the end of the war, between 2001 and 2008 (see Figure 1 for dates). They have resulted in the preparation of consolidated national environmental strategies and plans, including:

- **2004** National Biodiversity Strategy and Action Plan (NBSAP)[7]
- **2006** National Capacity Self-Assessment and Action Plan (NCSA)[8]
- **2007** National Adaptation Programme of Action for Climate Change (NAPA)[9]
- **2008** National Implementation Plan on POPs (NIP)
- 2008 National Action Plan to Combat Desertification (NAP)

These documents have enabled Sierra Leone to meet its obligations under the main international conventions. The plans provide a basis for the development of medium and full size national projects that comprehensively address environmental and natural resource management. As shown in Figure 1, a number of such projects have been developed and have begun being implemented since 2010 with GEF funding. The GEF enabling activities also contributed to the 2008 amendment to the Environmental Protection Agency Act. There has been little other contribution of GEF projects to institutional and legislative reforms.

[7] Government of Sierra Leone (2003) *National Biodiversity Strategy and Action Plan (NBSAP)*.
[8] Government of Sierra Leone (2006) *Final NCSA Report and Action Plan*. Available: http://www.thegef.org/gef/sites/thegef.org/files/documents/document/ncsa-sierra%20leone-fr-ap-sml.pdf
[9] Government of Sierra Leone (2007) *National Adaptation Programme of Action (NAPA)*. http://unfccc.int/resource/docs/napa/sle01.pdf

Figure 1: Sierra Leone Legal and Policy Framework Timeline



TECHNICAL DOCUMENT B

Global Environmental Benefits Assessment

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1. Introduction

The purpose of the Global Environmental Benefits (GEB) Assessment is to appraise the country's contribution to the GEF mandate and its focal areas based on appropriate indicators such as those used in the Resource Allocation Framework (RAF) or System for the Transparent Allocation of Resources (STAR) concerning biodiversity and climate change, and other environmental indicators from external sources, which are referred to in GEF project documents.

This assessment should present, based on existing information, the environmental benefits that the country could generate globally in response to the GEF mandate. For example, in biodiversity, what ecosystems and species located in the country have global significance? In climate change, what are the major sources of CO^2 emissions?

The outline of the GEB Assessment includes, by each focal area:

- An overview of the focal area in the country
- A situational analysis, i.e. the status of the environmental resources by GEF focal area in the country and in respect to the global environment
- A trend analysis
- An analysis of the potential GEBs that the country could generate

2. Country Context

Sierra Leone is located in the South-Western part of the bulge of West Africa. It lies between latitudes 7° and 10° North of the equator and between longitude 10° and 13° West of the Greenwich Meridian. The country has a surface area of about 71,700 km^2 (28,000 m^2) with a population of about 5 million growing at around 2.5% per annum. Approximately 80-90% of the population is in the rural areas. The vast majority of the population subsists in poverty and there are high levels of malnutrition, partly as a result of 10 years of civil conflict. Life expectancy at birth is extremely low, less than 40 years, and infant mortality is among the highest in the world.

School enrolment ratios are now moderate and the illiteracy rate is around 80%. Sierra Leone's social diversity is reflected in the different ethnic groups and local languages, such as Mende, Temne, Limba, Creole, Loko, Fulah and Mandingo. There is no religious extremism in the country with Muslims and Christians coexisting peacefully.

The main economic activities in the country are agriculture and mining. Agriculture provides employment for about 75% of the population and contributes more than 30% to the GDP and 16% of the total export earnings. Fuel wood is the main source of energy for 90% of the population for domestic cooking. It is also used in agro-based industries such as tobacco and fish smoking in many coastal villages. The mining industry is one of the most important in terms of employment and contribution to the national economy and minerals mined include diamond, bauxite, rutile and gold.

Mining has significant potential as a large income generating sector but its impact on other land use activities has been extensive over the years. Studies have revealed that extensive damage is being caused to the ecosystem due to improper environmental management in the mining sector. Both large and artisanal mining operations have resulted in land devastation and removal of the top soil cover,

which has rendered the land unsuitable for farming and other economic activities in some areas. Water and air quality changes and siltation in tidal creeks and river systems affect maritime life and drinking water resources for communities living downstream. When mining is carried out in hilly areas and slopes, severe erosion takes place and flooding may result. In certain instances, the activities of the miners divert surface drainage.

3. Climate Change

The global environmental benefit in the climate change mitigation focal area is the sustainable mitigation of the concentration of anthropogenic greenhouse gases (GHG) in the atmosphere that are not covered by the Montreal Protocol. Specifically, it includes:

- Mitigated GHG emissions in metric tons of CO_2 equivalent;
- Increased use of renewable energy and decreased use of fossil energy resources;
- Improved efficiency in primary energy production, energy processes and transmission, and final energy consumption at end-use;
- Increased adoption of a low-carbon development path through technology transfer, market transformation, and enabling activities;
- Increased sequestration of carbon; and
- Reduced GHG emissions and enhanced carbon stocks under sustainable management of land use (including peat-lands), land use change, and forestry.

GEBs may also be generated through adaptation to climate change. Adaptation is the process of reducing the adverse effects of climate change on human and natural systems. It refers to the efforts made to cope with actual change as well as of adjusting to expected change. In practice, adaptation is climate-resilient development and natural resources management.

3.1 Sierra Leone's Climate

The climate of Sierra Leone is wet tropical, marked by distinct wet and dry seasons. The wet season is from May to October and the dry season from November to April. The wet season is related to the flow from the southwest of the tropical maritime monsoon, which is a mass of moisture-laden air that originates over the South Atlantic Ocean. The dry season is caused by the hot dusty air of the Harmattan trade winds that develop over the Saharan region in the circulation around the high pressure cells.

The mean annual rainfall in the country is 2,746 mm. The southern and coastal areas receive from 3,000 to 5,000 mm. The rains fall steadily in the wet season and is heaviest in the months of July and August. As well as the two main seasons there is also sub-season known as the Harmattan.

The temperatures are consistently high throughout the country, averaging about 28^{o}C. The humidity is also usually high as a result of the heavy rains coupled with the high temperature and the maritime influences. Humidity rises up to 93% in the wet season and decreases inland to about 47% as the rainfall

declines. There is little variation in the day length due to the country's location close to the equator, but hours of sunshine are affected during the wet season.

3.2 Greenhouse Gas Emissions[10]

Table 1 below shows the base year (2000) emission levels for the most important greenhouse gases in Sierra Leone. The total carbon dioxide emissions (CO_2) for the year 2000 were 574.061 Gg. The distribution across the major sectors is as follows:

- The emissions from energy generation are fairly high in the country, amounting to 529.287 Gg of CO_2 as Sierra Leone's energy generation is mainly based on diesel-powered generators. Recently, with the commissioning of the Bumbuna Hydro Electric Power Station, CO_2 emissions from the energy sector have been reduced.
- .The 'Land Use, Land Use Change and Forestry' (LULUCF) sector is the least significant source of CO_2 with emissions of 752,748 Gg, followed by the waste sector emitting 11.83 (???). The industrial processes are however marginal amounting to 39.55 Gg of CO_2 mostly from cement production.
- The total methane (CH_4) emissions are 32,312 Gg. Agriculture is the most important source of CH_4 emissions (86.67%), followed by the LULUCF sector (5.63%) and finally the waste sector (11.83%).
- The other sectors are not sources of CH_4 emissions.
- Nitrogen dioxide (N_2O) emissions are estimated to be 13.91 Gg. 8.54 Gg come almost exclusively from the agricultural sector. The waste sector is also a source of emission with 31.29 Gg.

From the above it can be seen that the LULUCF sector, agriculture and energy sectors have the most potential for GHG reductions.

3.3 Climate Trends in Sierra Leone

Various models have been used to assess future climate change scenarios for Sierra Leone, such as the GCM (General Circulation Model), HADCM (Hadley Centre Coupled Model), and ECHAM (climate change model developed at the Max Planck Institute for Meteorology in Hamburg). The average temperature between 1961 and 1990 was about 26.7°C. This average is expected to increase by about 7% to 9% by the year 2100.

Climate data for the period 1961 to 1990 were used to construct the climate change scenarios for Sierra Leone. Data were sourced from the following meteorological stations; Lungi, Bonthe, Kabala, Njala and Bo. The parameters used for the study were precipitation (rainfall), temperature, solar radiation, and evaporation, amongst others. It was evident from the study that the coastal areas experienced the heaviest rainfall in the form of torrential rains. The study period (1961-1990) shows an average annual rainfall of about 2,746 mm, which varied from 3,659 mm at Bonthe in the south to 2,618 mm at Kabala in the North.

Projections for the rainfall values in 2100, using the ECHAM-4 and HDCM2 models, are similar to the current rainfall figures. The CSIRO-TR (climate model developed for the Australian Commonwealth Scientific and Industrial Organization) and UKTR models, however, show a decrease in rainfall to about 3-10% below the current monthly and annual values. Based on the GCM outputs, solar radiation is expected to decrease by 12% under the HADCM2, by 9% under the UKTR model, and by 5% under the

[10] Government of Sierra Leone (2012) *Second National Communication on Climate Change to the UNFCCC*.

CSIRO-TR and ECHAM models. In Sierra Leone, based on the last reference MAGICC/SCENGEN (Model for the assessment of GHG induced climate change/Scenario Generator), CO_2 concentration of about 350 ppm was determined in 1990. Concentrations are expected to double to about 580ppm by 2025 and about 700ppm by 2100. Sea level rise (SLR) scenarios adopted in this study are 0.2m as a baseline and 0.5m, 1.0m and 2.0m by 2100.

There is an indication of consistent temperature warming across all seasons and scenarios. The projected 1.5°C to 2°C increase in temperature will result in increased evaporation losses, decreased precipitation, and a continuation of rainfall decline.

Table 1. Greenhouse Gas Emissions for the Base Year (2000)

Table 2.5: Summary Report for 2000 National Greenhouse Gas Inventory of Sierra Leone

(Gg)

Greenhouse Gas Source and Sink Categories	CO_2 Emissions	CO_2 Removals	CH_4	N_2O	NO_x	CO	NMVOC	SO_2
Total National Emissions and Removals in 2000								
1 Energy	**529.28**							
Fuel Combustion (Sector Approach)	529.28							
i. Energy Industries								
ii. Manufacturing Industries and Construction								
iii. Transport								
2 Industrial Processes								
i. Mineral Products	111.2397						000000957	
3 Solvent and Other Product Use	**NOT ESTIMATED DUE TO LACK OF METHODOLOGY**							
4 Agriculture								
i. Enteric Fermentation			5.152					
ii. Manure Management			414.2					
iii. Rice Cultivation			15640.37					
iv. Agricultural Soils								
v. Prescribed Burning of Savannas	129.36		689.91	8.54	308.58	24.147		
vi. Field Burning of Agricultural Residues								
vii. Other (please specify)								
5 Land-Use Change & Forestry		**-405,339,92**	**5,431**	**4,645**	**167,891**	**49,267**		
i. Changes in Forest and Other Woody Biomass Stocks		1,066,501.5						
ii. Forest and Grassland Conversion	5331300.6		5,631	4,645	167,891	49,267		
iii. Abandonment of Managed Lands		-44,798,789						
6 Waste								
i. Solid Waste Disposal on Land								
ii. Wastewater Handling			11.81	31.29				

Source: *Republic of Sierra Leone, 2012 , GHG emissions survey, 2010-2012, Table 2.1.*

3.4 Climate Change Impacts

Coastal Habitats and Biodiversity

The collateral impacts of rising sea levels on the coastal zone will include shoreline recession, increased flood frequency, inundation of coastal lands and wetlands, and the salinization of surface waters and ground-waters. These impacts will in turn affect coastal habitats and biodiversity. In Sierra Leone, the retreat of the shoreline will result in significant loss of the mangroves of the Kambia district and elsewhere, strand vegetation, coastal swamps and the habitat of marine biodiversity (turtles, snails etc.). The species of mangrove vegetation of risk from flooding and shoreline retreat includes *Conocarpus erectus*.

The most vulnerable wetlands are those of the Kambia district and areas of the western area (Freetown), such as Aberdeen Creek, which is also one of the Ramsar sites in Sierra Leone. The loss of beach will adversely affect the survival of inter-tidal organisms and those that make use of the sandy beaches at some stage of their life cycle e.g. the semi-terrestrial Ghost Crabs, *Ocypoda cursor* and *O. Africana*. The marine turtles that could be impacted on are the Leatherback (*Dermochelys coiacea*), the Hawksbill (*Erectmochelys imbricata*), Green Turtle (*Chelonia myda*), the Loggerhead (*Caretta carretta*) and the most abundant of all, the Olive Ridley (*Lepidochelys olivacea*).

Fisheries and Marine Life

Marine life, like life on the entire earth depends on a stable climate and any change in climate will be reflected in species composition and location of the various marine communities. The current distribution of marine plant and animal communities is a reflection of how different species and ecosystems have adapted to past climates. Future climate changes will affect the boundaries of ecosystems and the mix of species that inhabit them. This will have major implications for human activities particularly in fisheries and coastal formations such as mangroves and coral.

Water Resources

The vulnerability of the water resources sector to climate change has been assessed in the Vulnerability and Adaptation Report contained in Sierra Leone's First National Communication on Climate Change. It is evident from the report that water resources will be affected by climate change. Various General Circulation Models (GCMs) have been used in developing climate change scenarios for Sierra Leone. The models predict an increase in temperature of about 5□C by 2100. The increase in temperature will increase the amount and intensity of precipitation. An increase in rainfall could lead to an increase in surface runoff, resulting in flooding. On the other hand a decrease in the amount and intensity of rainfall may lead to drought.

3.5 Contribution to Global Environmental Benefits

For Sierra Leone, climate change is viewed as a threat to a sustainable development path. As stated by Johnson et al. (2013)[11] the various models on the effects of climate change show different results but all differ significantly from the baseline scenarios. The most significant results are those relating to possible declines in the production of basic food crops: vulnerability of crops to climate change also poses a direct threat to farmers' livelihoods and to overall food security.

The GEF Benefits Index for Climate Change seeks to determine the potential global benefits that can be realized from climate change mitigation activities in a country. It is constructed from two

[11] Johnson R. G., Kandeh, M., Jalloh, A., Nelson, G. and Thomas, T. (2013) 'Chapter 12: Sierra Leone'. In *West African Agriculture and Climate Change: A Comprehensive Analysis*. Edited by Jalloh, A., Nelson, G., Thomas, T., Zougmore, R., and Roy-Macauley, H. Research Monograph. International Food Research Institute. Washington DC.

indicators: (i) the baseline GHG emissions for the year 2000 in tons of carbon equivalent; and (ii) Carbon Intensity Adjustment Factor computed as the ration of carbon intensity in 1990 to the carbon intensity in 2000. In the *GEF Benefits Index for Climate Change* (2008), Sierra Leone was identified as having an index score of 1080 later revised to 1227, equating to a share of the global GBI of 0.0%.[12]

Adaptation to Climate Change

Based on the identified mitigation and adaptation measures laid out in the National Communication, a strategy has been developed for the future implementation of the Convention in Sierra Leone. The National Adaptation Program of Action (NAPA) is to enable Sierra Leone to develop simplified and direct channels of communication for information relating to the urgent and immediate adaptation needs arising from disasters caused by climate change and extreme weather events. Specifically, the document aims at: (i) identifying a list of priority activities, (ii) formulating priority adaptation options, (iii) building capacity for adapting to longer-term climate change and variability, and (iv) raising public awareness on the urgency to adapt to the adverse effects of extreme weather events.

The successful implementation of the NAPA depends on the availability of the human and financial capacities in the country, and the required international cooperation. The following adaptation projects from the NAPA are on-going or in the design phase.

- UNDP-UNEP project "Strengthening Climate Information and Early Warning Systems in Africa for Climate Resilient Development and Adaptation to Climate Change" (GEF-LDCF co-financed)
- UNDP Project: "Building Adaptive Capacity to Catalyze Active Public and Private Sector Participation to manage the Exposure and Sensitivity of Water Supply Services to Climate Change" (GEF-LDCF co-financed)
- UNDP Project: "Sustainable use of biomass as a source of domestic energy use through innovative technologies and private sector involvement" (GEF Trust Fund co-financed)
- AfDB Project: "Building resilience to climate change in the water and sanitation sector" (GEF-LDCF co-financed)
- IFAD project: "Integrating adaptation to climate change into agricultural production and food security in Sierra Leone" (GEF-LDCF co-financed)
- Ongoing UNDP, IFAD and AfDB activity: Rehabilitation & Reconstruction of meteorological/ climate monitoring stations throughout the country
- Ongoing UNDP capacity building of the Meteorological Department through training of personnel for adaptation to climate change
- Ongoing UNDP and EU project: Sensitization and awareness raising campaigns on climate change impacts on women relating to the three conventions of biodiversity, desertification and climate change
- Ongoing UNDP project, Institutional Strengthening of the Water Resources Sector in Sierra Leone
- Ongoing UNDP Promotion of Rain Water Harvesting and Development of An Integrated Management System for Fresh Water Bodies

[12] GEF (2008) *GEF Benefits Index for Climate Change*. Available: http://www.thegef.org/gef/sites/thegef.org/files/documents/GEF%20Benefits%20Index%20Climate%20Change.pdf

Mitigation of Greenhouse Gas Emissions

Policies to limit the net emissions in Sierra Leone, as in other countries, can best promote sustainable development if they are consistent with broader societal objectives. Some mitigation options can even promote benefits far beyond immediate climate change concerns such as reducing health problems, increasing local employment, minimizing air pollution, protecting and enhancing forest and watersheds, minimizing certain subsidies and taxes, and accelerating the development and diffusion of energy-efficient technologies.

Though Sierra Leone's emissions are negligible, in a bid to significantly contribute towards the reduction of the sources and potential sources of GHG emissions or enhancement of carbon sinks – as indicated in its response on the Copenhagen Accord in 2010[13] – Sierra Leone is undertaking a number of mitigation actions as listed below:

1. Establishment of the National Secretariat for Climate Change (NSCC).
2. Institutional strengthening and capacity building for environmental protection and management, as well as the country's climate change mitigation and adaptation efforts.
3. Increasing conservation efforts through: the establishment of a network of 12 protected areas by 2015; sustainable management and protection of forest reserves and catchment areas including mangroves, coastal and inland wetlands; delineation and restoration of vulnerable habitats and ecosystems in the western area of the country; provision of support for a national assessment on forest resources.
4. Improving forest governance to maintain the land area covered by forests to at least 3.4 million ha by 2015. This will be through the development of legislation, regulations and bye-laws for environmental protection, including control of deforestation, firewood collection and charcoal production and through capacity building, training and support to law enforcement services and the Ministry of Agriculture (Forestry Department).
5. Setting and developing air, water and soil quality pollution standards, and ensuring regular assessments and monitoring through control programs.
6. Introducing conservation farming and promoting the use of other sustainable agricultural practices, such as agroforestry.
7. Development of an Integrated Natural Resources and Environmental Management program for Sierra Leone, including sustainable land management programs, particularly in relation to ecosystems.
8. Expanding clean energy utilization, such as solar, mini-hydroelectric power, LPG, and biomass stoves.
9. Development of energy efficiency programs through sensitization and awareness raising campaigns. Sustainable production of charcoal and reduced dependence on firewood.
10. Development of alternative energy sources, e.g. biofuels from sugarcane, corn, rice husks.
11. Developing agricultural and urban waste incineration programs for energy production.
12. Improving waste management through composting and recycling of waste.
13. Development and enforcement of regulations on regular maintenance of vehicles. Improving the use of mass transport (e.g. road and water) for passengers and cargo to reduce traffic congestion and GHG emissions.

In a number of areas, there has been much progress. For example the National Secretariat for Climate Change (NSCC) was established in in 2012, and there are a number of on-going projects funded by GEF as indicated in the other sections of this report.

[13] Sierra Leone's Response to the Copenhagen Accord. Available: https://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/sierraleonecphaccord_app2.pdf

4. Land Degradation

Global environmental benefits in the Land Degradation focal area, specifically addressing desertification and deforestation, include:

- Improved provision of agro-ecosystem and forest ecosystem goods and services;
- Mitigated/avoided GHG emissions and increased carbon sequestration in production landscapes;
- Reduced vulnerability of agro-ecosystems and forest ecosystems to climate change and other human-induced impacts;
- Conservation and sustainable use of biodiversity in productive landscapes; and
- Reduced pollution and siltation of international waters.

4.1 Situational Analysis

Sierra Leone was originally a forested country with over 60% of its land covered by closed high forest of moist evergreen and semi-deciduous types, the rest being woodland savanna of the Guinea type. Today, nearly 70% of its forest cover has been lost. The main direct cause of deforestation has been forest conversion for slash-and-burn agriculture, through which about 75% of the country's population is engaged. This situation is further aggravated by the growing farming population, the attendant shortened fallow periods and declining yields, and the consequent need to clear even more forest to make up for the declining yields.

Less than 5% of the original primary forest remains in isolated forest reserves towards the tops of mountains and hillsides, particularly at Gola (77,044 hectares), Kambui (21,213 ha), Dodo Hills (21,185 ha), Nimini (15,557 ha), Freetown Peninsula (14,089 ha), Tama (17,094 ha), Tonkoli (47,656 ha), Kasewe (2,333 ha), Loma (33,200 ha), Sanka Biriwa (11,885 ha), Kuru Hills (7,001 ha) and Kangari Hills (8,573 ha).

At present, the following vegetation communities can be distinguished: forests, savannas, grasslands and swamps. The four main physical regions are: the coastal plains, the interior plains, the interior plateau 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 major land use type is the cultivation of rice on the margins of the mangrove swamps. This is potentially the most sustainable type of rice farming in the country. Mangrove swamps are the most typical type of vegetation along the coast. They are especially prevalent in creeks, deltas and lagoons in brackish and tidal waters where the vegetation declines in height away from the water's edge. It is composed mainly of evergreen forest trees, which produce dense canopies. The red mangrove is the most common tree. They are used very extensively along the coastal areas as firewood and to produce charcoal. In some areas, such as north of Freetown between Pepel and Rokpur, the mangroves have been extensively cleared for rice cultivation. This is a major contributing factor towards land degradation in this region. The rest of the coastal plains are mainly riverine grassland swamps called *batii* lands which also support the annual cultivation of paddy, fertility being constantly replenished by the annual deposition of alluvium.

The interior plains rise gently from an elevation of 40m in the West to 200m in the Northeast, extending from the coastal terraces in the West across to the East, and occupying approximately 43% of the land area. They are separated from the interior plateau region by a distinct escarpment. The interior plains are covered mainly by secondary forest, farm bush and forest-savannah mosaic,

with the primary forest having been cleared either for timber, farming or fuel wood and left to re-grow. The forest-savanna mosaic is essentially a mixture of patches of forest and grasses and is usually found within a short distance of the main roads where they are more accessible than distant secondary forest areas. Frequent dry season fires prevent the savannahs from becoming reforested. Here also are found the seasonally flooded 'bolilands', which are saucer-shaped depressions covered with grasslands. The bolilands are being used for mechanical rice farming as there are no tree stumps and plowing can easily be done before the rains when the ground is dry. However, the soils are infertile and need added fertilizers for good yields. These plains contain the greater percentage of arable land for the cultivation of upland rice and most of the country's other food crops. The conversion of forest to forest savannah mosaic, due to the recurrent fire episodes embedded in the slash-and-burn agricultural practices, is a major land degradation issue.

The plateau region ranges in altitude from 200m to 700m. It is found in the north-eastern and south-eastern parts of the country and consists of undulating high relief and rolling plains and hills. As with the interior plains, the original forest cover in the plateau region has been reduced to secondary forest and farm bush through farming and logging. In other areas, derived savanna woodland vegetation occurs as a result of cultivation and fire. This is characterized by the abundance of oil palm trees, the presence of coppiced forest shrubs and other common secondary forest trees. In other areas the forest has been replaced by tree crops such as cocoa and coffee. In heavily farmed areas where annual fires are frequent, fire-resistant species such as *Lophira alata*, a fire climax, become dominant in association with tall grass cover.

The Freetown Peninsula 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 unique in the sub-region. The steep slopes on the peninsula are still covered by lush tropical lowland rain forests. There is growing encroachment from construction activities on the slopes of the mountains due to the city expansion, a form of land degradation.

Sierra Leone's hydrological profile includes a series of rivers that run from the Guinean Dorsal Hills: the Kolenten or Great Scarcies, the Little Scarcies, Rokel, Jong, Sewa, Moa and Mano Rivers. Other streams in the lowlands include the Ribi, Kukuli, Gbangbaia and Waanje Rivers.

4.2 Land Degradation Trends

The principal direct causes of land degradation in Sierra Leone are: the unsustainable use of forest resources; unsustainable agricultural practices, especially those resulting in soil fertility loss and decline in crop yields on upland rainfed sites; wildfires on farm fallows and wooded savannas; deforestation from clearing for agriculture; and mining (GEF ID 3510, Project Document).[14]

Unsustainable use of forest resources

This refers to forest over-cutting for saw timber, wood fuels (firewood and charcoal) and other forest products. The unsustainable use of forest resources leads to the replacement of high value species by low value species, loss of productive potential and the degradation of ecosystem integrity and function. The opening of access roads for timber harvesting very often opens the way for slash-and-burn agriculturalists to complete the cycle of forest destruction. The over-cutting of mangroves for wood fuel contributes towards diminished ecological estuary functions of critical mangrove ecosystems and can have major negative impacts on the productivity of fisheries (fish, shrimps, crabs, etc.). Over-cutting also contributes to the release of greenhouse gases. There are no tested, proven systems for the sustainable management of any of the different types of natural forest in Sierra Leone, nor are there any management systems for established forest plantations.

[14] GEF (2007) *Project Document: GEF ID 3510.*

Unsustainable agricultural practices

Currently, upland, rainfed agriculture is practiced in an unsustainable manner in Sierra Leone. This particularly refers to the slash-and-burn agriculture, which is the traditional, upland, rainfed farming system in most parts of the country. It involves the conversion of forest and woodlands into croplands. The forest is cut, dried and burned. The ashes provide a one-time flush of nutrients that favors crop growth. After one or more years of cropping, the land is fallowed before new cycles of being slashed, burned and cropped. Under very long fallow periods (15-30 years), slash and burn farming can be sustainable. However, fallows have been reduced from a period of 20-25 years down to 7-9 years leading to the inability of the fallows to restore fertility and so resulting in reduced yields. In the drier, northern region, bush fallow periods have decreased to less than five years with grass fallows replacing bush fallows. Grass fallows are less efficient in restoring soil fertility than wooded fallows. Declining yields combined with population growth has lead farmers to clear forests on more marginal lands where fertility is inherently more difficult to sustain leading to further soil erosion and land degradation.

Slash-and-burn is also an income earner for the farmer from the sale of wood fuels and other wood products. It is therefore a major driving force behind land degradation in the country. There is now glaring evidence of the biophysical and socio-economic impacts of unsustainable agricultural practices in the country. These include loss of soil and soil fertility, reduced yields, and encroachment onto increasingly marginal lands. The socio-economic impacts include impoverishment of communities, increased food insecurity and the negative impacts on education, health and on women and marginalized groups. Population growth, poverty and the lack of economic alternatives are all root causes of slash-and-burn agriculture.

Wildfires on wooded savannas and farm fallows

Wildfires are another major direct cause of land degradation in Sierra Leone. There is always a huge amount of highly combustible grass fuels on savannas and fallows and these areas burn very frequently during the dry season. Grasses on the very thinly-wooded savanna may reach five meters in height and the fires burn so hot that the tree canopy cover is kept at very low levels – often only about 5 to 10% cover. The various reasons for the setting of such fires are poorly understood. One common cause is the burning of the slash on recently cleared slash-and-burn fields late in the dry season in preparation for planting. These fires commonly spread to adjoining fallow and savanna lands through simple negligence. It is not clear to what extent the wooded savanna lands are burned intentionally or for what reasons. Whatever the reasons for burning, there is very little attention paid to fire control.

The term fallow normally refers to field that has not been cropped for a period of time to allow the recovery of soil fertility, or to control certain weeds. In the absence of fire, the tree cover of wooded savannas would almost certainly develop quickly and close in to create a new closed canopy forest. Sixty years of research in the Ivory Coast has demonstrated this.

Deforestation from clearing for agriculture

Deforestation resulting from forest clearing for agriculture is a direct cause of land degradation. The best crop yields obtained from the prevailing upland, rainfed, slash-and-burn agriculture are obtained from land where the forest has just been cleared and burned. In effect, under slash-and-burn agriculture, the native forests and fallow vegetation are “mined” for their nutrient content. The nutrients in the ash provide a rapid, initially lush growth of crop plants. However, much of the ash and the nutrients are lost through runoff or through leaching. Another portion of the nutrients are lost with the harvest of the agricultural crops. Only a portion of the nutrients are recycled. With each cycle of slash-and burn, soil fertility is only partially restored and crop yields continue to decline. The continued decline in yields combined with several other factors including population growth, shortage of economic alternatives, and the traditional land tenure systems that grant land

ownership to those that clear the forests, together lead farmers to clear more and more forest for conversion into agricultural land. Forest clearance is also facilitated by the improved road access developed by forest license holders for saw timber. The overall impacts of forest clearance for agriculture include the destruction of forests and their ecological functions and the increased susceptibility of degraded forests to fire, which further prevents regeneration of fallows.

Large-scale mining

Mining activities in Sierra Leone are creating a wide range of issues related to land degradation and health and safety of the mining communities. Before the war, a lot of mining activities – notably by the Sierra Rutile Ltd. (Titanium oxide) and SIEROMCO Ltd. – degraded the land severely. The mines also operated without compliance with 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 a vast expanse of land that needs urgent attention for rehabilitation, restoration of vegetation cover and agricultural productivity. Mining has now recommenced but with no corresponding sustainable land management practices in place. Mining has had severe impacts on the land 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 is significant. The drainage patterns of the Jong River in the southern region have been disturbed as a result of creation of tailings, ponds, and dams and the construction of haulage routes from the open cast mines of rutile and diamond. Other impacts expected to occur if measures are not taken include increased risk of flooding of settlements surrounding the mine sites, siltation and dislocation of villages.

Small-scale mining

Small-scale mining for diamonds has also created similar impacts including deforestation and land degradation. The heaps of mine spoils have interrupted drainage patterns resulting in stagnant waters that have become breeding grounds for mosquitoes. The runoff waters from these mined areas are frequently choked with sediments. Mining has also had negatively affected the aesthetics of the areas where it is carried out. 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.

4.3 Contribution to Global Environmental Benefits

The objective of Sierra Leone's National Action Program to Combat Desertification and Land degradation (NAP, 2003)[15] is set within the overall vision of Sierra Leone's longer-term development agenda articulated in Vision 2025. This is based on the "desire to create a better future for Sierra Leone a future that is characterized by virtuous circle of peace, stability and wealth creation, in place of the vicious circle of poverty and under-development." Therefore, the objective of the NAP is to achieve sustainable development by creating long-term strategies that focus on improved productivity of land and sustainable land management practices that will lead to improved conditions of living.

Core areas of intervention proposed in the NAP, the implementation of which are expected to contribute to achievement of GEBs in the land degradation focal area are as follows:

[15] Government of Sierra Leone (2008) *National Action Programme to Combat Desertification and Land Degradation (NAP).*

Forestry and Wildlife Management

The Government of Sierra Leone is seriously concerned of the uncoordinated exploitation of the forest resources, in particular in the savanna woodlands in the North, where rampant smuggling of *Pterecarpus errineaceous* (muninga) across the border to be sold for export to China through Guinea is very attractive. In the same way, there is rampant illegal hunting across the border from Liberia. An initial negotiation meeting by the three countries, namely Sierra Leone, Guinea and Liberia is already undertaken. This process must be urgently followed up and concluded immediately.

Also of importance is the issue of forest fires in the uplands, especially in the savanna woodlands. A comprehensive fire management model is recognized as the best tool to combat this menace of forest management. As for the lowlands, including mangrove ecosystems and water catchment areas, needs attention, through the elaboration of an ecosystem master plan. The inconsiderate felling of mangroves in some areas has caused alarm. It is worth mentioning that the country has made good efforts in the management of its mangroves including undertaking mangrove reforestation of degraded areas. Therefore, the Forestry Action Plan needs to be revisited, updated and implemented. Introduction of collaborative wildlife management is closely related to community forestry and can build on the forest experience to a large extent.

Livestock and Range Management

High priority should be given to support a Livestock Development and Rangeland Management Programs with the purpose of establishing a comprehensive database to facilitate planning in the area of rangeland management and livestock production. Relevant intervention areas would, inter alia, include:

- the conduct of a range resources inventory;
- identification of high-risk areas;
- participatory land-use planning; and
- Popularization of small ruminants management.

Mining

The Mines and Minerals Act (2009) confirms that mining activities adversely affects the environment and recognizes the need for mitigating actions to redress degradation caused by mining. Mining activities undertaken by large mining companies 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. 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. A decentralized special fund, the Rehabilitation Fund, has been set up by the Government for the reclamation of mined areas.

Agriculture

The following high priority intervention areas are to be pursued under the NAP:

- Addressing poor land-use practices and checking the trend of soil degradation. Main activities would comprise of training of trainers in integrated land-use planning, community based land-use planning and land-use improvement plans at the village level.
- Prevention of severe upland erosion and the related siltation in the lowlands. The program would be based on pilot activities along with the conduct of surveys. The GEF-funded UNDP sustainable land management project (GEF ID 3510) falls in this area.
- Development of extension tools to address inappropriate crop production practices
- Irrigation farming, mainly across the floodplains initially
- Introduction of high yield crops and mechanical farming
- Improvement of infrastructure and marketing systems
- Introduction of adaptive methods for food processing, food storage and value addition

5. Biodiversity

Global environmental benefits in the Biodiversity focal area include:

- Conservation of globally significant biodiversity;
- Sustainable use of the components of globally significant biodiversity; and
- Fair and equitable sharing of the benefits arising from the utilization of genetic resources, including by appropriate access to genetic resources.

5.1 The Current Status of Biodiversity

Ecosystems

Ocean, freshwater, brackish water, coastal beaches (rocky, sandy and muddy), wetlands (mangrove swamps), inland valley swamps (bolilands), savannah woodlands and tropical rainforests characterize the diversity of ecosystems found within the country. About 15,000 plants species have been identified in Sierra Leone. There are an estimated 5,250 species of useful plants (NBSAP, 2003).

Half of Sierra Leone is a low-lying plain with swampy areas. Inland, the terrain rises to a hilly plateau extending northward to the Guinea border. The eastern flank of the country has important mountains – Mount Bintumani (about 1,940m), the second highest point in West Africa, and Sanka Biriwa (1715m) in the Tingi Hills.

The Gola Forest Reserve is predominantly lowland tropical moist evergreen rain forest with small areas of moist semi-deciduous forest. The moist semi-deciduous forest has less total rainfall, 2,000-2,500mm annually, with a four to five month long dry season. There are more deciduous trees but the total diversity of plants is less than in the tropical moist evergreen forest. The Loma Mountains, Tingi Hills and Tama Tonkolili Forest Reserve all have moist semi-deciduous forests.

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

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

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

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

An estimated 200,000 to 300,000 ha of mangrove swamps fringe the coastline. Mangroves are restricted mostly to the four main estuaries (Scarcies, Rokel, Yawri Bay and Sherbro Rivers). The mangroves of Sierra Leone have been studied mostly as a resource rather than sites for biodiversity. The mangroves are dominated by five species (*Rhizophora racemasa, R. Harrisoni, R. Mangle, Langucunclaria racemosa and Avicennia nitida*). Intermingled among the mangroves may be other species of plants including *Paspalum vaginatum, Sesuvium portulacastrum and Philoxerns vermincularis. Rhizophora* often inhabit the seafront, while *Avicennia and Languncularia* are found landwards.

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

Flora and Fauna

The status on the threatened animal species indicates that there are 761 species of mammals and birds. Of the bird species, 6 are threatened with extinction. There are 15 primates, all of which are either endangered or vulnerable. Of the 18 antelopes, 2 are extinct and the 16 are threatened. Populations in other mammals, like elephants and hippos, have been drastically reduced. Of the birds, 6 are threatened.

Table 2. IUCN Red List Category Summary for Sierra Leone

	EX	EW	Sub-total	CR	EN	VU	Sub-total	NT	LR/cd	DD	LC	Total
Animals	0	0	**0**	8	30	55	**93**	67	0	95	1,127	**1,382**
Plants	0	0	**0**	2	7	47	**56**	7	1	16	159	**239**
Total	0	0	**0**	10	37	102	**149**	74	1	111	1,286	**1,621**

***IUCN Red List Categories: EX** - Extinct, **EW** - Extinct in the Wild, **CR** - Critically Endangered, **EN** - Endangered, **VU** - Vulnerable, **LR/cd** - Lower Risk/conservation dependent, **NT** - Near Threatened (includes LR/nt - Lower Risk/near threatened), **DD** - Data Deficient, **LC** - Least Concern (includes LR/lc - Lower Risk, least concern)*

***Sources**: IUCN, 2014 (Red List Table 6a and Table 6b)*[16][17]

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

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

Fish stocks of Sierra Leone are the most diverse along the West Coast of Africa. Marine and coastal fish stocks can be classified into two broad categories based on the biology and physico-chemical parameters of the environment. About 213 species of pelagic and demersal fish stocks have been

[16] IUCN (2014) IUCN Red List Table 6a: Animals. Version 2014.1, Last Updated: 12 June 2014.
[17] IUCN (2014) IUCN Red List Table 6b: Plants. Version 2014.1, Last Updated: 12 June 2014.

recorded so far. The stocks can be classified into 3 categories from both biological and management point of view, namely; pelagic, demersal and shellfish (crustacea and molluscs).

Pelagic fish stocks consist of the true pelagic and a largely loose category often referred to as semi-pelagic. The demersal fish stocks can be classified into four categories: (i) *Sciaenid* fauna, (ii) *Sparid* fauna, (iii) deep shelf community and (iv) continental slope. Forde (1978) noted that Soviet trawlers caught some 243 species of fish in 1976. FAO (1990) recorded 237 species of fish for the West African region belonging to 108 different families. The contribution of various categories of fish stocks over the year are close to estimates provided by Coutin (1989) as follows: small pelagics (43-55%); demersals (30-40%), large pelagics (3%) and shrimps (2%). The total biomass is estimated at between 300,000 and 700,000 Mt.

5.2 Trends and Threats to Biodiversity

Trends in threats of resource use in Sierra Leone over the years have depended on the specific historical conditions that have existed at the time. Pre-colonial Sierra Leone was characterized by an increasing awareness of the decline in biological diversity. The formation of the Sierra Leone Forestry Department in 1911 was a direct result of surveys carried out on biological diversity. Thirteen forest reserves were established. Research into conservation of biological diversity in the post-World War II era involved the introduction of quick growing tree species, to combat forest degradation due to population pressures.

However, post-independence Sierra Leone paid little or no attention to the conservation of biodiversity. Policies and strategies spelt out in development plans were characterized by apathetic attitudes towards implementation (NBSAP, 2003).

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

Logging for timber

During the colonial period, the lowland rainforests of Sierra Leone provided the bulk of high quality timber for Britain to the extent that before independence, much of the timber resources along the coast had already been severely depleted. Whatever timber remained was in the interior and this also came under severe pressure as logging companies pushed further into those areas with no proper monitoring. After the timber was felled, slash-and-burn agriculturists were quick to move into the areas vacated by the logging companies. Most of these sites received little or no attention in terms of replanting or engaging in regeneration activities. The 29 potential rainforest reserves in the country fall within the lowland rainforest ecosystem and logging with permit has been allowed to occur. The level of illegal logging activities has now become unprecedented. During the civil conflict, most of the timber needs of Freetown were met from the Western Area Forest Reserve as access to the interior was effectively restricted by the rebels. Two timber species were the focus of intense exploitation; *Heritiera utilis* and *Terminalia ivoriensi*. Even though illegal logging activities still go on in the western area forests, attention has now been directed to the forest reserves in the interior, most of which lack effective management. Because forest reserves offer limited protection for most wildlife, logging activities coupled with hunting are a potentially devastating combination for forest biodiversity.

Fuel wood, charcoal and pole extraction

The lack of cheap and affordable electricity and fuel (kerosene) in the urban, as well as in the rural areas, mean that energy needs have to be met through alternative sources. The most common and frequently utilized energy sources are fuel wood and charcoal. The bulk of these come from the

exploitation of preferred species from lowland rainforests, mangrove swamp forests and the *Lophira* savannah in the North of the country. An estimated 85 percent of the Sierra Leonean population is dependent on the use of fuel wood and charcoal for domestic heating and cooking. This percentage is expected to rise as the population increases and no investment is made in the production of modern electricity needs. On a daily basis, one can see many heavy-laden truckloads of fuel wood and charcoal being brought to Freetown. Most of the coastal mangrove swamp forests have become depleted as demand for wood for fish smoking and evaporation of salt has laid waste to vast areas of former prime mangrove swamps. This practice has been identified as detrimental to the breeding of marine biological diversity. Construction poles also form a significant portion of the non-timber forest products extracted from the lowland rainforest ecosystem. Farm bush areas are the preferred sites for the exploitation of poles, with *Anisophyiles laurina and Pentadesma bulyraceae* comprising the bulk of poles brought into Freetown for sale.

Bush meat and pets

Bush meat is an important protein source and forms an integral part of the diet of rural and urban populations. All manner of wildlife is hunted for the increasing bush meat trade and in all the big towns and cities, there is increasing demand for the meat of wild animals, which generates a considerable amount of income. Even threatened and endangered wildlife have not been spared from this trade and throughout many of the protected areas, hunting pressures are on the rise. Recent surveys point to the near extinction of the red Colobus monkey (*Piliocolobus badius*). Perhaps more devastating to the wildlife populations in the country is the removal of wild animals for trading as pets. Chimpanzees (*Pan troglodytes*) are endangered in West Africa, yet form the bulk of wild animals captured for the pet trade. Even though there is legislation against the capture of chimpanzees as pets, the laws are not strictly enforced and populations continue to be depleted.

Slash-and-burn agriculture

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

Mineral exploitation

Sierra Leone is rich in mineral deposits in almost all of the ecosystems and all these have been under either artisan or industrial scale mining schemes at one time or another. Diamonds, iron ore, rutile, bauxite, gold, granite, chromites and platinum are some of the diverse mineral wealth of Sierra Leone and many of these are still being extracted. The operations of many of the mining companies in the past were not subject to environmental impact assessment, which has led to the most devastating mining practices in the history of the country. Deforestation, siltation and displacement of human populations have potential impact on the biodiversity of the country. In most forested areas of the South and East of the country, artisan mining also results in the exploitation of wildlife, with a large number of domestic and migrant hunters supplying the bush meat needs of mine workers.

Over-fishing of marine resources

Sierra Leone's marine resources, particularly fish and shrimps, are under immense pressure for over-exploitation, with many raising concern over the long-term sustainability of the current levels of extraction. *Sardinella maderensis and Ethmalosa fimbriation* are reported to be the most exploited fish species in the marine ecosystems and *Penaeus notalis* being the most exploited shrimp species.

Most foreign trawlers are not effectively patrolled or monitored to avoid over exploitation. Artisanal fishing has also come under fire for unsustainable practices involving the use of beach seine netting. The mesh sizes involved are small (usually less than 25 mm diagonal stretch length) and are considered illegal by Sierra Leonean law. They are extremely damaging to marine resources as they remove even the smallest fish and shrimps that would mature to form the next breeding population.

Bad policies

In the early 1940s and throughout the 1950s, the Agricultural Department in the colonial administration implemented a pest control policy that became known as "monkey drive". Numerous complaints by farmers about crop damage caused by monkeys resulted in a bounty being offered for the head of every dead monkey. This laid the foundation for migrant hunters from Liberia to move into Sierra Leone. They killed an estimated 254,000 monkeys of all species in just less than 10 years. By the time this policy was brought to a halt, severe damage had already been caused to the biodiversity, to the extent that populations never fully recovered. Immediately after the 10 year civil war, the Government, through a Department for International Development (DFID) project, provided chair-saws to several paramount chiefs throughout the country under a good governance program. The aim was to allow them to exploit timber resources for reconstruction efforts in their chiefdoms. This was an unfortunate and ill-conceived idea and policy as most of the saws ended up being used in illegal logging activities in the forest reserves.

Poverty

Poverty is of the biggest indirect threat to biodiversity in Sierra Leone. The majority of the population depends to a large extent on natural resources for their livelihoods, which are often over exploited. High demand coupled with unsustainable practices of exploitation and utilization continues to place pressure on the natural resource base and impacts negatively on biodiversity.

5.3 Contribution to Global Environmental Benefits

Actions and institutional arrangements for the conservation and sustainable use of biodiversity in Sierra Leone are derived from concerns about the environment, forestry and wildlife. In 1911 the Forestry Department was specifically established in direct response to concerns raised about the rapid rate of deforestation of the Western Area forests due to timber logging meant for export. Thirteen forest reserves were established. Currently there are 48 forest reserves and conservation areas in Sierra Leone with the Outamba Kilimi National Park (Savannah ecosystem) and the Tiwai Island Wildlife Sanctuary (lowland rain forest ecosystem) meeting the World Conservation Union classification system standards. Furthermore, several protected areas have been proposed as national parks, game reserves, etc.

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

The National Biodiversity Strategy and Action Plan (NBSAP) identified a total of eight priority ecological sites of important biodiversity and suggested that urgent actions were needed to restore the integrity and ecological functionality of these systems. These ecological sites are spread over

four major types of ecosystem, comprising: the Arid and Semi-arid; Coastal, Marine and Freshwater; Forest; and Mountain zones. The government is now seeking support for all of them.

The GEF Benefits Index (GBI) for Biodiversity seeks to measure the potential global benefits that can be realized from biodiversity related activities in a country. It recognizes the richness of available data in some areas of biodiversity through the inclusion of detailed indicators and acknowledges the data gaps in other areas through the inclusion of broad indicators. It is aligned with the 2010 targets of the Convention on Biological Diversity (CBD). The *GEF Benefits Index* (2008) identifies Sierra Leone as having a revised index score of 9.1, representing 0.1% of the global index.[18]

Two important World Bank implemented, GEF funded projects are currently underway – the Sierra Leone "Biodiversity Conservation Project (SL-BCP)" (GEF ID 2948) and the "Wetlands Conservation project (SL-WCP)" (GEF ID 4105).

The SL-BCP is expected to make a valuable contribution to increasing the number, size and integrity of a variety of global ecosystems by delineating representative samples of ecological areas and declaring them as legally protected. This will remove them partially or entirely from production and any other form of land use that may have an adverse impact on the objectives for which they are set aside. The project focuses on support to four protected areas with a total area of 249,588 ha, representing 3 main ecosystem types that have been identified as priority sites in the NBSAP. These include: (i) The Western Area Peninsula Forest (17,688 ha, consisting of remnant moist closed forest, representing the western-most in the Upper Guinea Forest Block, established as forest reserve in 1916 and re-gazetted in 1973 as a national park); (ii) The Gola Blocks of Forests (76,100 ha, a tract of closed canopy, lowland rainforests, consisting of tropical wet evergreen to moist-semi deciduous closed forest vegetation, established as forest reserve in 1926 and 1930) and Tiwai Island Forest (1,200 ha rainforest, established in 1987 as a game sanctuary); (iii) the Outamba-Kilimi (110,900 ha, savanna vegetation type, gazetted in 1995 as a national park) and; (iv) the forest complex of the Loma Mountains (33,201 ha, montane ecosystem, gazetted as a national park in 1973) and Tingi Hills (10,519 ha, montane ecosystem type, gazetted in 1973 as a game reserve).

The Wetlands Conservation Project will put into practice the conservation planning and management of the priority wetland sites - coastal (Sierra Leone River estuary) and inland (Mamunta Mayosso). The Sierra Leone River Estuary covers an area of more than 34,000 ha and was designated as a "Wetland of International Importance" on December 13, 1999 under the Ramsar Convention on Wetlands. This site is the drowned estuary of the Rokel or Seli River. It is bounded to the north by a coastal plain indented by creeks, and to the south by the mountainous Western Area peninsula. At the point of entry into the Atlantic Ocean, the estuary widens to about 11 km and abruptly deepens along its southern shore to form a natural harbour (the third-largest in the world). The estuary is lined by 110 ha of mud and sand foreshore, backed by mangrove, and 1,800 ha of intertidal mudflat and muddy sand flats. The predominant mangrove tree species are *Rhizophora* sp., *Avicennia africana*, *Laguncularia* sp. and *Conocarpus* sp. The site is a critical bird habitat. A total of 36 wader species have been recorded in the estuary and numbers are known to exceed 20,000 regularly. This is one of the four major sites for wintering waders in the country. Concentrations are usually found along the banks of the Bunce River and Aberdeen Creek, where mangroves provide suitable roosting sites, as well as breeding habitat for such species as *Butorides striatus.* Less common migrant palearctic waders (less than 500 individuals) found include *Arenaria interpres*, *Numenius arquata*, *Tringa stagnatilis* and *Calidris temminckii* (BirdLife International, 2009).[19] Major threats to the site include, *inter alia*, unsustainable clearing of mangroves for firewood and construction materials;

[18] GEF (2008) *GEF Benefits Index for Biodiversity*. Available: http://www.thegef.org/gef/sites/thegef.org/files/documents/GEF%20Benefits%20Index%20Biodiversity.pdf

[19] BirdLife International (2009) Important Bird Area factsheet: Sierra Leone River estuary. Sierra Leone.

dumping of untreated waste from industries in the Freetown area; and oil spillage from tankers unloading at the main port.

The Mamunta Mayosso complex is situated in Kholifa and Mabang Chiefdoms, Tonkolili District, Northern Province, about 180km due east of Freetown, and was the first site to be managed as a wildlife sanctuary in Sierra Leone. Located almost at the centre of the country, Manunta Mayosso supports a wide range of vegetation types. The predominant vegetation is boliland (seasonally flooded grassland) with occasional occurrence of swamps, savanna, secondary forest and two perennial lakes. This 2,000 ha site is important for its diverse endemic flora and has excellent eco-tourism potential. It is one of the few areas in Sierra Leone still supporting viable populations of the threatened dwarf crocodile, and hosts 252 species of birds, belonging to 51 families. These include two near threatened species - Turati's Boubou and Rufous-winged Illadopsis. A waterfowl census conducted at the two wetlands of Dakrafi and Robierra (Thompson, 1994) gave a total of 1,280 birds of 18 species and includes a large count of the White-faced Whistling Duck. In addition to birds, eight species of primates are known to occur in this sanctuary. Also present are big game mammals such as bushbuck, bush pig, genets and duikers. The threatened primate species are the Western Chimpazee (En) and Red Colobus monkey (Vu). Other threatened fauna are Pigmy Hippo (NT) and Dwarf Crocodile. Major threats to the site include cattle grazing and fishing.

Other key interventions in biodiversity conservation include the:

- EC-financed project “Conservation of the Western Area Peninsula Forest Reserve and its Watershed”, which is being implemented by Welthungerhilfe and Environmental Forum for Action (ENFORAC);
- "Trans-boundary Peace Park Project", which is implemented by Bird Life International and the Conservation Society of Sierra Leone;
- USAID-supported trans-boundary project between Sierra Leone and Guinea;
- EU/CARE supported Sustainable Agriculture Project in Koinadugu; and
- Irish Aid-supported project in support of Tiwai Island Sanctuary.

International NGOs involved in conservation activities in Sierra Leone include Conservation International, the Royal Society for the Protection of Birds (RSPB) and Bird Life-Netherlands. National NGOs that may become implementing partners or service providers under the project include the Conservation Society of Sierra Leone, INFORAC, the Environmental Foundation for Africa (EFA), and the TACUGAMA Chimpanzee Project.

6. Persistent Organic Pollutants (POPs)

Persistent organic pollutants (POPs) are pesticides, industrial chemicals, or unwanted by-products of industrial processes that have been used for decades but have more recently been found to share a number of disturbing characteristics. POPs exposure can cause severe effects on human health through birth defects, cancers, and immune and reproductive system disorders, on biodiversity, and on ecosystems. Reducing POPs can thus produce global environmental benefits such as:

- Reduced POP risks on human health and the environment through reducing and eliminating production, use and releases of POPs; and
- Protected ecosystems and their goods and services, including biodiversity, from POP impacts.

The Stockholm Convention currently focuses on 21 POPs of immediate concern: pesticides, industrial chemicals, and unintentional byproducts. The original 12 POPs, often referred to as "the dirty dozen", are: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, hexachlorobenzene (HCB), polychlorinated biphenyls (PCBs), dioxins, and furans. In May 2009, the Conference of Parties took the historic decision to add 9 new chemicals to the list of controlled substances under the Convention: alpha- and beta- hexachlorocyclohexane (by-products); lindane and chlordecone (pesticides); tetra- and hexa- bromodiphenyl ether, hexabromobiphenyl, pentachlorobenzene, perfluorooctane sulfonic acid, and perfluorooctane sulfonyl fluoride (industrial chemicals).[20]

6.1 POPs Production and Use

None of the original twelve POP chemicals have been or are manufactured in Sierra Leone. Importation of POP pesticides and application equipment is undertaken by commercial organizations. In the past, POP pesticides, such as DDT and Dieldrin, were used across the country. Now, the only POP pesticide still in use in the country is HCB, although quantities of obsolete pesticides (e.g. Kocide 101) are still in stock due to a lack of proper disposal facilities.

According to the current estimations, there are no significant stockpiles of PCBs in Sierra Leone. PCBs enter the country through imported electrical appliances, hydraulic oils, and impregnators etc. The National Power Authority (NPA) and the Bo-Kenema Power Services (BKPS) are the major providers of electricity nationwide and the major owners of transformers. It has been estimated that nearly 75% of the transformers in Sierra Leone contain more than 500 ppm PCB levels, while the remaining 25% have no PCBs.

Table 3 shows the estimation of POPs released in Sierra Leone. The major releases are into the air (646 g TEQ/a) and into residues (588 g TEQ/a). Countrywide surveys, with the aim of identifying possible contamination sites and determining the levels of contamination, revealed no sites contaminated with POP pesticides. Two thermal power stations and a privately owned used oil refinery were identified has having potential PCB contamination. Also, two municipal waste dump sites, where hospitals disposed medical wastes by open burning, were identified as posing health and environmental threats because of their locations.

[20] Government of Sierra Leone (2008) *National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (POPs).*

Table 3. Estimated releases of U-POPs in Sierra Leone

No.	Main Source Categories	Annual Releases (g TEQ/a)			
		Air	Water	Land	Residue
1	Waste incineration	2.0			0.01
2	Ferrous and non-ferrous metal production				
3	Power generation and heating	6.88			
4	Mineral production	0.274			
5	Transport	0.008			
6	Uncontrolled combustion processes	637		8.00	588
7	Production and use of chemicals and consumer goods (inc. gas flaring from oil production)				
8	Miscellaneous	0.00018			
9	Disposal/Landfill		0.09		
10	Potential hotspots	-	-	-	-
1-9	Total	**646.16**	**0.09**	**8.00**	**588.01**

Source: *National Implementation Plan, Table 9*

6.2 Potential Global Environmental Benefits

With GEF funding (GEF ID 2486), the Government of Sierra Leone has developed an Action Plan to reduce or eliminate the chemicals in Annexes A and B of the Stockholm Convention. Since Sierra Leone does not produce POPs, the strategies developed focus on:

- Control of importation and use;
- Awareness raising of decision makers and users; and
- Equipping the institutions involved with the means of identification and intervention.

Priority activities cover strengthening the legal and institutional framework for management of POPs and other agricultural and industrial chemicals, facility development for PCB disposal, establishment of coordination mechanisms for POPs management, establishment of better environmental practices to manage POPs pesticides, and creation of public information, awareness raising and education tools and mechanisms on POPs.

Although the NIP has now been prepared, it has yet to be ratified by Parliament. However, steps are underway to integrate the proposals in the NIP into a regional project that is expected to receive GEF funding.

7. Ozone Depleting Substances (ODS)

Ozone depletion has adverse impacts on humans, animals, plants and ecosystems, and the objectives in this focal area are to safeguard the ozone layer through phasing out the use of Ozone Depleting Substances (ODS) worldwide. The agreed global environment benefits of projects under this focal area include:

- Protected human health from cancer, cataracts, and immune system impairment through the prevention of releases of ODS;
- Reduced the ODS risks on the environment, such as aquatic ecosystems, terrestrial plants, and possibly climate change; and
- Sustained ecosystem services and goods through the phase-out of HCFCs.

7.1 Status of Ozone Depleting Substances

Table 3 presents data on the level of ODS consumption in Sierra Leone which shows that only HCFCs (hydro-chlorofluorocarbons) are a problem as far as the production and consumption of ODS is concerned. HCFC-22 is used solely for servicing refrigeration equipment, consisting of 55,000 split/window air-conditioners; 16,000 cold rooms used in the food processing enterprises, ice-making plants and central air conditioning systems used in a few Government and private institutions; and 1,000 refrigerated transport units.

Table 4. ODS Consumption Levels in Sierra Leone (tons)

Annex Group Name	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Baseline (1998-2000)
CFCs	92.9	80.8	66.3	64.5	26.2	18.2	10.4	4.2	6.1	0.0	78.6
Halons	9.0	0.0	15.0	18.5	0.0	0.0	0.0	0.0	0.0	0.0	16.0
Other Fully Halogenated CFCs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carbon Tetrachloride	0.7	0.2	0.1	2.4	0.0	0.0	0.1	0.2	0.1	0.0	2.6
Methyl Chloroform	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HCFCs	1.9	2.2	2.0	1.6	1.0	1.4	1.5	1.4	1.5	1.8	1.7
HBFCs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bromochloro-methane		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Methyl Bromide	1.2	1.2	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	2.6

Source: *Personal communications, V. H. O. Sawyer, Ozone Officer, Environmental Protection Agency, Freetown.*

NB: *"Calculated Levels of Consumption" means production plus imports minus exports of controlled substances (paragraph 6 of Article 1). However, any export of controlled substances to non-Parties are not be subtracted in calculating the consumption level of the exporting Party (paragraph (c) of Article 3).*

7.2 Potential Global Environmental Benefits

HCFC phase-out strategy

The objective of Stage I of the on-going HCFC Phase out Management Plan (HPMP) for Sierra Leone is to meet the Montreal Protocol's HCFC control targets, up to and including the reduction in 2020, while Stage II will focus on phasing out the remaining HCFC consumption by replacing and retrofitting equipment to natural refrigerants (Tables 5 and 6).

With funding from the Multilateral Fund for the Implementation of the Montreal Protocol, Sierra Leone has made good progress in the implementation of its HPMP[21]. Sierra Leone's ODS regulations issued in 2008, were revised in 2011 to incorporate further control measures on the phase-out of ODS including HCFCs. The regulations control imports and exports of ODS and ODS-based equipment, and provide for quota and licensing systems (coordinated by the National Ozone Unit in the Environment Protection Agency) and the registration and certification of all stakeholders including refrigeration service technicians and ODS importers. The Government of Sierra Leone has put in place strategies to achieve the complete phase-out of HCFCs through the promotion and use of natural refrigerants and other viable alternative technologies that have high-energy efficiency with low global warming potential.

Table 5. The Sierra Leone HCFC Phase out Management Plan (HPMP)

	Description	Period
Overarching Strategy	Provision of ozone and climate benefits through the integrated plan for ODS reductions for the refrigeration sector, promotion and adoption of energy efficiency alternative technologies.	2011-2030
Stage I	Reduce HCFC consumption by at least 35 per cent of the baseline (1.67 ODP tons) through the establishment of good servicing practice that would enable the safe use of natural refrigerants, implementation of activities reducing consumption of HCFC-based blends and an incentive program to retrofit HCFC-based equipment to alternative refrigerants.	2011-2020
Stage II	Implementation of activities to completely phase out remaining consumption of HCFCs based on the use of natural refrigerants.	2021-2030

Source: *HCFC phase-out management plan (stage I, first tranche)*

Table 6. HPMP Annual Targets for Stage I

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Montreal Protocol reduction schedule of Annex C, Group I substances (ODP tons)	N/A	N/A	1.67	1.67	1.5	1.5	1.5	1.5	1.5	1.09	N/A
Maximum allowable total consumption of Annex C, Group I substances (ODP tons)	N/A	N/A	1.67	1.67	1.5	1.5	1.5	1.5	1.5	1.09	N/A

Source: *HCFC phase-out management plan (stage I, first tranche)*

[21] UNEP/UNIDO (2013) *Project Proposal: HCFC Phase-out Management Plan (stage I, second tranche)*.

8. International Waters

Global environmental benefits in the International Waters focal area include:

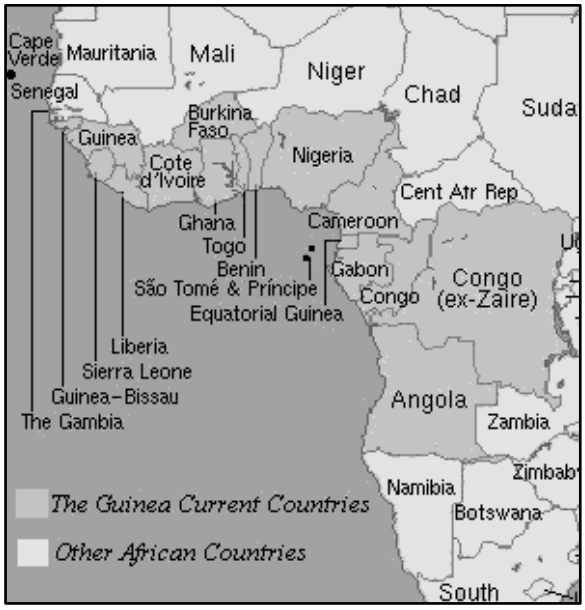
- Multi-state cooperation to reduce threats to international waters;
- Reduced pollution load in international waters from nutrient enrichment and other land based stresses;
- Restored and sustained freshwater, coastal and marine ecosystems goods and services, including globally relevant biodiversity and ecosystems as well as capacity to absorb carbon to reduce global warming; and
- Reduced vulnerability to climate variability and climate-related risks, and increased ecosystem resilience through catalyzing multi-state cooperation to balance surface and groundwater use across sectors.

8.1 The Guinea Current Large Marine Ecosystem (GCLME)

Sixty-four large marine ecosystems (LMEs) have been delineated globally. They are defined by their distinctive bathymetry, hydrography, chemistry, and tropho-dynamics. Sierra Leone is in the Guinea Current Large Marine Ecosystem (GCLME), which stretches from Guinea Bissau at the southern end of the Canary Current down to northern Angola, the seasonal limit of the Benguela Oceanographic Current. The LME includes the drainage basins of major rivers such as the Niger and Volta and extends seaward to the (variable) front delimiting the Guinea Current from open ocean waters.

Spanning 16 countries, from Guinea Bissau to Angola (Angola, Benin, Cameroon, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Gabon, Ghana, Equatorial Guinea, Guinea, Guinea-Bissau, Liberia, Nigeria, Sao Tome and Principe, Sierra Leone and Togo), the Guinea Current Large Marine Ecosystem (GCLME) is ranked among the most productive coastal and offshore waters of the world with rich fishery resources, oil and gas reserves, precious minerals, a high potential for tourism and an important reservoir of globally significant marine biodiversity.

Figure 1. Countries along the GCLME



8.2 Contribution to GEBs in International Waters

Sierra Leone has participated in two regional GEF projects that are making a contribution to the attainment of GEBs in the International Waters focal area: the UNDP-UNEP project, "Combating Living Resources Depletion and Coastal Area Degradation in the Guinea Current Large Marine Ecosystem (LME) through Ecosystem-based Regional Actions" (GEF ID 1188); and the "SP-SFIF: West Africa Regional Fisheries Program (WARFP)" (GEF ID 3558), with participation from Senegal, Cape Verde, Sierra Leone and Liberia.

The project on Combating Living Resources Depletion has an overall development goal to create an ecosystem-wide assessment and management framework for the sustainable use of living and non-living resources in the GCLME to: recover depleted fish stocks; restore degraded habitat; and reduce land and ship-based pollution.

With 5 components, 37 outputs and over 100 activities, the GCLME project was a substantial undertaking. Important milestones during the life of the project have been the completion of a transboundary diagnostic analysis (TDA), development and endorsement of the Strategic Action Plan (SAP), creation of the Interim Guinea Current Commission (IGCC) and the decision to create a permanent Guinea Current Commission (GCC) through a protocol to the Abidjan Convention. Fifteen countries developed National Action Plans (NAPs) and six national demonstration projects were completed with the results disseminated. The project invested substantially in individual capacity building though over 80 workshops. Together, these represent important foundational steps towards the project development goal – to create an ecosystem-wide assessment and management framework for sustainable use of living and non-living resources in the GCLME.

Although delivery and outcomes in the areas of fisheries and living resources, biodiversity and habitats, and water quality fell short of those anticipated in the project document, key outputs in this area – reflecting strong partnerships with UNEP GPA, FAO, IMO and the Abidjan Convention – include:

- development of regional fisheries management plans;
- national plans of action on land based sources of marine pollution (NPAs-LBS);
- adoption of the Protocol Concerning Cooperation in the Protection of the Marine and Coastal Environment from Land-Based Sources and Activities;
- adoption of the amended regional Protocol Concerning Cooperation in Combating Pollution in Cases of Emergency in the Western and Central African Region;
- and a related Regional Contingency Plan.

In the West Africa Regional Fisheries Program (WARFP), the combined development and global objective is to sustainably increase the overall wealth generated by the exploitation of the marine fisheries resources of West Africa, and the proportion of that wealth captured by West African countries. Key Issues addressed in Sierra Leone are: poor governance of the sector and weak regulatory and management frameworks for sustainable fisheries as the sector grows in the aftermath of the war; high levels of illegal fishing, particularly increasing the country's capacity to prevent illegal foreign vessels; poor benefits from fisheries to the local economy; and weak small-scale processing.

The expected global environmental benefits of the project are the protection of the globally significant fish habitats and fish stocks in the Canary Current Large Marine Ecosystem (CCLME). The country-based projects would contribute to the improved governance and management of the resources and strengthened capacity of stakeholders to consider the values of sustainable fisheries. Additionally, by improving the value of the resources from in-land processing (and improved post-harvest handling of fish catch), the investments will develop the artisanal sector and create jobs from small-scale processing activities, thereby decreasing the pressure on the resource. Thus, better resource management and reduced poverty in West Africa will further strengthen sustainability in the CCLME.

Progress toward sustainably increasing the economic benefits from the region's fisheries has been substantial. The Government of Liberia and Sierra Leone have now substantially increased surveillance and reduced illegal fishing, creating space for the development of a new long-term feasible policy vision, based on more sustainable exploitation of the resources. At the regional level, the Sub-Regional Fisheries Commission (CSRP) has begun the work of reviewing the monitoring and data collection systems for fisheries in each of the participating countries, to help them establish a national 'dashboard' of key fisheries information (such as fishing licenses and revenues), that would be aggregated into a regional dashboard that would serve as a knowledge portal for the region's fisheries.

TECHNICAL DOCUMENT C

Review of Outcomes to Impact (ROtI)

LDC/SIDS Portfolio Project: Capacity Building for Sustainable Land Management in Sierra Leone

(GEF ID 3510)

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Acronyms

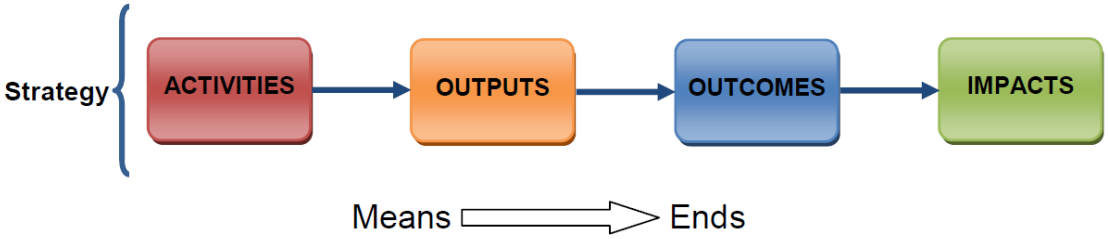
CBD	Convention On Biodiversity
CPE	Country Portfolio Evaluation
CPS	Country Portfolio Study
EA	Enabling Activity
ECOWAS	Economic Community Of West African States
EDS	Enterprise Development Services Ltd
EECP	Energy Efficiency and Conservation Program
EPA	National Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
GEFIEO	GEF Independent Evaluation Office
GHG	Greenhouse Gas
GIS	Geographic Information System
GoSL	Government of Sierra Leone
IBRD	International Bank for Reconstruction
ICR	Implementation Completion Report
ID	Impact Driver
IDA	International Development Association
IS	Intermediate State
IUCN	International Union For The Conservation Of Nature
LDCF	Least Developed Country Fund
MAFFS	Ministry of Agriculture, Forestry and Food Security
MDA	Ministries, Departments And Agencies
MDG	Millennium Development Goal
MODEP	Ministry Of Development And Economic Planning
MRU	Mano River Union
MSP	Medium Size Project
MTI	Ministry Of Trade and Industry
MTIP	Medium-term Investment Plan
NAP	National Action Program to Combat Desertification/Land Degradation
NEAP	National Environmental Action Plan
NEP	National Environmental Policy
NEPA	National Environment Protection Act
NLP	National Land Policy
NRM	Natural Resource Management
NTFP	Non Timber Forest Product
NU	Njala University
PCU	Project Coordination Unit
PDF	Project Development Facility
PMU	Project Management Unit
PRSP	Poverty Reduction Strategy Paper
RAF	Resource Allocation Framework
ROtI	Review of Outcomes to Impacts
SLM	Sustainable Land Management
TOC	Theory of Change
UNCCD	United Nations Convention To Combat Desertification
UNDP	United Nations Development Program

1. Introduction to the ROtI Approach

Terminal project evaluations rarely provide information about impact due to the lack of data available to make such an assessment, and the complexity of environmental processes and the long timeframe needed to generate impact, which may only be realized many years after project completion. The ROtI methodology seeks to overcome these challenges by exploring the underlying logical sequence of conditions and factors – referred to as the 'theory of change' – that will lead to impact, and by assessing the extent to which the theory of change has been realized in practice. The methodology provides a quick and cost effective way of indirectly measuring project impact, or the potential to deliver impact in the future.

GEF projects are generally designed and structured according to a logical framework, which in essence is a simplified theory of change, with the following basic means-to-ends hierarchy:

Figure 1. Means-to-ends hierarchy for standard logical frameworks



Most GEF projects and their terminal evaluations mainly focus on the first three steps in the above LogFrame hierarchy – the project activities, which achieve a set of outputs, which in turn will contribute to achieving outcomes. However, GEF Terminal Evaluations (TEs) also score the likelihood that project results will be sustainable, thereby implicitly assessing the likelihood of impact. But to more explicitly understand the process for delivering eventual impact, the ROtI methodology focuses on the last step in the means-to-ends hierarchy, developing a detailed theory of change from outcomes to impacts. The *ROtI Practitioner's Handbook* (GEFEO 2009) provides a detailed explanation of the ROtI methodology. The main stages include:

Stage 1: Impact identification

The initial characterization of the project's intended long-term environmental impacts, which in the ROtI methodology are referred to as Global Environment Benefits (GEBs). Understanding what the project is ultimately trying to achieve is a vital first step in developing the theory of change for achieving impact.

Stage 2: Project LogFrame review

The verification of the project's outcomes, and their appropriateness to achieving the desired impacts.

Stage 3: Outcomes to impacts analysis

The identification and assessment of the logical steps, conditions and associated factors (i.e. theory of change) necessary to overcome the barriers to realizing impacts, which provide an indirect measure of impact.

2. The Sierra Leone Sustainable Land Management Project (SLM)

2.1 Project Objectives

Long-term goal: Contribute to the mitigation of land degradation and promotion of ecosystem integrity and stability, with enhanced ecological functions and services through capacity development and mainstreaming of sustainable land management (SLM).

Project objective: Strengthen Sierra Leone's national institutional and human resource capacity to combat land degradation in Sierra Leone.

The project was expected to build capacity for SLM in Sierra Leone by the removal of the key barriers to SLM, and to mainstream SLM into laws, university and school curricula, and the national budget. This project was to create sustainable capacity and ownership in Sierra Leone to mitigate land degradation and thereby meet the country's obligations under the United Nations Convention to Combat Desertification (UNCCD).

2.2 Project Financing

The project had a total budget of USD 1,178,000 that was to be financed by a total GEF commitment of USD 475,000 and by co-financing commitments of about USD 703,000.

Table 1. Projected financing of the SLM project in Sierra Leone

Donor	Amount (US$)
GEF	475,000
UNDP	200,000
Government	100,000
FAO	290,000
CILSS	13,000
EU	100,000
TOTAL	**1,178,000**

Source: *Project Document, GEF ID 3510*

The UNDP Terminal Evaluation Report[22] indicated that GEF actually contributed USD 475,000 while the UNDP allocated USD 163,400.00 as co-finance to the project. Other co-finance allocations were in kind or aligned to complement the activities of similar projects undertaken by the partners.

2.3 Project Implementation and Components

The project was implemented over a period of three years. It was slated to have started in June 2009 and end in June 2012, but an extension until December 2012 was granted upon request by the PIU due to delays in start-up. It therefore finally ended in December 2012.

Sierra Leone has a problem of deforestation and land degradation caused by many factors, with many barriers that prevent the country from implementing SLM practices. The SLM Project was

[22] GEF (2013) *Terminal Evaluation Report: GEF ID 3510.*

designed to build capacity for SLM in Sierra Leone by the removal of key barriers and to mainstream SLM into, laws, university and school curricula and budgets through a Mid-Term Investment Plan (MTIP). It was to prioritize training and capacity building, mainly in the areas of sustainable resource management practices for mangroves, wooded savannas, woodlots and fallows.

The Environment Protection Agency (EPA) under the Office of The President was the official key partner. The Project was implemented by a Project Management Unit, headed by a National Coordinator, and situated at EPA-SL. The UNDP Sierra Leone Country Office provided guidance to the project implementation and evaluation reviews. A Steering Committee made up of representatives of several Ministries and UNDP provided oversight for project implementation. A Technical Committee for Mainstreaming (TCM) was formed primarily to provide technical and professional guidance in the mainstreaming of SLM during the implementation of the Project and to assist the PIU achieve the outputs of the component.

To address the issues of deforestation and land degradation resulting in soil fertility loss and decline in crop yields on upland rainfed sites, wildfires on farm fallows and wooded savannas it was felt that the establishment of demonstration sites was crucial, thorough which natural resource and fire management would be undertaken; the tree cover of wooded savannas would almost certainly quickly develop and close in to create a new closed canopy forest. If fire protection continued, and if seed sources of native shade tolerant trees were available (or perhaps, if they were reintroduced), these new forests would evolve towards a more natural type of forest. Under management, they could evolve towards a forest with a high density of high value species. Improved capacities for fire control and fire management would be essential for developing more sustainable forms of land management. The sites would also provide the forum for capacity building of other local and national NGOs and of government agencies for replication of the community-based management systems.

Ten one hectare sites in Makari and Makoth in Makari-Gbanti Chiefdom (wooden savanna) and Gbendembu in Gbendembo-Gowahun Chiefdom (mixed forest and savanna grassland), all in Bombali District were identified as the restoration demonstration sites. Boundary demarcation and ecological surveying of pilot sites, as well as comprehensive baseline data collection was undertaken. Lease agreements for the land for the pilot sites was signed between the SLM Project and the land owners and tribal authorities of Makari, Makoth and Gbemdembu in the presence of the two Paramount Chiefs, PC Massa Yelli Tham II of Makari Gbanti Chiefdom, and P.C. Kandeh Baba Keha III of Gbendembu Chiefdom, their tribal authorities and District Council Administrators and functionaries.

Two local NGOs (PASACOFAS and Green Scenery) were contracted to manage the pilot sites and signed MOUs to that effect. They submitted annual work plans based on the MOU. A consultancy firm was contracted to update the Integrated Financial System (IFS) of the project and provided a report. However, the project technical committee on financial strategy and investment plan suggested that the framework to be used for developing the mainstreaming action plan - the Medium Term Investment Plan (MTIP) be applied to the IFS. Therefore, the PIU was to resuscitate the IFS Technical Committee and review its mandate. The renewed mandate of the committee would ensure that the IFS process is as participatory as possible, which would ultimately encourage stakeholder responsible for implementing aspects of the plan to take ownership. It would also take into consideration the outcomes and recommendations of an ECOWAS workshop at Bamako. The upgrade of the mandate of the Technical Committee would come with additional expenses, which would be incurred in the implementation of activities to be determined by the Committee. The specific tasks of the Committee were expected to cover a period of six months, which would culminate in the IFS plan and its adoption by government. There is no evidence that any further action was taken to prepare the MTIP.

The project undertook activities to increase public participation in the mainstreaming process and popularization of a mainstreaming roadmap for eventual integration of land management into the

policies and action plans of the targeted MDAs. It included such topics as rapid deforestation, encroachment on protected forests, bush fallow or rotational farming system that promotes deforestation; land disputes and the chaotic land tenure system; dumping of waste in coastal and marine environment; construction of unauthorized sub-standard housing units on topographically unsuitable areas like hill-slopes and valleys; degradation of forests and water sources in water intake points and hydro watersheds; environmental issues that are not properly addressed by responsible ministries; wide-spread land devastation in the wake of mining operations and other activities.

Meetings were held with officials of MDAs – such as the National Fire Force, the Forestry Department, Department of Agriculture, and local government among others – within the provincial councils (Makeni and Bo) on their views towards how best to create ownership within the project. It was expected that after validation, recommendations on the way forward for SLM mainstreaming would be collected and incorporated in a final document that would be approved by the Government of Sierra Leone (GoSL). There is no evidence that any document was submitted for final approval by GoSL.

An important activity was the construction of fire belts of approximately one hectare around each site using cassava, pineapple and other plants. The activity created immediate employment for more than 50 youth in the communities around the pilot sites. Fire monitors (22 men, 2 women) were employed for prevention of fires in the pilot sites. Despite this, the Makari pilot site was accidentally burned down in April 2011, and again in 2013, after the end of the project.

2.4 Project Performance at Completion

UNDP's Terminal Evaluation Report for the Project was submitted in April 2013. The ratings were as follows:

- **Relevance:** The project was highly relevant to Sierra Leone with respect to capacity building for developing SLM practices to arrest land degradation and promote healthy ecosystems and sustainable livelihoods in different ecological zones of the country
- **Effectiveness:** Rated as *highly satisfactory.*
- **Efficiency:** Rated as *satisfactory.*
- **Impact:** Overall, the evaluator rates the long-term impacts of the project on the local environment and poverty reduction as *highly satisfactory.*
- **Sustainability:** The sustainability and replication elements of the project were rated as *satisfactory.*

3. The Project's Global Environment Benefits

The starting point for the ROtI assessment is to identify the project's intended environmental impacts. For GEF projects, these are termed Global Environment Benefits (GEBs), which are defined in the ROtI Handbook (2009) as 'lasting improvements in the status of an aspect of the global environment that safeguard environmental functioning and integrity as well as benefiting human society'. The expected Global Environmental Benefits (GEBs) for this project were listed as follows in the project document (GoSL and UNDP 2007):

1. Restored ecosystem integrity and function of very badly degraded mangrove forests. Of special ecological importance is the value of the mangroves as an irreplaceable nursery for a wide variety of marine species including fish species of commercial importance to both coastal and open ocean fisheries.
2. The project will begin to restore extremely degraded wooded savannas back towards a closed canopy forest. This can be expected to result in a greatly diminished frequency, if not the elimination, of fire from the ecosystem. This will lead to the conversion of the wooded savannas from a fire-based ecosystem, with annual loss of nutrients, to a closed canopy ecosystem with continual recycling of nutrients, the development of a litter layer and the increase in biodiversity over time. The hydrological functions will evolve dramatically resulting in much greater infiltration of rainwater and the development of a more natural hydrological regime.
3. Greatly increased volume of wood and sequestered carbon per hectare in managed mangrove and wooded savannas.
4. Increased litter layer and soil organic matter and increased woody component on fallow lands due to fire management and very early burning.
5. Improved biodiversity conservation in mangrove and wooded savannas.
6. Critical estuary/nursery functions of mangroves will be conserved. The biodiversity of the mangroves is expected to increase very dramatically.
7. Fire management in wooded savannas will allow the reestablishment of fire-intolerant species more adapted to the original natural ecology. As the canopy coverage closes in, the fauna of the forest should evolve rapidly from the fauna of an open savanna ecosystem to that of a closed canopy forest.
8. Improved sustainability of agricultural lands. The fire management on fallow lands will result in increased organic matter in fallow soils and enhanced recovery of soil fertility. The fire management will result in a significant increase in the woody vegetation cover of fallow lands. Deep-rooted woody species are generally much more efficient in the restoration of soil fertility than the grass species that dominate fallow lands that burn very hot in the mid to late dry season.

Taken together, the outcomes and impacts above directly address a number of GEBs under the land degradation focal area, namely: improved provision of agro-ecosystem and forest ecosystem goods and services and mitigated/avoided GHG emissions and increased carbon sequestration in production landscapes.[23]

[23] http://www.thegef.org/gef/GEB

4. The SLM Outcomes to Impacts Theory of Change

The Theory of Change (TOC) for a project is the logical sequence of conditions and factors that are necessary to deliver the ultimate project impact. The basic project theory of change starts with activities and develops, through a means-to-ends hierarchy, until finally reaching impact. GEF project terminal evaluations assess the basic theory of change as far as outcomes, but do not usually go far in assessing the crucial last step to impact. The ROtI assessment focuses on this last step and develops and assesses a detailed TOC between outcomes and impacts, referred to as *outcomes to impacts pathways*. Each outcome to impacts pathway represents a specific project strategy. Figure 2 below illustrates the key elements and relationships for a detailed TOC between outcomes and impacts, which applies to many GEF activities.

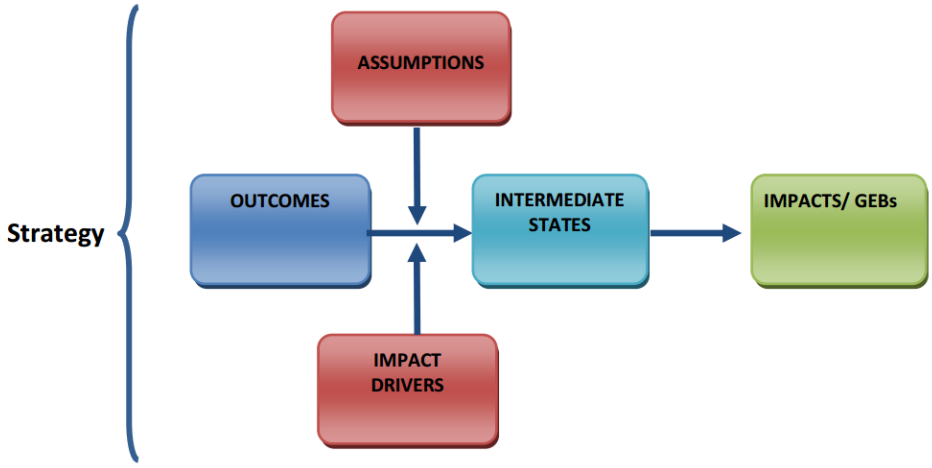


Figure 2. Generic theory of change for outcomes to impacts pathways

The key ingredients of the outcomes to impacts pathways that are examined by the ROtI are *intermediate states, impact drivers and assumptions*, which are defined in Table 2 below. If the project outcomes are assessed to be successfully delivered and the key ingredients of the TOC between outcomes and impacts are in place, then it is reasonable to conclude that there is indirect evidence that the barriers and threats to impact have been overcome and that impact has or will be achieved with time.

Table 2. Definitions of Theory of Change Elements in the Outcomes to Impacts Pathways

TOC terms	Definition
Intermediate States (IS)	These are the transitional conditions between the project's outcomes and impacts that must be achieved in order to deliver the intended impacts
Impact Drivers (ID)	These are the significant factors that, if present, are expected to contribute to the ultimate realization of project impacts and that are within the ability of the project to influence
Assumptions (A)	These are the significant factors that, if present, are expected to contribute to the ultimate realization of project impacts, but that are largely beyond the power of the project to influence or address

The overall theory of change for the SLM is summarized in Figure 3. It can be seen from the Figure that the project had two strategies to deliver its intended impacts, namely:

- **Strategy 1:** Strengthen institutional capacity for sustainable land management
- **Strategy 2:** Mainstream SLM into laws, university and school curricula and budgets, through a Mid-Term Investment Plan

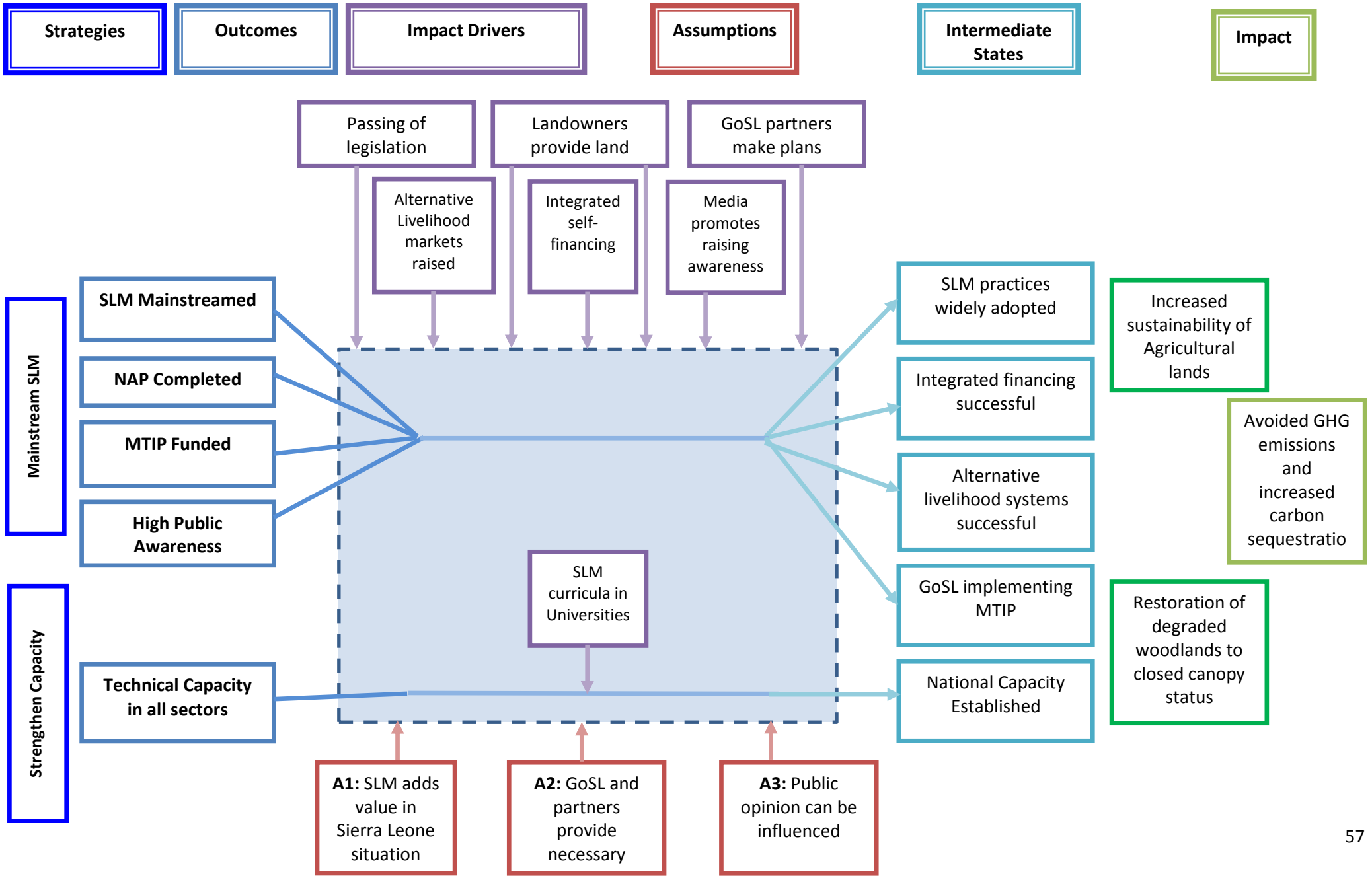
These strategies will be examined individually to see how they were adopted and with what effects. However, it should be born in mind that the strategies are inter-related, rather than discreet and that they are treated individually for purposes of analytical clarity. Furthermore, underlying the project was a set of assumptions, which needed to hold true across all of the strategies if they were to succeed. During the course of project support, the two strategies were expected to contribute towards the delivery of five broad outcomes:

- **Outcome 1:** Sustainable land management is mainstreamed into policies, laws, programs, budgets and regulatory frameworks
- **Outcome 2:** National Action Program (NAP) to combat desertification/Land Degradation is completed and approved
- **Outcome 3:** Medium-term investment plan (MTIP) is approved and funded
- **Outcome 4:** Public awareness of the desirability of Sustainable Land Management is high
- **Outcome 5:** Technical and Management capacity for Participatory Sustainable Land Management exists in all sectors in Sierra Leone

For analytical purposes, the broad outcomes were subdivided into more specific deliverables, all of which should be attained in order for the strategy to deliver its expected results. For each strategy, there were also impact drivers, which needed to be active at all stages of the intended cause and effect chain in order to promote and sustain new patterns of behavior. These impact drivers were part of the processes set in motion by the project, but are not direct project outcomes. Although individual impact drivers may relate particularly closely to one strategy or another, they all need to be in place for any of the strategies to deliver its intended results. For the Sierra Leone SLM, there are 7 key impact drivers, namely:

- **Impact Driver 1:** Markets and marketing mechanisms are in place for products from income generating alternative livelihood activities of households.
- **Impact Driver 2:** Realistic and adequate integrated self-financing plans are developed for SLM pilot sites
- **Impact Driver 3:** Electronic and print media promote SLM (Lessons learned from implementation of Pilot Sites are widely disseminated through local radio stations)
- **Impact Driver 4:** "GoSL and partners make plans for SLM
- **Impact Driver 5:** National Parliament and local governments willing to pass legislation on SLM
- **Impact Driver 6:** Landowners willing to set aside family land for implementation of SLM practices, manage by each family
- **Impact Driver 7:** Njala University, and other Universities and secondary schools effectively integrate SLM into their curricula

Figure 3. Overall Theory of Change for Sierra Leone SLM Project



Finally, a set of assumptions formed the basis on which the project results could be achieved. The extent to which these held would have an important effect on the extent to which the project could move towards its Global Environment objective. Three key assumptions were identified as underlying the project:

- **Assumption 1:** SLM adds value in the Sierra Leone situation
- **Assumption 2:** GoSL and international partners provide necessary funding for implementation of SLM projects
- **Assumption 3:** Public opinion can be influenced in favor of SLM

Between the outcomes and the intended impacts a complex set of intermediate states must be passed through. In order to analyze the achievements of the project in the long term, it is necessary to review each of its two strategies in turn, to see to what extent the intended cause and effect chain materialized. This is undertaken in Chapter 5 below.

5. Assessment of Achievement of the Outcomes to Impacts Pathways

The assessment of achievement of the outcomes to impact pathways was undertaken on the basis of individual interviews with former project officers, group discussions with project staff, including the NGOs managing the pilot sites, group discussion with project beneficiaries (communities and individuals) and a review of project documentation. The assessment is presented according to the two main strategies identified for achieving impact in the project brief. These strategies link with the identified intermediate states considered necessary to deliver impact.

The rating system used for the assessment is defined in the ROtI handbook and shown in Table 3 below. It is applied at different levels of the Theory of Change, both at the individual TOC element level (outcomes, impact drivers, assumptions and intermediate states), and at the overall project level.

Table 3. Field ROtI Rating System

Rating	Description
0	Not achieved
1	Poorly achieved
2	Partially achieved
3	Well achieved

In Box 1 below, the ratings are elaborated with descriptions of their interpretations. These descriptions provide guidance for the rating; although the complexity of GEF projects means that an aspect of the Theory of Change may not exactly fit at one particular rating level. In this situation, the lower rating level is assigned.

The reporting for each strategy starts off by providing a justification for why the identified intermediate state and associated factors for the strategy are considered important in delivering ultimate impact. The theory of change for the strategy is then examined through its logical steps, firstly validating the extent to which the outcomes were achieved at project closure, followed by an assessment of the extent to which the impact drivers and assumptions have been realized. Each section concludes with an assessment of achievement of the intermediate state itself.

Box 1. ROtI Rating Guideline Interpretations

Not achieved (0)

From a *theoretical perspective*, the Theory of Change (TOC) aspect is not explicitly or implicitly identified by the project, and/ or from a *delivery perspective*, very little progress has been made towards achieving the TOC, and the conditions are not in place for future progress.

Poorly achieved (1)

From a *theoretical perspective*, there are no appropriate mechanisms set out to achieve the TOC aspect after GEF funding ended, and/ or from a *delivery perspective*, little progress has been made towards achieving the TOC aspect, but the conditions are in place for future progress.

Partially achieved (2)

From a *theoretical perspective*, the TOC aspect is explicitly recognized and the mechanisms set out to achieve it are appropriate but insufficient (e.g. there is no clear allocation of responsibilities for implementing the mechanisms after GEF funding ends). From a *delivery perspective* moderate and continuing progress is being made towards achieving the TOC aspect, although there is not yet a strong basis for the eventual delivery of the intended Global Environmental Benefits.

Well achieved (3)

From a *theoretical perspective*, the TOC aspect is explicitly recognized and appropriate and sufficient mechanisms to achieve it are apparent (e.g. specific allocation of responsibilities after GEF funding ended), and/or from a *delivery perspective* substantial progress has been made towards achieving the TOC aspect and a strong basis is in place for eventual delivery of the intended Global Environment Benefits.

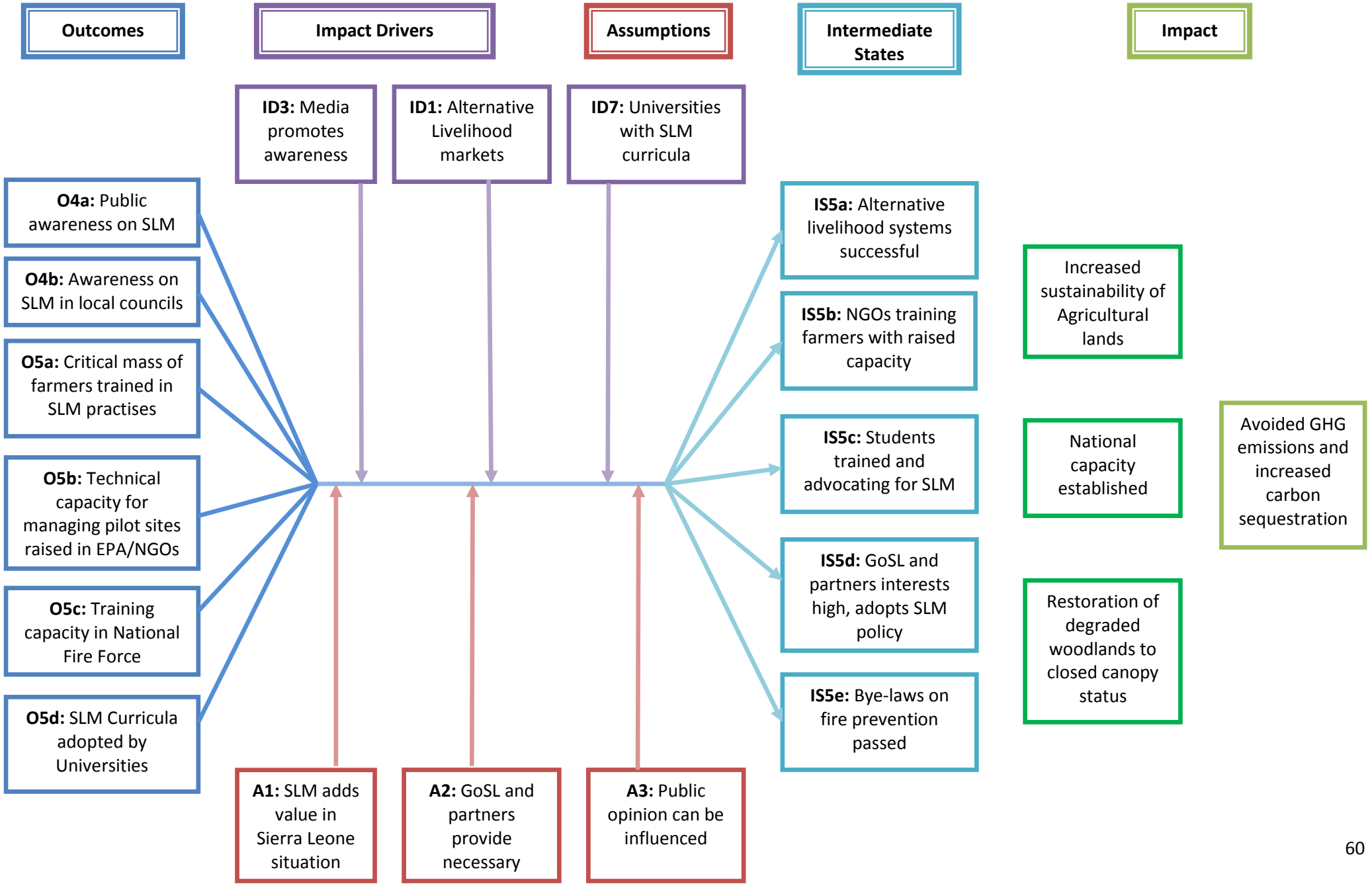
5.1 Strategy 1: Strengthening National Capacity for SLM

A Theory of Change Overview

The first strategy focused on a complex set of outcomes and intermediate states, which would support progress towards the intended GEB of improved provision of agro-ecosystem and forest ecosystem goods and services and mitigated/avoided GHG emissions and increased carbon sequestration in production landscapes, as a result of improved sustainability of agricultural lands and restoration of extremely degraded wooded savannas back towards closed canopy forests.

The cause and effect chain is shown in Figure 4 below. Whilst the intended outcomes would raise capacity, awareness and standards, the intermediate states would build on these achievements to place SLM at the center of national policies, approaches and practices.

Figure 4. Strategy One: Strengthen National Capacity for SLM



This strategy had two intended outcomes, which were seen as essential in order to successfully move towards the intermediates states. These were Outcome 4 of the Overall Theory of Change: Public awareness on SLM raised with two sub outcomes; and Outcome 5: Technical and Management Capacity in all Sectors on SLM raised, which consisted of four sub outcomes. The overall set of outcomes and sub-outcomes for this strategy is therefore as follows:

- **Outcome 4a:** Public awareness on SLM raised
- **Outcome 4b:** Awareness for SLM raised in local councils
- **Outcome 5a:** Critical mass of farmers trained in SLM practices, including fire protection and alternative livelihood systems
- **Outcome 5b:** Technical capacity for management of pilot SLM sites raised in EPA-SL and NGOs
- **Outcome 5c:** Capacity of National Fire Force in training local communities in fire protection of woodlands raised
- **Outcome 5d:** Curriculum on SLM adapted, and administered at Njala University and other Universities and Polytechnics

Based on interviews, discussions and document analysis the impact pathway was expected to lead through an initial set of five intermediate states to one second stage state IS 5: National Capacity established. These were as follows (see Figure 4):

- **Intermediate State 5a:** Farmers knowledge and their interest in adoption of alternative livelihood systems raised and their use becomes the norm
- **Intermediate State 5b:** The technical capacity of NGOs in SLM management raised, and they are successfully training farmers
- **Intermediate State 5c:** A large number of students trained in SLM and become strong advocates for the practices in their communities
- **Intermediate State 5d:** Government and private sector interest sustained and increased and the Government prepares and adopts a SLM policy
- **Intermediate State 5e:** Local Government increase their interests in SLM practices and pass bye laws on fire prevention

Three impact drivers were necessary to enable movement from the outcomes achieved towards the intermediate states, as shown in Figure 4.

- **Impact Driver 1:** Profitable alternative livelihood systems exist and their markets are functional, which is essential to get farmers interested in SLM practices.
- **Impact Driver 3:** The media promotes awareness of the need for SLM, the availability of SLM technology, and the profitability of adoption of SLM practices" which is necessary to get GoSL and local Governments interested in promoting SLM.
- **Impact Driver 7:** Njala University, and other Universities and secondary schools effectively integrate SLM into their curricula, which is necessary to ensure that a large cadre of trained people in SLM are produced.

Progress towards the intermediate states is built on three external assumptions, which underlie the cause and effect chain. These assumptions are the same across both strategies. They are as follows:

- **Assumption 1:** SLM adds value in the Sierra Leone situation
- **Assumption 2:** GoSL and international partners provide necessary funding for implementation of SLM projects
- **Assumption 3:** Public opinion can be influenced in favor of SLM

The next section explores the extent to which the Theory of Change relating to Strategy 1 has been realized in the 3 years of project implementation and the one year since project closure.

B Theory of Change Assessment

Outcomes

Outcome 4a: Public awareness on SLM raised

The project team spent time conducting meetings with all stakeholders to get a buy-in to a road map for mainstreaming SLM into national and local plans and strategies. As indicated earlier the road map covered such issues as rapid deforestation/encroachment on protected forests/bush fallows or rotational farming system that promotes deforestation, etc. There were also discussion programs in national and local radios. However, these activities were of too limited a scope to have had national impact. Even the road map document was not formally adopted and has not been propagated after project end.

Overall this outcome can only be rated as ***poorly achieved.***

Outcome 4b: Awareness for SLM raised in local councils

Awareness of the benefits of SLM among local council officials (Chiefdom Councils and District Councils) is essential if they are to support SLM activities in their areas and pass legislation on SLM practices such as prevention of fires or hunting for wild life (bush meat) in protected areas. Among the stakeholders contacted in discussion of the road map were officials of local councils. In addition there were lots of sensitization meetings with local authorities in which pilot sites were located on the benefits of restricting access to pilot sites for cutting of firewood or trapping of animals. Thus although no legislation was passed, local authorities were able to convince community members not to access the sites. Of course, enforcement of such restricted sites was facilitated by the fact that the lands were leased from landowners, who thus surrendered their rights to access the lands! There is no evidence that such restrictions would have been enforced without legislation for privately owned land.

Overall the Output is assessed as ***poorly achieved.***

Outcome 5a: Critical mass of farmers trained in SLM practices, including fire protection and alternative livelihood systems

Local capacity in SLM including fire prevention and use of alternative livelihood systems was developed in the communities with pilot sites. That was the main thrust of all project activities and there is evidence on the ground of such capacity increase. However, 12 months after project end, there is already evidence of erosion of the capacity, e.g. farmers trained in alternative livelihood systems such as use of compost and bee-keeping are not able to put them into practice at the Gbendembu site because of insufficient training. Furthermore, there are no indications of any noticeable improvement in the capacity for SLM in neighboring communities although some site visits were organized for them.

Overall, the outcome is rated as ***poorly achieved.***

Outcome 5b: Technical capacity for management of pilot SLM sites raised in EPA-SL and NGOs

The Environmental Protection Agency (EPA) was charged with management of the SLM project. The capacity still exists in the institution for management of such projects. Two local NGOs had their capacity increased for management of such projects (development of appropriate MOUs, some training in financial management, recruitment and training of staff in SLM practices including fire prevention and sustainable livelihood activities, etc.). But training and capacitating of two local NGOs is a long way from what would be necessary to have a national impact. Furthermore, 12 months after project end it is evident that the

capacity is being lost with departure of some key staff from the NGOs, and the NGOs are no longer carrying out SLM activities, as they are no longer receiving project funds for such activities.

Overall, the Outcome can only be rated as ***poorly achieved***.

Outcome 5c: Capacity of National Fire Force in training local communities in fire protection of woodlands raised

The District Fire Force in Bombali District demonstrated that it already has the capacity for training of local communities in fire prevention activities such as construction of fire belts and bush fire-fighting by fireguards. It designed and conducted training courses at the three SLM sites, as well as at other communities in the District. There is every indication that this capacity also exists in other Districts.

Although the SLM project did little capacity building of the Fire Force in Bombali and other District, the fact that the capacity exists leads to a rating of the Outcome as ***well achieved.***

Outcome 5d: Curriculum on SLM adapted, and administered at Njala University and other Universities and Polytechnics

The envisaged SLM curriculum was not developed at the Universities, as the technical support needed could not be provided by the project. However, the Schools of Environmental Sciences & Agriculture at Njala University have courses in topics related to SLM, so that all students graduating from the University in environmental science are exposed to SLM principles.

No new curriculum was developed for secondary schools, but the project assisted some schools to form Nature Clubs, members of which were to the SLM sites on a regular basis for learning SLM practices at the sites

Because of the existence of SLM related courses at the principal agriculture training institution in the country the Outcome can be rated as ***poorly achieved***, even though the project failed to help in expanding the curricula, or transferring it to other training institution as envisaged.

Intermediate States

IS 5a: Farmers knowledge and their interest in adoption of alternative livelihood systems raised and their use becomes the norm

As indicated earlier under Outcome 5a, some alternative livelihood activities were undertaken at pilot sites, but the type and quantum of alternative livelihood activities promoted have not been demonstrated to fully compensate for incomes likely to be lost from non-exploitation of closed off areas.

The Intermediate state was ***poorly achieved.***

IS 5b: The technical capacity of NGOs in SLM raised, and they are successfully training farmers

As indicated for Outcome 5b above, the technical capacity of two local NGOs for SLM was raised and they successfully managed the three sites. However, no other NGOs were trained and the capacity created in the two NGOs is already eroding, only 12 months after the end of the project. Neither have they used their training to improve the capacity of communities outside the project sites.

Overall the IS was ***poorly achieved***

IS 5c: A large number of students trained in SLM and become strong advocates for the practices in their communities

Only a relatively small number of students receive training in environmental management at Njala University. Even for tis small number, there is little evidence that they are strong advocates for SLM.

The IS is only **poorly achieved.**

IS 5d: Government and private sector interest sustained and increased and the Government prepares and adopts a SLM policy

GoSL interest in SLM policy is demonstrated by the fact that environmental issues are included in Pillar 2 – Managing Natural Resources, of the Country's Agenda for Prosperity (AfP), the third Poverty Reduction Strategy Paper (2013-2018). Important strategy issues in the AfP that are specific to individual sectors important in sustainable management of the environment are:

- **Water resource management:** Policy will develop water resources, ensuring water is used in an integrated manner, addressing human needs, ecosystems, and conservation; responding sustainably to the needs of society and the economy.
- **Land management:** Strategies include a legal framework for land ownership; developing land-use planning; creating sustainable infrastructure for social improvement and economic growth; training farmers in sustainable land and water practices.
- **Forests:** Sustainable management will meet widely different objectives, of forest conservation, watershed regulation, traditional exploitation, economic development and job creation, eco-tourism, biodiversity and climate change.

As part of project activities there was a review of existing environmental legislation to identify gaps, which resulted in the preparation of a road map for mainstreaming of SLM. However, no legislation ways of securing funds for continuation of the activity.

Because the GoSL is actively pursuing its AfP with private sector support, the IS can be regarded as ***partially achieved***, although no legislation has yet been adopted.

IS 5e: Local Government increase their interests in SLM practices and pass bylaws on fire prevention

Bye-laws have not been formerly adopted by ant local government. Although local communities surroundings the 3 pilot sites successfully enforced laws restricting access to the sites, and such restrictions are still in place 12 months after end of the project, this cannot be regarded as demonstrating increased awareness of SLM practices without supporting legislation. This is especially the case when there is evidence that the interests are mainly due to the fact that the project provided payments for SLM services rendered at the pilot sites. There is no evidence that SLM practices will continue for long without payments made by a project.

Overall, this IS is ***poorly achieved.***

Impact Drivers

ID1: Profitable alternative livelihood systems exist and their markets are functional

Alternative livelihood incomes markets exist in Sierra Leone that can significantly compensate for incomes lost from non-exploitation of closed off areas. In addition to supplying domestic markets there are even good prospects for export to neighboring

countries. A recent study (Dean et al 2010) identified the following tradable commodities of agricultural origin as potential Non Traditional Exports (NTEs) for Sierra Leone: Fresh vegetables (String beans, Plum tomatoes, Cabbage, Okra, Cucumbers); Cut leafy vegetables (Potato leaves, Cassava leaves, Crain crain, Green); Fruits (Mangoes, Pineapples); Roots and tubers (Sweet potatoes, Cassava); Tree Crops (Kola nuts, Cashew nuts, Coconuts); Processed products (Mango juice, Garri, Honey, Bees wax, Coconut milk); Other food crops (Sesame Palm oil, Rice); Prospective products (Moringa, Jatropha). Many of these can be produced as alternative livelihood products to forest exploitation.

From the above list five Category 1 products (String beans, Sesame, Pineapples, Kola nuts, and bee honey) were investigated for priority development as NTE products. All have established production possibilities and market opportunities that could be competitively pursued. The study showed that returns to family labor are positive and high for all commodities except Sesame where the returns are negative. For the four commodities the returns are several times the going wage rates, and are also much higher than those earned by staple food crop and traditional export crop producers. Production of String beans, kolanuts, pineapples and honey for the domestic market using existing technologies is therefore highly profitable.

Producers mainly sell their output in the villages in which they reside, and most sales are to traders who take possession in the villages. Farm gate sales are virtually unknown except among a tiny fraction of honey producers

Overall it can be seen that this Impact Driver is present, has much prospects and available to producers in savanna woodland. We can conclude that the ID was ***fully achieved.***

ID3: The media promotes awareness of the need for SLM, the availability of SLM technology, and the profitability of adoption of SLM practices

This Impact driver is necessary to get GoSL and local Governments interested in promoting SLM. As discussed under Outcome 4a the project team spent time conducting meetings with all stakeholders to get a buy-in to a road map for mainstreaming SLM into national and local plans and strategies. As indicated earlier the road map covered such issues as rapid deforestation/encroachment on protected forests/bush fallows or rotational farming system that promotes deforestation, etc. There were also discussion programs in national and local radios. However, these activities were of too limited a scope to have had national impact. And awareness of SLM is not being promoted on a national scale by the print or electronic media.

Overall this Impact driver can only be rated as ***poorly achieved.***

ID7: Njala University, and other Universities and secondary schools effectively integrate SLM into their curricula

This Impact driver is needed to ensure that a large number of trained people in SLM are produced. As discussed under Outcome Njala University is continuing to implement a curriculum on environmental management that includes SLM practices. However the curriculum was not expanded as expected under the project, and the other Universities and secondary schools have limited capacity for training in SLM.

The Impact Driver can therefore be rated only as ***poorly achieved.***

C Overview of Progress from Outcomes to Impacts

On the basis of the evidence and analysis presented above, an overview of the progress made from Outcomes to Impacts over the period 2008 to 2012 is presented in Table 4 below.

Table 4. Outcomes to Impacts Assessment Findings for Strategy 1

TOC Component	Assessment	Rating
O4a: Public awareness on SLM raised	There was a little done during project implementation but it had little effect	1
O4b: Awareness for SLM raised in local councils	Not much achieved, even in the local councils in the District with the pilot projects	1
O5a: Critical mass of farmers trained in SLM practices, including fire protection and alternative livelihood systems	The 3 sites developed local capacity, including capacity of local NGOs, but no indications that the capacity is being sustained, or likely to be sustained	1
O5b: Technical capacity for management of pilot SLM sites raised in EPA-SL and NGOs	Capacity within EPA-SL now exists. However, only two NGOs had capacity increased which is already almost all lost	1
O5c: Capacity of National Fire Force in training local communities in fire protection of woodlands raised	The District Fire Force in Bombali demonstrated that it already has the capacity. This is likely to be the case in other Districts	3
O5d: Curriculum on SLM adapted, and administered at Njala University and other Universities and Polytechnics	Njala University already has some of the necessary elements in its curriculum. However, not much done to expand the curriculum or introduce it to other Universities or secondary schools.	1
IS5a: Farmers knowledge and their interest in adoption of alternative livelihood systems raised and their use becomes the norm	Only affected farmers are those around the 3 pilot sites. The knowledge has not been disseminated country wide	1
IS5b: The technical capacity of NGOs in SLM management raised, and they are successfully training farmers	Only two NGOs had their capacity raised, and indications are that they are already losing the capacity only 12 months after project closure	1
IS5c: A large number of students trained in SLM and become strong advocates for the practices in their communities	Only a relatively small number of students receive training in environmental management at Njala University	1
IS5d: Government and private sector interest sustained and increased and the Government prepares and adopts a SLM policy	Indications that GoSL and private sector interests will be sustained. However no SLM policy has been legislated and adopted	2
IS5e: Local Government increase their interests in SLM practices and pass bye laws on fire prevention	Laws have not been passed by local councils, but communities around community pilot sites have been able to enforce restricted access to the sites	2
ID1: Profitable alternative livelihood systems exist and their markets are functional	Profitable alternative livelihood systems exist and the project attempted to train farmers in their use	3

TOC Component	Assessment	Rating
ID3: The media promotes awareness of the need for SLM	A small effort was done with local media during project implementation but even the limited amount has not continued post project	**1**
ID7: Njala University, and other Universities and secondary schools effectively integrate SLM into their curricula	No new curricula were developed. Only Njala University has a curriculum on environmental management that addresses SLM issues. No progress with Polytechnics or secondary schools	**1**
Overall Assessment of Strategy 1	None of the Intermediate states for this strategy have been well achieved, and there is little prospect of any arriving at this stage in the near future. All of the Outcomes were poorly achieved except for one, which was mainly a pre-existing situation. Overall, this strategy can only be regarded as having made only a little progress towards achieving it GEB of increased capacity in SLM in Sierra Leone	**1**

5.2 Strategy 2: Mainstreaming Sustainable Land Management

A Theory of Change Overview

This strategy also focuses on delivering a complex set of intermediate states, which would support progress towards the intended GEB of improved provision of agro-ecosystem and forest ecosystem goods and services and mitigated/avoided GHG emissions and increased carbon sequestration in production landscapes, as a result of improved sustainability of agricultural lands and restoration of extremely degraded wooded savannas back towards closed canopy forests.

The cause and effect chain is shown in Figure 5 below. The targeted intermediate states would provide essential steps to enable the scaling up and replication of the original project outcomes, leading to the intended GEB. The project outcomes in the overall TOC that were identified as essential for delivering these intermediate states were:

- **Outcome 1:** Sustainable land management is mainstreamed into policies, laws, programs, budgets and regulatory frameworks, which can be disaggregated into 6 sub-outcomes, shown below.
- **Outcome 2:** National Action Program (NAP) to combat desertification/Land Degradation is completed and approved.
- **Outcome 3:** Medium-term Investment Plan (MTIP) is approved and funded.

The disaggregated elements of Outcome 1 are:

- **Outcome 1a:** At least one integrated SLM Pilot site set up and managed by NGOs in each chiefdom with degraded savanna woodlands
- **Outcome 1b:** At Least one integrated SLM Pilot Site set up and managed by NGOs in each chiefdom with a mangrove ecosystem
- **Outcome 1c:** Alternative livelihood practices identified and adopted by farmers in each SLM Site

- **Outcome 1d:** Effective fire prevention practices successfully demonstrated in each savanna SLM Pilot Site
- **Outcome 1e:** Local Councils with savanna woodlands pass byelaws on fire prevention practices
- **Outcome 1f:** Local communities successfully develop and implement integrated financing mechanisms for sustaining and expanding SLM sites.

Based on ROtI meetings and discussions, the Intermediate States (IS) identified as necessary steps towards the expected impacts were as follows (see Figure 5):

- **Intermediate State 1:** SLM practices widely adopted in mangrove swamps and degraded woodlands
- **Intermediate State 2:** Integrated financing mechanisms successfully implemented at local levels
- **Intermediate State 3:** Farmers successfully using profitable alternative livelihood systems
- **Intermediate State 4:** GoSL successfully implementing the MTIP

Six impact drivers and three external assumptions were identified as necessary to bridge the gap between the project outcomes and the intermediate states, as shown in Figure 5 below.

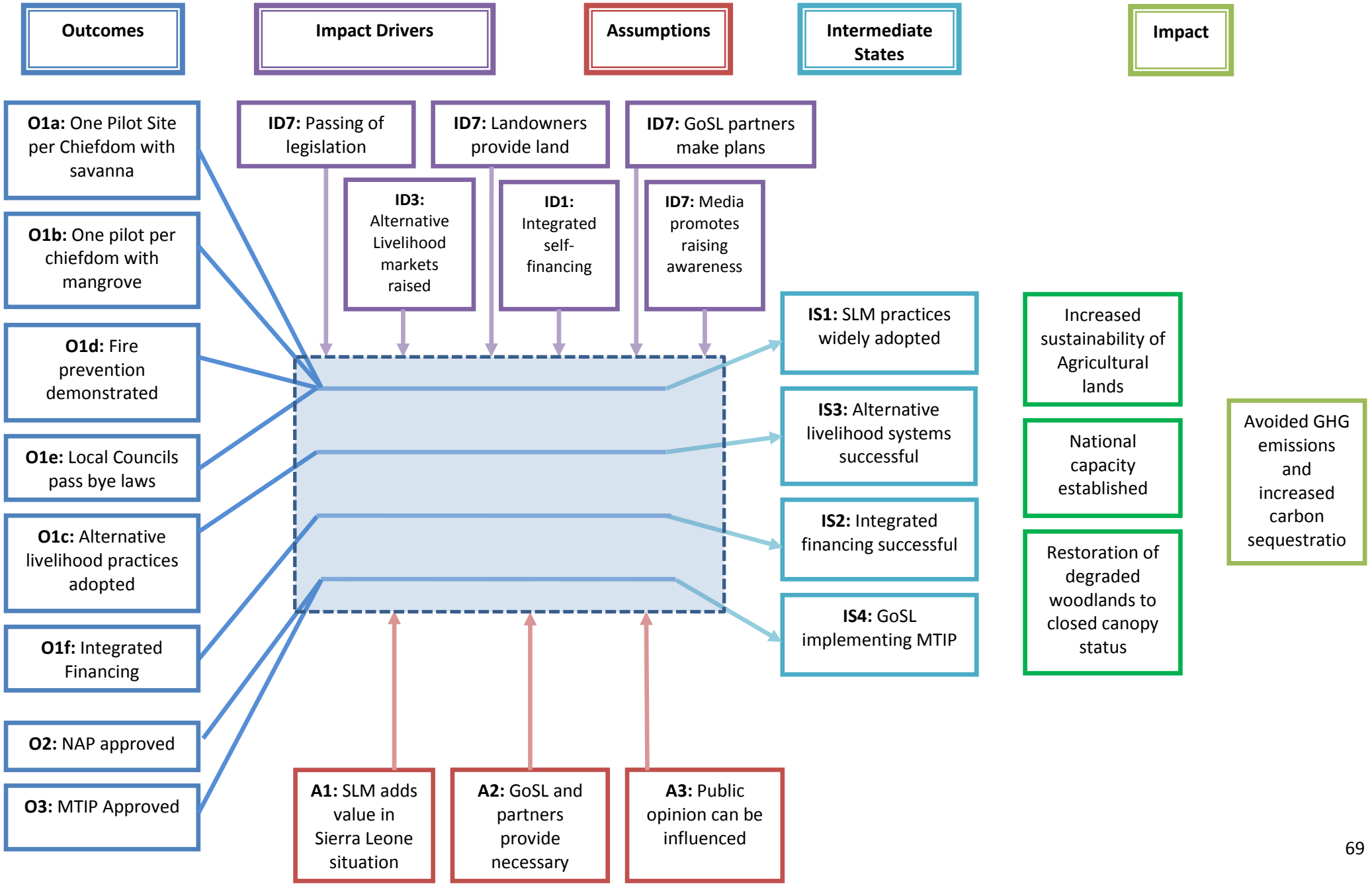
- **Impact Driver 1:** "Alternative livelihood systems with effective markets exist" for farmers to profitably adopt as replacement for exploitation of products from degraded savanna woodlands and mangrove swamps, is a critical factor for scaling up from the initial outcomes demonstrating the advantages of SLM practices.
- **Impact Driver 2:** "Integrated financing mechanisms for SLM" is critical to ensure that local communities can continue to operate and expand the SLM sites.
- **Impact Driver 3:** "Media and public promote SLM" will play an important role in ensuring a broad and continuing base for GoSL and public support SLM programs.
- **Impact Driver 4:** GoSL and partners make plans for SLM, which is important in ensuring that a NAP and an MTIP are produced.
- **Impact Driver 5:** National Parliament and local governments willing to pass legislation on SLM
- **Impact Driver 6:** Landowners willing to set aside family land for implementation of SLM practices, managed by each family.

Progress towards the identified intermediate states is based on the three external assumptions – common to both of the two strategies – that provide a basis for the entire cause and effect chain. They are:

- **Assumption 1:** SLM adds value in the Sierra Leone situation
- **Assumption 2:** GoSL and international partners provide necessary funding for implementation of SLM projects
- **Assumption 3:** Public opinion can be influenced in favor of SLM

The next section assesses the extent to which the TOC relating to Strategy 2 has been realized in design and practice, by examining the achievement of the TOC components, starting with the outcomes and finishing with the intermediate states. Table 5 at the end of this section provides a summary of this analysis.

Figure 5. Strategy 2: Mainstreaming SLM in Sierra Leone



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B Theory of Change Assessment

Outcomes

Outcome 1a: At least one integrated SLM Pilot site set up and managed by NGOs in each Chiefdom with degraded savanna woodlands

The savanna zone of Sierra Leone covers the Northern Province of Sierra Leone with 149 chiefdoms and chieftainships, all of which have degraded woodland caused by the local practice of shifting cultivation, which involves use of fire to clear vegetation before the planting of annual crops. Often these fires get out of hand – the so called bush fires, which spread into land that has just been left to go to fallow, drastically reducing the regenerative quality of such fallows. The basic concept of the SLM project was that such degraded woodlands would be protected from fires and exploitation by local communities, for example the cutting of young trees for firewood and coal burning.

The literature on 'slash and burn' agriculture clearly indicates that 7 to 12 years of closed fallow is necessary to restore degraded savanna to a closed canopy state. The SLM project document called for the setting up of ten pilot demonstration sites. However, the project set up only involved three 10 ha sites in Makari Gbanti and Bombali Sebora Chiefdoms; the number that the allocated funding was deemed to be able to support.

A critical factor to note is that the land for the pilot sites was leased from local land owners for a substantial fee – a three year lease of Le 5 m (about USD 1,150) for one site – and that 12 months after project end, landowners interviewed indicated that they expected their lands to be returned if rent was not to be paid in future.

Overall then, it can be seen that this Outcome was ***poorly achieved.***

Outcome 1b: At Least one integrated SLM Pilot Site set up and managed by NGOs in each chiefdom with mangrove ecosystem

The Project Management team made absolutely no attempt to implement this component. It was clear to them that the funding available was not sufficient to undertake activities in a second ecosystem. It was evident that the project objectives were over-ambitious. However, the planned mid-term review, which should have made adjustments to the LogFrame objectives, did not take place and the project ran to the end with the requirement for mangrove swamp sites still on its books. The activity seemed to have been allowed to quietly slip away, as all project progress reports and the Final Evaluation Report made no mention of the requirement for mangrove swamp pilot sites.

Overall, the Outcome was ***not achieved*** and no attempt was made to achieve it.

Outcome 1c: Alternative livelihood practices identified and adopted by farmers in each SLM Site

At the 3 pilot sites alternative livelihood practices to be adopted by farmers as an alternative to exploitation of degraded savanna woodlands were introduced to farmers. These included vegetable farming using composts, bee-keeping, soap making, planting of pineapples, cassava and other plants in firebreaks, burning of charcoal, etc. One year after project end, farmers reported that they had been trained, and some had adopted the practices, but the activities were on a limited scale and were not providing enough compensatory income. Furthermore, there was not much indication that farmers would be willing to put their own lands, as opposed to community lands leased for pilot sites, using the alternative practices as a substitute. Neither has there been any adoption of the alternative activities in neighboring communities without pilot sites.

Overall, the Outcome was therefore ***poorly achieved***.

Outcome 1d: Effective fire prevention practices successfully demonstrated in each savanna SLM Pilot Site

The main activity at the pilot sites was the construction of firebreaks around the sites. These were manned by fireguards trained by the Bombali Fire Force in Makeni. All the sites constructed the firebreaks. 12 months after the end of the project, the firebreaks were still being maintained, even though the fireguards were no longer receiving their salaries. This was because of a strong expectation that a new phase of the project would soon come to fruition. In the other two sites there was less or no work done. During the 2013 dry season, fire had engulfed part of one of the sites, destroying gains made by two years of fire prevention.

Overall the Outcome can be considered as ***partially achieved*** as fire prevention practices had been partially demonstrated, but not maintained one year after project completion.

Outcome 1e: Local Councils with savanna woodlands pass byelaws on fire prevention practices

Local Councils are expected to adopt and to be successfully enforcing SLM laws relating to fire burning and restricted entry into lands under SLM. Byelaws have not yet been formerly passed in any of the Chiefdoms with pilot sites. However, local communities surrounding the three pilot sites successfully enforced restrictions on access to the sites. Such restrictions are still in place 12 months after end of the project, and there are indications that they will continue to be enforced for as long as the communities feel that there will be follow-up projects. This was clearly because the lands for the sites were leased from the landowners who were the only ones with rights to access the lands in the first place, and who consider themselves “paid off”. There are clear indications that if rents for the lands were not paid, the landowners would reclaim their lands, with no clear indications as to whether they would continue to abstain from exploiting the lands until they reach closed canopy status.

Overall this outcome can be considered as ***poorly achieved***, because entry was prevented by paying off landowners, and not by legislation.

Outcome 1f: Local communities successfully develop and implement integrated financing mechanisms for sustaining and expanding SLM sites.

This is a critical outcome for achievement of the TOC for the project. The project document envisaged that communities with pilot sites would develop integrated financing plans and mechanisms that would ensure that site activities such as payment of fire guards, payment of lease rent, support of agricultural extension activities on alternative livelihood systems, etc. continue after the end of the project. This was not done in any of the sites. Community elders in the sites indicated that they knew of no such requirement. On the contrary, all, including the

NGOs managing the sites, expected project activities to continue. They thought this would include post-project payment of staff, hopefully in a new project phase, which has not yet materialized. Consequently, the little gains made by the project are already being lost just 12 months after project end. For example, fire consumed one of the sites as fire guards were not on duty, NGOs are no longer carrying out any activities, and some experienced staff have already been lost.

Overall the outcome was ***not achieved***, even in the three pilot sites.

Outcome 2: National Action Program (NAP) to combat desertification and land degradation is completed and approved

The NAP was prepared with the aim of combatting desertification and land degradation. The NAP is set within the overall vision of Sierra Leone's longer-term development agenda articulated in 'Vision 2025'. This is based on the "desire to create a better future for Sierra Leone a future that is characterized by virtuous circle of peace, stability and wealth creation, in place of the vicious circle of poverty and under-development". Therefore, the objective of the NAP is to achieve sustainable development by creating long-term strategies that focus on improved productivity of land and SLM practices that will lead to improved conditions of living.

The NAP has well prepared SLM projects with attached budgets and management mechanisms. Core areas of intervention proposed in the NAP, the implementation of which is expected to contribute to achievement of GEBs in the land degradation focal area, are as follows: (1) forestry and wildlife management, (2) livestock and range management, (3) mining, (4) agriculture, (5) gender and land degradation, and (6) waste management and environmental health. However, the Draft NAP has to date not been submitted for ratification by Parliament as required in the project document. With new funding, work is continuing on alignment of the draft NAP with the UNCCD 10 year plan, so Outcome 2 is likely to be fully achieved, but with several years delay.

Overall, the Outcome can therefore be rated as ***partially achieved***.

Outcome 3: Medium-term Investment Plan (MTIP) is approved and funded

The EPA-SL and other GoSL institutions should have mechanisms for development and approval of MTIP in place that are sufficient to ensure implementation of the MTIP.

Although stock taking was undertaken in the project under the Terre Afrique consultancy, a draft MTIP was not produced, as it was reported that EPA-SL and other institutions have not mastered the budgeting techniques that Terre Afrique tried to introduce.

However, there are some prospects for achieving this Outcome in the future because environmental issues are included in Pillar 2 – Managing Natural Resources – of the Country's Agenda for Prosperity (AfP), the third Poverty Reduction Strategy Paper (2013-2018). Important strategy issues in the AfP that are specific to individual sectors important in sustainable management of the environment are:

1. **Water resource management**: Policy will develop water resources, ensuring water is used in an integrated manner, addressing human needs, ecosystems, and conservation; responding sustainably to the needs of society and the economy.
2. **Land management**: Strategies include a legal framework for land ownership; developing land-use planning; creating sustainable infrastructure for social improvement and economic growth; training farmers in sustainable land and water practices.

3. **Forests**: Sustainable management will meet widely different objectives, of forest conservation, watershed regulation, traditional exploitation, economic development and job creation, eco-tourism, biodiversity and climate change.

Overall, because of the prospects of funding under the AfP, the Outcome can be rated as ***poorly achieved*** even though the required MTIP was not produced.

Intermediate States

IS 1: SLM practices widely adopted in mangrove swamps and degraded woodlands

This Intermediate State would exist if there are Pilot SLM sites in each chiefdom with degraded mangroves and woodlands that are being up-scaled to cover majority of degraded lands in the Chiefdom. As indicated earlier, there was no activity undertaken to promote SLM in mangrove swamps due to a lack of funding.

For degraded savanna, there has been no progress in up-scaling the pilot sites within the two chiefdoms with sites, and there are no prospects for the up-scaling of such pilots (using leased community lands) within the chiefdoms without substantial project funding, let alone spill over to other chiefdoms. SLM practices cannot, therefore, be considered as widely adopted in the degraded savanna woodlands of Sierra Leone.

Overall, the IS was ***not achieved.***

IS 2: Integrated financing mechanism successfully implemented at local levels

As indicated earlier the project did not succeed in introducing the integrated financing concept to communities with pilot sites. Communities believed the project mode with leased lands and paid salaries for staff such as fire guards would continue. Neighboring communities were unsurprisingly, campaigning for similar sites to be established in their communities.

The critical IS for achievement of the GEB was ***not achieved.***

IS 3: Farmers successfully using profitable alternative livelihood systems

As indicated earlier, some alternative livelihood activities were undertaken at pilot sites, but the type of and extent to which alternative livelihood activities were promoted have not been demonstrated to fully compensate for incomes likely to be lost from non-exploitation of closed-off areas.

The IS can be considered as only ***poorly achieved.***

Impact Drivers

ID 1: Alternative livelihood systems with effective markets exist

See discussion in Section 5.1.

ID 2: Integrated financing mechanisms for SLM are in place

As indicated earlier, no integrated financing mechanisms were developed in any of the project sites, and there are no indications that the capacity exists in local government to develop them without assistance.

Overall, this ID can be considered as ***not achieved.***

ID 3: Media and public promote SLM

As indicated in Section 5.1, this ID was poorly achieved.

ID 4: GoSL and partners make plans for SLM

This Impact driver is important in ensuring that a NAP and an MTIP are produced. Arresting land degradation and promoting sustainable land management is one of the most important national environmental challenges facing Sierra Leone as identified in the country's PRSP. GEF support in the Land Degradation focal area allowed the country to implement this medium size project. Overall the project enabled the country to build some limited capacity for sustainable land management, and mitigation of the threats of land degradation as shown in Section 5.1. It enabled Sierra Leone to prepare a National Action Program (NAP) to combat desertification and thereby meet the country's obligations under the UNCCD, although a MTIP has not been produced.

Overall, this ID can be rated as fully achieved, since GoSL has made plans for SLM in its AfP and secured GEF funding for preparation of the NAP and an MTIP.

ID 5: National Parliament and local governments willing to pass legislation on SLM

Although no legislation has yet been passed, there is every indication that the Parliament is willing to pass such legislation. The Sierra Leone Parliament has passed a whole series of legislation on the environment (see Volume 1, Section 2.5).[i] Important legislative actions related to sustainable land and natural resource management in Sierra Leone are the National Environmental Policy (2002), the National Environmental Action Plan (2002), the National Land Policy of (2004) all of which were prepared with support of the World Bank, and the Energy Policy, and the Mines and Minerals Act.

For SLM, existing legislations to identify gaps was done during this project, resulting is preparation of a mainstreaming strategy and an Action Plan, but no legislation has been drafted. There has been no action since the end of the project, but EPA-SL is looking for ways of securing funds for continuation of the activity.

Overall this ID can be rated as fully achieved.

ID 6: Landowners willing to set aside family land for implementation of SLM practices, managed by each family.

This Impact Driver is needed if SLM practices propagated by the project, namely the closing-off of degraded lands for years to allow the vegetation to recover and wildlife to return, are to be widely adopted. The pilot sites have demonstrated that degraded savanna woodlands can be closed-off and managed for regeneration of the lands. But this has been done using project funds to lease land and pay site management staff. For SLM practices to be sustainable, landowners have to set aside and manage their own degraded land. There is no known case where this has been done in the target communities, which still find it profitable to exploit the degraded woodlands (e.g. for harvesting of firewood and trapping the depleted fauna). Furthermore, there is little prospect for success in encouraging landowners to close off their

degraded lands, as very little progress has been achieved in developing adequate alternative livelihoods to compensate for current land use practices nor convincing demonstration of that fact to a critical mass of landowners.

Overall it can be concluded that this ID was not achieved.

C Overview of Progress from Outcomes to Impacts

On the basis of the evidence and analysis presented above, an overview of the progress made from Outcomes to Impacts over the period 2008 to 2012 is presented in Table 5 below.

Table 5. Outcomes to Impacts Assessment Findings for Strategy 2

TOC Component	Assessment	Rating
O1a: At least one integrated SLM Pilot site set up and managed by NGOs in each chiefdom with degraded savanna woodlands	Only done in 2 out of over 50 Chiefdoms with degraded savanna woodlands	**1**
O1b: At Least one integrated SLM Pilot Site set up and managed by NGOs in each chiefdom with a mangrove ecosystem	No mangrove swamp site set up	**0**
O1c: Alternative livelihood practices identified and adopted by farmers in each SLM Site	Farmers were trained, but little evidence of widespread adoption even in chiefdoms with pilot projects	**1**
O1d: Effective fire prevention practices successfully demonstrated in each Savanna SLM Pilot Site	Successfully done in the 3 pilot sites	**3**
O1e: Local Councils with savanna woodlands pass byelaws on fire prevention practices	None of the councils passed such bye laws, but local communities successfully enforce such provisions	**1**
O1f: Local communities successfully develop and implement integrated financing mechanisms for sustaining and expanding SLM sites.	None were developed, and no attempt was made to do so in any of the pilot sites.	**0**
O2: National Action Program (NAP) to combat desertification/ Land Degradation is completed and approved	A draft of the NAP was produced, but has not been ratified by Parliament as required.	**2**
O3: Medium-term Investment Plan (MTIP) is approved and funded	MTIP was not prepared, but some unsuccessful attempts were made to do so. However implementation of the Agenda for Prosperity will provide funding for SLM activities.	**1**
IS1: SLM practices widely adopted in mangrove swamps and degraded savanna woodlands	No mangrove swamp activity undertaken and no indications of the sustainability of the degraded savanna woodland pilots.	**0**
IS2: Integrated financing mechanism	No integrated financing mechanisms	**0**

TOC Component	Assessment	Rating
successfully implemented at local levels	developed even for the 3 pilot sites.	
IS3: Farmers successfully using profitable alternative livelihood systems	Some alternative livelihood activities were undertaken at pilot sites. However it has not been established to farmers that these are viable, and there is little indication of such activities post-project.	**1**
IS4: GoSL successfully implementing the MTIP	MTIP has not been developed.	**0**
ID1: Alternative livelihood systems with effective markets exist	See Table 4	**2**
ID2: Mechanisms exist for Integrated financing mechanisms for SLM at local levels	None exist.	**0**
ID3: Media and public promote SLM	See Table 4	**1**
ID 4: GoSL and partners make plans for SLM	GoSL has made plans for SLM in its AfP and secured GEF funding for preparation of the NAP and an MTIP.	**3**
ID5: National Parliament and local governments willing to pass legislation on SLM	Parliament & local governments have passed environmental management legislation in the past and there is every indication that they are willing to do so in future.	**3**
ID 6: Landowners willing to set aside family land for implementation of SLM practices, managed by each family.	No indication on this yet even at the 3 pilot sites. And there is little prospect for success.	**0**
Overall Assessment of Strategy 2	None of the Intermediate States of this strategy was well achieved. Three of the IS were not achieved because the Outcomes that would have led to them were not achieved. As recognized by the Project Management Team from the onset of the project, it had hugely unrealistic targets for the funding of an MSP. These included expectation of work in the mangrove swamp ecology, and the requirement for setting up of far more sites even in the savanna ecosystem than could be accommodated within the time frame or budget of the project. Critically, no integrated local financing mechanism was developed for sustainability of pilot sites, and no MTIP was developed that would ensure continued state financing of SLM activities after the project.	**0**

6. Overall Assessment of Progress towards the Intended Global Environmental Benefit

The Sustainable Land Management Project is relevant to the development needs of Sierra Leone, aligning well with local needs and addressing one of most pressing constraints to agriculture - the principal livelihood means for rural people – namely, soil fertility and land degradation issues. It also aligned well with environmental issues presented in Pillar 2, 'Managing Natural Resources', of the Country's Agenda for Prosperity (AfP), the third Poverty Reduction Strategy Paper (2013-2018). It is also relevant to the objectives of the GEF in that it was designed to contribute to two important GEBs: improved sustainability of agricultural lands and restoration of extremely degraded wooded savannas back towards a closed canopy forest.

The SLM Project was not effective due to the fact that it did not meet the majority of its targets. The project prepared a draft National Action Plan (NAP) but this was not submitted for approval by Parliament as envisaged. Mainstreaming of SLM principles did not take place as envisaged either – a study identified gaps but did not begin the process of drafting of required legislation as planned. Critically, the project was also designed to set up an integrated financing system for SLM activities that would be integrated into national budget process, but this was also not achieved.

The main thrust of the capacity building activities of the SLM project was to develop three pilot SLM sites (although, the CPAP target called for 10) where locals were to be trained and capacitated. The three sites were established and training took place on alternative livelihood activities, fire control, site management by local NGOs, and other issues, but all gains are currently being eroded post-project with all activities ceased. It is clear that activities are no longer being sustained after the project ended in 2012. The communities are hoping for a new replacement project for which there are hardly any prospects. There has been no replication of the activities or scaling up.

Annex 1. References

1. Government of Sierra Leone (2013) *Agenda for Prosperity: Road to Middle Income Status.* Sierra Leone's Third Generation Poverty Reduction Strategy Paper (2013 – 2018).
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5. GEFEO (2009) The ROtI Handbook: Methodological Paper #2. Available: https://www.thegef.org/gef/sites/thegef.org/files/documents/M2_ROtI%20Handbook.pdf
6. Deen, S., Spencer, D., Wilson, S. and Sesay, P. (2010) Supply Chain Survey To Identify Non Traditional Exports And Market Opportunities: A Study conducted for the Sierra Leone Investment and Export Promotion Agency (SLIEPA). Freetown: Enterprise Development Services. Available: http://www.eds-sl.com/docs/EDS-SupplyChainSurveyOfNonTraditionalExportsInSierraLeone-01.10.10.pdf

Annex 2. Participants and Interviewees

ROtI Discussion Group

1. Mariatu Swarray, UNDP Portfolio Manager, Environment and Disaster Management
2. Kolleh Bangura, Director, Environmental Protection Agency
3. Lahai Keita, Environment Officer, Project Manager SLM, Environment Protection Agency
4. Mr Steven Syril Jusu, Chief Environment Officer, Ministry of Lands, Country Planning & the Environment

Individual Interviewees

1. Pa Sorie Conteh, Acting Paramount Chief, Makari-Gbanti Chiefdom
2. Mr Usman Wurie Sesay, Asst Regional Coordinator, PASACOFAS
3. Pa Abdulai Conteh, Headman, Makari Village
4. William Kamara – SLM Makari Site Land Owner
5. Baba Mansaray/ John Kamara, Fire Guard, Makari Site
6. Pa Sorie Bangura/ Mr Usman Bangura, Committee Members, Makari Site
7. Sgt 249 Lansana Bangura, National Fire Force, Makeni
8. Mr Mohamed Kamara, Field Officer, Makoth Site, Green Scenery
9. Mr Edie Sesay, Project Animator, Makoth Site, Green Scenery, Makeni
10. Mr Abdulai bangura/ Pa Santigie Sesay/ Mr Abu Kargbo/ Mrs Ayi Sesay/ Mrs Kadie Bruyah/ Mrs Miatta Kamara/ Mr Moses Kargbo, Fire Guards, Makoth Site
11. Paramount Chief Kande Sei II, Gbendembu Ngowahun Chiefdom
    - Amadu Dante Toure, Principle, Government Technical Institute, Maburka