



Government of Sierra Leone



ENVIRONMENT PROTECTION AGENCY SIERRA LEONE

SIERRA LEONE NATIONAL CLIMATE CHANGE STRATEGY AND ACTION PLAN

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Preface

Sierra Leone's Vision for 2013 to 2035 is to become a middle-income country. It would be an inclusive, green country, with 80% of the population above the poverty line. It would have gender equality; a well-educated, healthy population; good governance and rule of law; well-developed infrastructure; macroeconomic stability, with private-sector, export-led growth generating wide employment opportunities; there would be good environmental protection, and responsible natural resource exploitation.

In July 2013, my Government launched the five-year development plan entitled "*The Agenda for Prosperity 2013 to 2018*" in which Government's plans are laid out. The Agenda is to build a stable economy, founded on private sector-led growth, and to diversify activity across several competitive sectors, increasing value-added and generating gender-equitable employment. The longer term economic growth target is for annual GNI per capita growth of 4.8% that is annual growth in total GNI of 6.7%. Diversified economic growth will require greatly strengthened infrastructure: transport, power, water, ICT, and financial services. Transformation of agriculture will combine smallholder commercialisation with larger-scale agro-based production. It is planned to increase Sierra Leone's UNDP Human Development Index from 0.33 to 0.62.

To achieve the sustainable growth and transformation underscored in the Agenda for Prosperity, my government is aware of and recognises the serious threats posed by climate change to every effort that we plan to undertake. It is for this reason that my Government in close collaboration with our long standing multilateral development partner, the UNDP, developed the Sierra Leone Low Emissions Climate Resilient Development Strategy (LECRDS), the National Climate Change Action Plan (NCCAP) and the accompanying Resource Mobilisation Strategy to enable implementation of the LECRDS and NCCAP.

The development of the LECRDS and NCCAP marks another landmark stride by the Government towards addressing climate change issues at the regional, national and sub-national levels. The Action Plan takes adaptation and mitigation efforts to the next stage of implementation; it will support efforts towards the continued attainment of our VISION 2035, the A4P (2013-2018) and it will guide the transition of the country towards a low carbon climate resilient development pathway.

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The President of the Republic of Sierra Leone

Acknowledgement

The Environment Protection Agency, as the national agency coordinating climate change issues in Sierra Leone acknowledges that climate variability and climate change will continue to impact economic development of Sierra Leone. It therefore recognises the need for enhance coordination of climate change activities in the country with a view to ensuring a climate resilient nation that follows climate sensitive development pathways.

Implementation of this Low Emissions and Climate Resilient Development Strategy of Sierra Leone and its accompanying National Climate Change Action Plan (NCCAP) and Resource Mobilisation Strategy captures the aspirations of Sierra Leones and drawn upon other National and Sectoral strategies. Country ownership is assured by the involvement of various state and non-state actors and other stakeholders. Review comments received from Dr. Reynolds Johnson are appreciated. The coordination role of Mr. Momodou Bah, Acting Deputy Director of the National Secretariat of Climate Change of the whole process of development of the document is appreciated.

The EPA, on behalf of the Government of Sierra Leone appreciates the efforts of International Consultant, Mr. Bubu Pateh Jallow of The Gambia who has previously conducted similar work with GoSL and the UNDP Office in Freetown. Development of such a document would be impossible without financial resources and technical support from the UNDP Country Office in Sierra Leone. I acknowledge the efforts of Dr. Lawrence Lee who provided valuable guidance and directions to the work of the Consultant. The efforts of Mariatu Swareh, Saskia Marijinissen, Sorie Kargbo and staff in the Finance Department are acknowledged and appreciated.

The Government of Sierra Leone is committed to the implementation of the LECRDS and the NCCAP and the Resource Mobilisation Strategy and invites all partners and stakeholders to join in delivering the prioritised actions (summarized in the Table below) for the benefit of our country.

.....
Mrs. Haddijatou Jallow, Executive Chairperson
Environment Protection Agency of Sierra Leone

Estimated Budget for Implementation of the Low Emissions and Climate Resilient Development Strategy and National Climate Change Action Plan

Project/Programme	Estimated Cost US Dollars
1. Strengthening the Environment Protection Agency to serve as Climate Change Secretariat for effective and efficient provision of technical and policy advice to the Government and people of Sierra Leone for relevant decision making in transitioning to green economic growth	5,000,000
2. Transform the National Meteorological Services of Sierra Leone into an Agency.	3,000,000
3. Strengthening of Climate Change Early Warning System of Sierra Leone	15,000,000
4. Promote Renewable (Solar, Wind, Hydro, Biomass) Energy based mini grids for productive uses in rural areas of Sierra Leone	38,000,000
5. Promote the use of energy-efficient cooking stoves to reduce greenhouse gas emissions from fuel wood consumption	5,000,000
6. Reinforcement of transmission and distribution system to reduce losses to 45% between 2015 and 2030	15,000,000
7. Reduce methane emissions through improved waste management by land filling, composting and recycling of waste in Freetown, and other cities and towns of Sierra Leone	68,000,000
8. Plan, develop and regulate a Green Technology Mass Transport System for the Urban and Rural Western Area of Sierra Leone	50,000,000
9. Promotion and adoption of roof-top and surface-runoff rainwater harvesting for 2000 households as climate change adaptation technologies for human consumption, animal watering and other livelihood uses.	1,500,000
10. National agricultural land and water management development for increased rice and vegetable production and for strengthened climate resilience.	5,000,000
TOTAL COST IN US DOLLARS	205,500,000

Acronyms

A4P	Agenda for Prosperity
AF	Adaptation Fund
AFD	French Development Agency
AfDB	African Development Bank (AfDB)
AFLAC	Africa, Latin America and the Caribbean Fund
AS	Archiving System (in GHG Inventory)
AUSAID	Australia AID
AWAC	Acoustic Wave and Current Profiler
CBOs	Community Based organizations
CCCFL	China Climate Change Framework Loan (of EIB)
CCPL	Climate Change Program Loan (of AFD and JICA)
CDCF	Community Development Carbon Fund
CDM	Clean Development Mechanism
CH4	Methane
CIA	Central Intelligence Agency of the United States
CIDA	Canadian International Development Agency (CIDA)
CIF	World Bank Climate Investment Funds
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTCN	Climate Technology Centre and Network
DANIDA	Danish International Development Agency
DCFW	Domestic Climate Finance Window
DFI	Development Finance International
DFID	Department for International Development of the UK
DNA	Designated National Authority
DNA	Designated National Authority
DNE	Designated National Entity
ECGCCA	European Commission Global Climate Change Alliance
ECHAM	Atmospheric general circulation model - Max Planck Institute for Meteorology
EIB	European Investment Bank
EVD	Ebola Virus Disease
EYETS	European Union Emission Trading Scheme
FAO	United Nations Food and Agriculture Organization
FGEF	French Global Environment Facility (of AFD)
FM	Frequency Modulation
GCF	Green Climate Fund
GCM	General Circulation Model
GDP	Gross Domestic Product
GEEREF	Global Energy Efficiency and Renewable Energy Fund (advised by EIB)
GEF	Global Environment Facility

GFDRR	Global Facility for Disaster Reduction and Recovery
GGF	Green for Growth Fund
GHG	Greenhouse Gas
GICI	German International Climate Initiative
GIS	Geographic Information System
GoSL	Government of Sierra Leone
GVWC	Guma Valley Water Company
HADC	UKMO Hadley Centre Model
HADLEY	Hadley Centre in the UK
ICFW	International Climate Finance Window of Sierra Leone (proposed)
ICII	International Climate Initiative
IKLU	Initiative for Climate and Environment Protection (IKLU of BMZ)
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Inter-tropical Convergence Zone
IUCN	International Union of Conservation of Nature
IWGA	Inter-ministerial working group on adaptation
JBIC	Japan Bank for International Cooperation
JCEP	Japan Cool Earth Partnership
JICA	Japan International Cooperation Agency
KCA	Key Category Analysis (in GHG Inventory)
KfW	German Development Bank
LDCF	Least Developed Countries Fund
LECRDS	Low Emissions and Climate Resilient Development Strategy
LULUCF	Land Use and Land Use Change and Forestry
M&E	Monitoring and Evaluation
MAFFS	Ministry of Agriculture, Forestry and Food Security
MDD	Methods and Data Documentation
MRV	Monitoring, Reporting and Verification
MSWGCA	Ministry of Social Welfare Gender and Children's Affairs
N ₂ O	Nitrogen Oxides
NaCEF	National Commission on Environment and Forestry
NAMA	Nationally Appropriate Mitigation Action
NBSAP	National Biodiversity Strategic Action Plan
NCC	National Climate Committee
NCC	National Climate Committee
NCCAP	National Climate Change Action Plan
NCCC	National Climate Change Council (proposed)
NCF	NEFCO Carbon Fund
NCF	Nordic Climate Facility
NCP	National Climate Policy

NDA	National Designated Authority
NDF	Nordic Development Fund
NEDF	Nordic Environmental Development Fund (of NEFCO)
NGOs	Non-Government Organizations
NIE	National Implementing Entity
NIIP	National Inventory Improvement Plan
NMS	National Meteorological Services
NWSP	National Water and Sanitation Policy
OECD	Organization for Economic Corporation and Development
PMCFW	Private and Market Climate Finance Window
PPCR	World Bank Pilot Program for Climate Resilience
PSF	Private Sector Facility under the GCF
QA/QC	Quality Assurance and Quality Control Procedures
SALWACO	Sierra Leone Water Company
SCCF	Special Climate Change Fund
SFCIA	Specialized Forum/Centre on Climate Impacts and Adaptation
SIDA	Swedish International Development Agency
SLCF	Sierra Leone Climate Fund (proposed)
TNAs	Technology Needs Assessments
UKTR	UKMO Transient Model
UN	United Nations
UNDP	United National Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention for Climate Change
USAID	United States Agency for International Development
USEPA	United States Environment Protection Agency
WB	World Bank
WHO	World Health Organization
WMO	World Meteorological Organization

EXECUTIVE SUMMARY

Background (Section I)

Sierra Leone is among the most vulnerable countries to climate change, and economic sectors and livelihoods are already frequently experiencing the manifestations of the impacts. According to the science of climate change, these impacts are likely to continue to affect Sierra Leone in the future, despite the country being least responsible for the problem since Sierra Leone's contribution to global emissions of greenhouse gases is negligible.

*Sierra Leone's Vision for 2013 to 2035 is to become a middle-income country. It would be an inclusive, green country, with 80% of the population above the poverty line. It would have gender equality, a well-educated, healthy population, good governance and rule of law, well-developed infrastructure, macroeconomic stability, with private-sector, export-led growth generating wide employment opportunities; there would be good environmental protection, and responsible natural resource exploitation. The Sierra Leone National Development Plan – **the Agenda for Prosperity 2013 -2018** indicates that Sierra Leone is committed to mainstreaming inclusive green growth in her development process. Thus, the development of the National Climate Change Strategy and Action Plan is timely and will support the transition to low-emission development involving decoupling carbon emissions from economic growth through a series of measures across all economic sectors.*

*The national circumstances of Sierra Leone have been fully taken into consideration during the development of the Strategy and Action Plan. This includes national and sectoral strategies included in the **National Development Plan–the Agenda for Prosperity**. Sierra Leone's Vision for 2013 to 2035 is to become a middle-income country. It would be an inclusive, green country, with 80% of the population above the poverty line. It would have gender equality, a well-educated, healthy population, good governance and rule of law, well-developed infrastructure, macroeconomic stability, with private-sector, export-led growth generating wide employment opportunities; there would be good environmental protection, and responsible natural resource exploitation. A review of the current status of implementation of the cross-cutting issues of the Climate Convention at the national level has been documented. These include (a) research and systematic observation systems; (b) technology transfer; and (c) education, training and public awareness.*

Low Emissions and Climate Resilient Strategy of Sierra Leone (Section II)

In Section II of the document the low Emissions and Climate Resilient Development Strategy (LECRDS) of Sierra Leone is discussed. Climate change perspectives of Africa and Sierra Leone are presented based on the scientific evidence in the reports of the Fifth Cycle of the Intergovernmental Panel on Climate Change (IPCC) and strategic documents developed in and for Sierra Leone which include the National Communications, the NAPA and other strategic documents. This Low-Emission Climate-Resilient Development Strategy (LECRDS) is a strategic document to assist Sierra Leone in shifting its development path from brown to green economy and to achieve sustainable development, based on its own socio-economic and development priorities.

The current national circumstances of Sierra Leone, the emissions and mitigation potentials of greenhouse gases from Sierra Leone, the projected climate scenarios, the impacts of climate change on

Africa and on the national and sectoral economies of Sierra Leone are discussed and they served as crucial inputs into the development of the LECRDS.

The VISION of the Sierra Leone Low Emission Climate Resilient Strategy is to create a new era for a harmonious relationship between the economy, environment, social and long term sustainability; shifts to a green economy and provides for the identification and implementation of various mitigation and adaptation measures. The goal of the strategy and the accompanying action plan is to prepare the government and people of Sierra Leone to limit their carbon footprint; reduce or minimize risks by improving adaptive capacity, adapt by reducing vulnerability to climate change impacts and increasing the resilience and sustainable wellbeing of all citizens; and to leverage new opportunities and facilitate collaboration in-country and with regional and global communities. The negative biophysical and socio-economic impacts of climate change will be minimised and the population will be well positioned to harness new opportunities presented by climate change through the implementation of low-emissions and climate resilient development policies and programs. The response strategy and action plan aims to maintain the emission levels of Sierra Leone relatively low or neutral by reducing her carbon footprint and by following green growth pathways in all economic sectors. It further aims to strengthen the Sierra Leone's resilience to climate change and its adaptive capacity, particularly in vulnerable economic sectors and communities.

The development of this Strategy and Action Plan is based on the guiding principles that include: (a) country-driven and specific climate change interventions; (b) sustainability of responses; (c) consultative and all inclusive approach; (d) cost effectiveness; (e) equity-based development; and (f) mainstream climate change into development frameworks.

Priority climate change response strategies have been identified and included in the LECRDS. These strategies are in the area of mitigation of greenhouse gas emissions and adaptation to the impacts of climate change. These strategies include:

Strategy 1: *Institutionalization of coordination, monitoring, reporting and verification of climate change issues by strengthening the Environment Protection Agency for effective and efficient provision of technical policy advice to the Government and people of Sierra Leone for relevant decision making in transitioning to green economic growth.*

Strategy 2: *Transformation of the National Meteorological Services of Sierra Leone into an Agency and strengthening of Climate Change Early Warning System of Sierra Leone*

Strategy 3: *Estimation, in a sustainable manner, of Sierra Leone's contribution to global warming and climate change; assessment of the impacts of climate change on Sierra Leone's economy and people; and analysis and contextualization of the possibility of national and sectoral climate change integrated plans providing guidance for the development and investment pathways of the country and choice of investments.*

Strategy 4: *Promotion of energy efficiency, enhanced management (improved transmission and distribution) and expansion of the energy mix through uptake of renewable energy sources (Solar, Wind, Hydro, Biomass) particularly in the rural areas of Sierra Leone.*

Strategy 5: *Enhancement of waste management systems at all levels to reduce pollution and greenhouse gas emissions under the category so as to improve health of both humans and animals and reduce global warming.*

- Strategy 6:** *Diversification of economic growth through strengthened transport sub-sector, particularly the infrastructure to contribute to the reduction of regional and global emissions of greenhouses and build a stable economy.*
- Strategy 7:** *Adoption and application of climate-smart and conservation agriculture that allow minimum disturbance and year-round maintenance of soil and soil cover, including the use of leguminous crops to boost soil nitrogen; adoption of new crops, crop rotation and/or crop varieties and adjusting the time of planting/harvesting; introduction of integrated soil-fertility management systems that cater to the nutritional needs of the crop without polluting the environment; and integrated water management practices.*
- Strategy 8:** *Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation.*
- Strategy 9:** *Integrated management of crops and Livestock management including the modification herd composition: variation of species/breeds; and adaptation of grazing management practices to increase soil carbon. Reduction of greenhouse gas emissions from livestock by improving animal nutrition, breed selection and manure management.*
- Strategy 10:** *Restoration of degraded lands with high production potential; application of erosion control, soil and water conservation, organic amendments, perennial or deep root crop systems; and improvement of land and soil, including drainage, desalinization, addition of gypsum to renovate sodic soils.*
- Strategy 11:** *Management of coastal and fisheries resources through promotion of non-destructive fishing techniques to maintain resilience of marine ecosystems; aquaculture in areas inundated by rising sea levels.*
- Strategy 12:** *Promotion and facilitation of early warning and disaster preparedness through strengthening and improvement of climate early warning systems, drought contingency plans, response to drought and flooding, sensitisation and awareness-raising, and promotion of weather-indexed risk insurance.*

The Climate Change Action Plan (Section III)

The National Climate Change Action Plan is developed to take the efforts (adaptation and mitigation) needed to respond to climate change in Sierra Leone to another stage beyond identification to implementation. Under the Climate Change Action Plan, the strategies identified in the LECRDS have been translated into mitigation and adaptation actions to enable Sierra Leone to take decisive and sustainable actions in addressing the root causes and the adverse impacts of climate change on the national economy and move the country into a green and resilient economy. The Action Plan includes (a) prioritised activities that will support Sierra Leone to transition to a low-carbon and climate-resilient economy; (b) information on financing the LECRDS and its Action Plan; (c) mobilisation of resources and (d) monitoring, reporting and verification of impacts on the citizens and economy of Sierra Leone due to the implementation of the strategy and action plan.

Implementation of the LECRDS and the National Climate Change Action Plan of Sierra Leone is contingent on the existence of solid climate change policy, climate change legal framework and a well-established institutional structure with well-defined roles and responsibilities of institutions and individuals. In Sierra Leone both the climate change policy and the institutional structure are in their infancy stages. There is no climate change law. Given the cross-cutting and overarching role that policy,

legislative and institutional reform can play in enabling Sierra Leone's climate change response, priority actions are envisaged and have been identified for the implementation of the LECRDS, NCCAP and other climate change issues. These priority actions include:

- 1. Review, revise and adopt the current Draft Climate Policy into a comprehensive Climate Policy;*
- 2. Establish the enabling legislative framework to implement the LECRDS and NCCAP actions;*
- 3. Establish and/or strengthen the high-level National Climate Change Council (NCCC), in the Office of the President; and*
- 4. Establish a National Climate Change Secretariat as the primary national government agency for climate change response.*

Jointly implemented, these actions constitute a comprehensive package that facilitates climate change mainstreaming and effective LECRDS and NCCAP implementation.

In addition to the National Climate Change Policy, Act and Secretariat, it is recommended that relevant Divisions and Units of the Secretariat should be established and/or strengthened and some national, sub-national and thematic committees should be established to support the Secretariat in the implementation of climate change, particularly the LECRDS and National Action Plan. This institutional framework should be inscribed and anchored on the provisions of the proposed new National Climate Change Act.

Establishment of partnerships with organizations, communities, and other partners would be crucial as sustainable means to face the challenges of global climate change and adapt to its impacts. Additionally, new partnerships specific to climate change should be forged to provide the enabling environments for closer working relations on a range of science and adaptation tools for decision making.

Resourcing Mobilisation Strategy for the LECRDS and NCCAP (Section IV)

*The realisation of the bold ambitions and actions identified in the Sierra Leone LECRDS and the NCCAP will require substantial financial resources. To be successful, Sierra Leone will need to access both public and private sources and from both within Sierra Leone and overseas. The cumulative expenditure commitment estimates in the LECRDS and NCCAP is about **205.5 Million US Dollars**. Raising the necessary capital is currently impeded by a number of barriers some of which include policy and regulatory weaknesses, difficulties in accessing commercial finance and technical capacity shortcomings. For sustainability, it is recommended to create a stand-alone dedicated Sierra Leone Climate Fund (SLCF). The SLCF would focus both on mitigation and adaptation activities; it would evolve in a phased manner starting with providing grant financing before evolving to offer a wider palette of financing instruments; it would aim to catalyse private sector funding through interacting with other financial intermediaries (e.g. commercial banks); and its governance structure would allow broad and equal representation from the government, civil society and the private sector leading to improved capacity of the Government to absorb international public climate finance.*

A Resource Mobilization Strategy is proposed with the ultimate objective of raising the resources needed to implement the Strategy and Action Plan. Utilizing detailed information about current donors and funding patterns, this document aims to provide a strategy on how the Government of Sierra Leone can mobilize resources for activities planned to address climate change at the national and sub-national levels. The document provides information about distribution of funds and highlights the importance of improving capacity to deliver and absorb funding at country level. It is recommended that resources

should be mobilized both domestically and internationally. For this reason, the SLCF should be designed to have three (3) windows: (1) Domestic Climate Finance; (2) International (Bilateral and Multilateral) Climate Finance; and (3) Private and Market Climate Finance. Detailed information on the structure and management of these Funds are contained in the underlying text in this document.

International cooperation is an important and necessary prerequisite for leveraging of inputs for the implementation of the LECRDS and NCCAP. Enhancing international cooperation, linking with international and regional programs, receiving international supports in terms of experience and technology relating to climate change mitigation and adaptation in different areas of the economy will enhance implementation and monitoring and evaluation. International cooperation with bilateral governments and multilateral organizations and institutions are required in order to mobilize resources such as knowledge, experiences and funds for implementation of the LECRDS and NCCAP, promote international collaboration in scientific and technological activities, and effectively apply and transfer climate friendly technologies.

Capacity building needs for the implementation of the LECRDS and NCCAP of Sierra Leone have been identified as (a) for gathering, processing, and providing and communicating meteorological and socio-economic data and information; (b) improving National GHG Inventories and Assessments of GHG Mitigation and Climate Change Adaptation Technologies; and improving climate Vulnerability (impacts and adaptation) Assessment

Monitoring, Reporting & Verification of Implementation of LECRDS and NCCAP (Section V)

Finally, the monitoring, reporting and verification of the implementation of the LECRDS and NCCAP of Sierra Leone have been articulated with the objective of tracking the transition of Sierra Leone to a low carbon and climate resilient economy. It will be necessary to develop and apply an integrated framework for measuring, monitoring, evaluating, verifying and reporting results of response (mitigation and adaptation) actions and the synergies between them. Effective implementation of the NCCAP is highly dependent on the internal “feedback” generated through monitoring, reporting and verification (MRV) processes. The framework must be able to assess the effectiveness of investment in mitigation and adaptation actions because the mobilization and continuation of financial and technological support are contingent on the effectiveness of the MRV framework. National, bilateral and multilateral financial partners and other providers of finance need the results of MRV systems to validate the effectiveness of funds they provide. Therefore, securing further financial support for the implementation of the NCCAP will be dependent on the successful establishment and implementation of a MRV framework.

For effective and efficient monitoring, reporting and verification, criteria with quantitative and qualitative indicators disaggregated according to gender and covering various sectors and levels of the national economy need to be developed and utilized in the monitoring process. Particular attention should be paid to coverage of the activity whether it be at the grassroots level community, sub-national and/or national; agriculture, water resources, ecosystem, etc; local level, middle-level and high-level decisions-makers and national policy-makers. The monitoring and evaluation criteria must also include the assessment of the impacts of the activity on the community and at the national levels such as change in knowledge and awareness on climate change, improvement in the livelihoods and influence on decision and policy making at the local and national levels

SECTION I: BACKGROUND

1.1: Introduction

Climate change is now recognised as the most serious global challenge of our time and the impacts of climate change on societies around the world are increasingly evident. As a Least Developed Country with Human Development Ranking indicated in Table 1 below, Sierra Leone is among the most vulnerable countries to climate change, and economic sectors and livelihoods are already frequently experiencing the manifestations of the impacts. According to the science of climate change, these impacts are likely to continue to affect Sierra Leone in the future, despite the country being least responsible for the problem since Sierra Leone’s contribution to global emissions of greenhouse gases is negligible.

Headline Indicators	Baseline	Target By 2017
Population Growth Rate	1.8%	1.3%
Infant Mortality Rate	89/1,000 live births	45/1,000 live births
Under Five Mortality Rate	140/1,000 live births	80/1,000 live births
Maternal Mortality Rate	857/100,000 live births	550/100,000 live births
Total Fertility Rate	5.1 children per woman	3.8 children per women
Adolescent Fertility Rate	122 live births per 1,000	90 live births per 1,000
HIV Prevalence Rate	1.5% of 15-49 year olds	1.15% of 15-49 years
Prevalence of Mental Disorders	> 12%	9%
Access to Safe Drinking Water	57%	80%
Access to Improved Sanitation	40%	60%
Primary School Pass Rate	Girls 72.5%; Boys 75.9%	Girls 80%; Boys 80%
JSS (BECE) Pass Rate	Girls 55%; Boys 62%	Girls 70%; Boys 70%
SSS (WASSCE) Pass Rate	Girls 8% (16%); Boys 7% (14%)	Girls 20% (30%); Boys 20% (30%)
Adult Literacy	Male 69.6% Female 43.5%	Male 75% Female 55%

Sierra Leone’s Vision for 2013 to 2035 is to become a middle-income country. It would be an inclusive, green country, with 80% of the population above the poverty line. It would have gender equality, a well-educated, healthy population, good governance and rule of law, well-developed infrastructure, macroeconomic stability, with private-sector, export-led growth generating wide employment opportunities; there would be good environmental protection, and responsible natural resource exploitation (A4P, 2012). The preparation and implementation of a Low Emissions Climate Resilient Development Strategy is a priority identified the Sierra Leone National Development Plan – *the Agenda for Prosperity 2013 -2018*. Sierra Leone is committed to mainstreaming inclusive green growth in the Agenda for Prosperity (A4P, 2012). The transition to low-emission development in both developed and developing economies has been

recognized internationally as an imperative to stabilizing greenhouse gas (GHG) concentrations in line with a 2°C temperature increase scenario. Reducing emissions and maintaining a safe operating space for humanity, requires transition to low emission development pathways around the globe. This means decoupling carbon emissions from economic growth through a series of measures across all economic sectors, such as energy efficiency improvements, usage of renewable energy sources, managing land use change and others.

This Low-Emission Climate-Resilient Development Strategy (LECRDS) is a strategic document to assist Sierra Leone in shifting its development path from brown to green economy and to achieve sustainable development, based on its own socio-economic and development priorities. The document is divided into three sections. Section I provides the background including the national circumstances of Sierra Leone with detailed information on the current status of the development of the country including the National Development Plan – the Agenda for Prosperity (2013-2018), and most of the sectoral policies and programmes that have or are being implemented. The information from the National and Sectoral policies, strategies, plans and programmes serve as baseline information that is used in shaping the Strategy (Section II) and Action Plan (Section III). Section II includes a strategic vision, objectives, principles and goals of the LECRDS and a short and medium-term component that presents specific actions to be undertaken to get on a green growth and climate resilient pathways. Section III documents the actions to be undertaken and their indicative costs in an Action Plan. This Plan presents a wide range of economy-wide interventions to be implemented across the public and private sectors. The actions include concrete mitigation and adaptation interventions and provide for the enabling conditions required for effectively responding to climate change. The section also provides direction for mobilizing funds for implementation of the actions; the monitoring, reporting and verification (MRV) of impacts of the implementation of the actions; and the national and international cooperation required for the implementation of the Action Plan.

The development of this strategy was based on a participative planning process ensuring that all relevant national and local stakeholders were consulted. The process was led by the Environment Protection Agency at the national level and the Sierra Leone UNDP Office at the international level. Due to the outbreak of the Ebola Virus Disease (EVD) in Sierra Leone which claimed 3,461 lives by February 2015 (WHO, 2015) in that country, extensive and intensive consultations including through workshops and focus group meetings were not feasible and had to be avoided. To ensure the formulation of the strategy was conducted in a participatory way, an International Consultant who has been involved in climate change studies in Sierra Leone and is knowledgeable about national circumstances was hired to collaborate with national experts and UNDP staff in Sierra Leone. Through e-consultation the document has been uploaded on to the EPA and UNDP websites and communicated to relevant experts and other stakeholders for iterative review until the document is accepted as a final draft.

Considering the ambitious nature of the Action Plan, support, partnerships, investments and technology innovations are required for the implementation of the actions and achievement of the goal of low-emissions and climate-resilient development pathways.

1.2: Sierra Leone National Context:

1.2.1: Geography:

Sierra Leone is located on the west coast of Africa, between the 7th and 10th parallels north of the equator. Sierra Leone is bordered by Guinea to the north and northeast, Liberia to the south and southeast, and the Atlantic Ocean to the west. The country has a total area of 71,740 km², divided into a land area of 71,620 km² and water of 120 km². The country has four distinct geographical regions: coastal Guinean mangroves, the wooded hill country, an upland plateau, and the eastern mountains. Eastern Sierra Leone is an interior region of large plateaus interspersed with high mountains, where Mount Bintumani rises to 1,948 meters. Sierra Leone can be split into three geological areas, in the east is part of the West African craton, the western area consists of the Rokelides, an orogenic belt, and a 20- to 30-km coastal strip of sediments (Schlüter and Trauth, 2008).

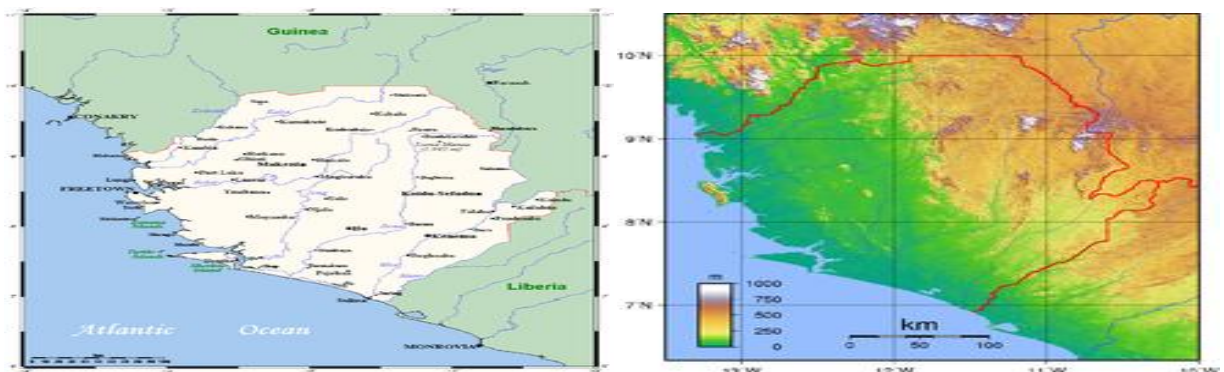


Figure 1: Political and Relief Maps of Sierra Leone

1.2.2: Population:

According to Statistics Sierra Leone (2012), the population is estimated at 6.0 million in 2011 with a growth rate of 3.3%. The population is 62% rural and 38% urban. The capital city of Freetown is located in the western area of the country and is home to approximately 1.25 million people (~21% of the total population). The country has about 13 tribes, eight of which are major ethnic groups that have historically resided in distinct areas of the country. The Susu, Limba, and Koranko were generally associated with the northern regions, the Temne in the central and western region, the Kono in the central eastern region, and the Mende in the south. The Creole and Sherbro primarily inhabited coastal regions. The years of conflict, urban migration, and mining industry have created a more mixed distribution of people in the last decades.

Sierra Leone's population almost tripled between 1960 and 2011, and it is projected to almost double again over the next 40 years. The urban annual growth rate has consistently been higher than total growth. These trends are projected to continue until 2050, when the urban population will be 59% and rural 41% of the total, both as a result of enlargements in settlements and in consequence of net rural-urban migration.

1.2.3: Current Climate:

The climate of Sierra Leone is tropical; although it could be classified as a tropical monsoon climate, it could also be describe as a climate that is transitional between a continually wet tropical rainforest climate and a tropical savannah climate (Gabler et al., 2008). There are two seasons: the rainy season from May to November, and a dry season from December to May, which includes harmattan, when cool, dry winds blow in off the Sahara Desert.

Temperatures:

The temperatures are consistently high throughout the country, roughly averaging about 28 degree centigrade. The amplitude of the average annual mean temperature of Sierra Leone is about 3^oC. Maximum temperature shows larger amplitude (about 5^oC) while minimum temperature has an amplitude of about 2^oC. Highest temperatures are recorded in March and resonate between February and April while lowest temperatures are recorded in July and August. The low temperatures in July and August are mainly due to almost continuous cloudiness and rain during these months. The average temperature is 26^oC and varies from around 26^oC to 36^oC during the year (Blinker, 2006; Le Vert, 2006). Mean annual temperature has increased by 0.8^oC since 1960, an average rate of 0.18^oC per decade. During the dry season, the harmattan (dry dusty cool air) causes average temperature of about 32^oC daytime (around 13000Hrs) and 15^oC at night (0600 Hrs). However, the harmattan period in recent times has been warmer than usual.

Precipitation

The climate of Sierra Leone is basically divided into two seasons: the rainy and drier seasons. The rainy or monsoon season runs from July to September with a country average rainfall of about 2746 millimetres (mm) and varies from 3659 mm in Bonthe in the South, 2979 mm in Lungi (Freetown) in the West and 2618 mm at Kabala and Bo in the north and central parts of the country. Average rainfall is highest at the coast, 3000–5000 mm per year; moving inland this decreases and at the eastern border of the country, the average rainfall is 2000-2500mm (Hughes and Hughes, 1992). This rainfall season is largely controlled by the movement of the tropical rain belt (also known as the Inter-Tropical Convergence Zone, ITCZ), which oscillates between the northern and southern tropics over the course of a year. When the ITCZ is in this northern position, the dominant wind direction in regions south of the ITCZ is south-westerly, blowing moist air from the Atlantic onto the continent.

The precipitation regime has become more erratic in the last 50 years and recently, delays in the start of rains and associated water shortages have been witnessed particularly in Freetown. Heavy rainfall following such dry spells often results in extensive flooding throughout the country. The effects of these unusual temperature and rainfall patterns on agriculture, water supply and sanitation are evident in various parts of Sierra Leone. It has also been observed that the pre-monsoon period which runs from April to June is now associated with stronger winds and more frequent rain/storms causing greater damage to lives and property. Calmer and dryer weather now appears to be associated with the September/November period which was usually characterized by frequent thunder and lightning and short but heavy rainfall.

Other climatic elements:

The humidity, like the temperature is usually high as a result of the heavy rains coupled with high temperature and 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 near equatorial location, but sunshine hours are affected during the wet season. The post monsoon period of October to November has predominant wind direction of south-westerly but with lesser strength and it signals the withdrawal phase of the rainy season and also the Southward migration of the ITCZ.

1.3: The National Development Plan—the Agenda for Prosperity

The Sierra Leone Government's plans are laid out in its five-year national development plan, "*The Agenda for Prosperity*" (GoSL/A4P, 2012), which was launched in July 2013. Sierra Leone's Vision for 2013 to 2035 is to become a middle-income country. It would be an inclusive, green country, with 80% of the population above the poverty line. It would have gender equality, a well-educated, healthy population, good governance and rule of law, well-developed infrastructure, macroeconomic stability, with private-sector, export-led growth generating wide employment opportunities; there would be good environmental protection, and responsible natural resource exploitation.

Sierra Leone draws on its natural resource endowments as the motor of the economy, aiming to be a model in responsible natural resource exploitation, with revenues directed at transforming and developing the country in a framework of sustainable environmental protection. The Agenda is to build a stable economy, founded on private sector-led growth, and to diversify activity across several competitive sectors, increasing value-added and generating gender-equitable employment. The longer term economic growth target is for annual GNI per capita growth of 4.8% that is annual growth in total GNI of 6.7%. Diversified economic growth will require greatly strengthened infrastructure: transport, power, water, ICT, and financial services. Transformation of agriculture will combine smallholder commercialisation with larger-scale agro-based production.

It is planned to increase Sierra Leone's UNDP Human Development Index from 0.33 to 0.62, the average level of middle-income countries, and the strategy will focus on improving health and education for all, and particularly for women and girls. Health will build on the Free Health Care and Scaled-Up Nutrition Initiatives, expanding immunisation and access to water and sanitation. Education access, equity and quality will be improved at all levels, achieving high literacy, and developing a labour force with the skills demanded by the employment-generating sectors of the economy.

The Agenda for Prosperity is built on the following pillars

Pillar 1 – Diversified Economic Growth

Pillar 2 – Managing Natural Resources

Pillar 3 – Accelerating Human Development

Pillar 4 – International Competitiveness

Pillar 5 – Labour and Employment

Pillar 6 – Social Protection

Pillar 7 – Governance and Public Sector Reform

Pillar 8 – Gender and Women's Empowerment

To achieve the sustainable growth and transformation underscored in the Agenda for Prosperity, adequate financing is needed for the projects and programmes identified. The Government will explore traditional and non-traditional sources of funding, including:

- a. Intensification domestic revenue mobilisation;
- b. Increase in donor support;
- c. Seeking support from the Millennium Challenge Corporation;
- d. Seeking public-private partnership support, particularly in infrastructure sectors;
- e. Exploring opportunities of potential benefits from carbon trading will be explored; and
- f. Exploring the utilization of Diaspora bonds to finance projects such as in infrastructure, housing and social amenities.

1.4: The Sectoral Development Plans

1.4.1: The National Economy

On the macroeconomic front, government implemented a restrictive fiscal policy during the past five years, preceded by a post-recovery expansionary fiscal policy. Hence, the overall deficit widened to -5.6% of GDP in 2012 from -3.1% of GDP in 2011 but it improved to -2.1% in 2013. It is projected at -4.1 in 2015 (AfDB, OECD, UNDP, 2014); of course these projections vary under different scenarios.

Domestic revenue increased to 6.4% for the first half of 2013 and is projected to reach 12.2% of GDP in 2015. Capital expenditure is projected to marginally increase to 8.3% of GDP by the end of 2015.

On economic co-operation, regional integration and trade, export growth varied from nearly 34% in 2010 to 68% by the second half of 2013. Imports grew by an average of 54.4% during 2008-11 and stabilised in 2012. The country's major trading partners include China, India, the United Kingdom, the United States, South Africa and Belgium. The trade balance improved from -55% of GDP in 2011 to -24.6% in 2013 and is projected to stabilise around that through 2015. The current account deficit, including official transfers will contract to 15.9% of GDP in 2015.

Sierra Leone's per capita GNI was \$340 in 2010. The Government and people of Sierra Leone have developed and adopted a Third Generation Poverty Reduction Strategy Paper (2013 – 2018), a medium term strategy entitled "*The Agenda for Prosperity - Road to Middle Income Status*". To reach the bottom rung of Middle Income status, the size of the economy and subsequently, the per capita GNI will have to triple in 25 years, with GNI per capita rising to \$1006. This implies an average growth rate in per capita income of at least 3.9% in the next 25 years, or 5.8% annual growth in total GNI.

Thus, Sierra Leone has recorded strong economic growth over the past five years. The improvement followed a combination of proactive monetary policy and specific fiscal measures to keep the prices of essential commodities at affordable levels; measures included temporarily removing import duties on petroleum and rice and reducing excise duties on petroleum. It was supported by stability in the exchange rate, and increased availability of domestic food supplies.

However, the EBOLA outbreak in 2014 continues to exert crippling impacts on the economy of Sierra Leone. According to a World Bank Report (WB, 2015) full-year 2014 growth in Sierra Leone fell by more than half to 4.0 percent from 11.3 percent expected before the crisis. Investor aversion further diminishes 2015 growth estimates to -2.0 percent in Sierra Leone (down from pre-Ebola estimates of 8.9 percent). This projection implies forgone income in 2015 of about US\$900 million for Sierra Leone.

1.4.2: Agriculture and Food and Nutrition Security

The overall goal for this sector during the Agenda for Prosperity is to have a sustainable, diversified, and commercial agricultural sector, which ensures food self-sufficiency, increase exports and create jobs opportunities for Sierra Leonean men and women. Transformative interventions will be anchored by agricultural extension and smallholder development, introducing productivity and enhancing food and cash crop technologies to increase yields and improve household incomes. Therefore, the sector strategic objectives and priority activities include (a) to increase the production of staple food crops for food security; (b) to promote and

increase value-adding activities for agricultural goods; (c) to increase the production and export of cash-crops; (d) improve access to Finance for Farmers and (e) to strengthen the capacity of the Ministry of Agriculture, Forestry and Food Security (MAFFS).

Agriculture contributes 40 to 50% of Sierra Leone's GDP, about 10% of exports, and provides employment to approximately two-thirds of the population. About 1% of Sierra Leone's land is under cultivation, and roughly 5% of cropland is irrigated. About 155,000 hectares are believed to be subject to some form of water management, with fewer than 30,000 hectares believed to be irrigated. Irrigable potential, however, is estimated to be more than 800,000 hectares.

Domestic production of food crops, especially rice, the staple food, has increased in recent years. Most rice is grown in rainfed upland areas (GOSL 2009a). The production of cassava and other food products, including sweet potato, poultry, small ruminants and cattle, also increased during the AfC period; the production of traditional export crops such as cocoa and coffee also increased (by 217% and 60% respectively). Cocoa and coffee exports increased between 2007 and 2011 by 105% and 220% respectively. Despite this growth, agricultural exports remain low and undiversified. Access to market and to credit is a severe constraint.

Since 2007, there has been a significant increase in private investment in the agricultural sector, with large investments in oil palm, sugar cane, rubber and fruits. Many of these investments will become operational during 2013-18.

1.4.3: Fisheries Sector

The Fisheries Sector Strategic Objectives and Priority Activities under the Agenda for Prosperity include (a) to increase the supply of fish for the domestic market by at least 15% annually, particularly from semi-industrial, artisanal, inland, and aquaculture fisheries activities, (b) to increase fish exports by focusing on strategic high-value markets such as the EU; and (c) to promote and increase value-adding activities for fisheries products.

Sierra Leone is blessed with abundant and varied fish resources. Fisheries activities currently contribute about 10% of GDP, and fish is a major source of animal protein for over 80% of the country's population. In addition, the sector currently employs over 500,000 Sierra Leoneans, with women at the forefront of many activities (particularly fish processing and marketing). The production of industrial fisheries has been around 20,000 tonnes, mainly exported with little or no value addition. The semi-industrial fisheries base, if upgraded, could significantly increase production levels. Artisanal fish production currently stands at around 120,000 tonnes, mainly for the local market with little or no value addition. It is estimated that wide-scale improvement of fisheries activities has the potential to bring the sector's employment levels close to one million people and revenue earning potential of \$60 million annually. Therefore, this sector has

the potential for rapid and inclusive growth, as well as positive spill-over for food security and poverty reduction objectives.

In spite of the sector's huge potential to contribute to economic growth and poverty reduction, it continues to face daunting challenges.

1.4.4: Water Resources Sector

The Government of Sierra Leone (GoSL) recognises the role of water and sanitation in the fight against poverty, reducing mortality and the improvement of living standards. The government's policy on water and sanitation is laid out in the second generation Poverty Reduction Strategy Paper (Agenda for Change, 2008-2012) and further reinforced in the Agenda for Prosperity, 2013 - 2018. The Water and Sanitation policy is aimed at (a) effective and sustainable development and management of water resources; (b) development of water supply and sanitation services and improving the provision of safe water supplies and sanitation facilities in urban and rural areas; and (c) promoting and scaling up the Community Led Total Sanitation and Open Defecation-Free Communities concepts (Ousman Barrie, 2012). According to the National Water and Sanitation Policy (NWSP), policy formulation, coordination and regulation in water and sanitation are the central government's role. The Ministry of Energy and Water Resources is the policy, regulatory and oversight entity with respect to water resources. The Ministry of Health and Sanitation is responsible for policy oversight, coordination and regulation in respect of sanitation and hygiene, including solid and liquid waste management.

The water resources of Sierra Leone include atmospheric (treated under the Climate sub-section above), surface and ground water. Sierra Leone has nine major river systems. The Rokel/Seli, Pampana/Jong, Sewa and Waanje systems originate from within the country, as do the numerous coastal streams and creeks; the Great and Little Scarcies and Moya Rivers originate from the Fouta Jallon Plateau in the Republic of Guinea, and the Mano River originates from the Republic of Liberia. These rivers range in length from 160 km for the Great Scarcies to 430 km for the Sewa River; their catchment areas range from 2,530 km² for the coastal streams and creeks, to 14,140 km² for the Sewa River. The total mean annual runoff from the river basins is of the order of 160 km³, with monthly runoff following rainfall variability. Internally, renewable water resources are over 29,000 km³ per capita, which is six times the average for Africa. Produced ground water is estimated at 50km³ annually and much of this (80%) overlaps between surface and ground water.

At the service delivery level, local councils have responsibility for rural water supply and solid waste management in urban areas. Rural sanitation is assumed to be a household matter. In terms of urban water supply, the Guma Valley Water Company (GVWC) is responsible for Freetown, while the Sierra Leone Water Company (SALWACO) is responsible for other urban and peri-urban areas and for rural water supply, including the provision of technical support to local

councils. International organisations, including UNICEF and WHO, also intervene either directly or through NGOs in the service delivery process. Demographic pressures make it difficult for planning and infrastructure to keep pace. Hardly any significant water and sanitation infrastructure has really been developed in the country after the first two post-independence decades. The Guma Dam, constructed immediately after post-independence and still the sole public water infrastructure to Greater Freetown, is designed to supply a population of 300,000 people, but over 1.5 million people live there today. The Water Point Mapping in 2012 reported that 18% of existing water points across the country was broken, while another 14% are partly damaged and currently dysfunctional.

In nominal terms, total disbursements to the water and sanitation sector in Sierra Leone have increased year on year since 2009. The rates at 1.4% or 1.5% of GDP are high relative to many other sub-Saharan African countries. Projected expenditure on water and sanitation is to increase domestically financed water and sanitation funding to at least 1.5% of GDP by 2015.

1.4.5: Health Sector

Prosperity for Sierra Leoneans can be measured by the levels of access to reasonable health care; high quality education; and equal opportunities for all, regardless of age, gender, religion and tribe, and with special attention to the needs of the disabled and vulnerable. According to the Agenda for Prosperity (GoSL/A4P, 2012 and AfDB (2013), Sierra Leone has a comprehensive program for improving primary health care and health outcomes. In the Agenda for Prosperity (GoSL/A4P, 2012), health targets include increasing life expectancy by 10 years (from 47 to 57 years) over the next 25 years. There has been progress in recent years: an estimated 26% of children under the age of 5 sleep under bed nets, and 30% of those with malarial fever receive ant malarial drugs, the average for low-income countries. Over half (57%) of those with acute diarrhea receive oral rehydration therapy (compared with 39% for low-income countries), and nearly half those with acute respiratory infections are taken to a health-care provider.

However, there is still much progress to be made in addressing many of the underlying conditions of poor social and health resilience, including the lack of access to clean water sanitation and clean cooking fuels, as well as inadequate solid waste disposal and drainage. Improved health outcomes are fundamental to broader resilience in Sierra Leone. They will involve providing access to a modern hospital for every mother; building on the Free Health Care and Scaled-Up Nutrition Initiatives, and improving the number of doctors, nurses, and other essential medical personnel; increased coverage for child immunization, as well as increased percentage of the population with access to clean water and sanitation facilities.

The Ebola Viral Disease has turned the clock back and undermined much of the recent gains. Before the Ebola outbreak, Sierra Leone had one of the fastest-growing economies in the world. While the rest of the world hailed the country's post-war development, it paid less attention to

the precarious health situation there. The country was unprepared for the monumental work of an outbreak. Sierra Leone has lost hundreds of doctors, nurses, nursing assistants, and other health workers. In many communities, life has been brought to a standstill. People stopped going to markets; children stopped going to school because the schools were shut down; routine medical checks do not happen and pregnant women do not get health services. Inpatient health services, including major surgery have been severely affected by the Ebola outbreak. Significant international efforts are needed, not only to stop and contain the Ebola epidemic, but also to limit its indirect effects on health service functioning.

1.4.6: Forests and Biodiversity Resources

The Forestry Act of 1988 empowers the Minister to declare any area to be a protected area for the purpose of conservation of soil, water, flora, and fauna. The current extent of state-owned forestland is unknown. The state owns most of the land designated as forest reserves and nationally protected areas, but some percentage of land is also privately held or within chieftaincy land. The Forestry Division of the Ministry of Agriculture, Forestry and Food Security (MAFFS) is responsible for forest management and biodiversity conservation. The National Commission on Environment and Forestry (NaCEF) is responsible for managing the country's natural and environmental resources; and advising the Ministry on policy, project implementation, environmental monitoring, and setting priorities. The Forestry and Wildlife divisions within NaCEF are responsible for natural forest management, management of forest plantations, and management of rangeland and national parks. There is considerable overlap in environmental responsibilities of the NaCEF and other ministries, such as the Ministry of Agriculture and Food Security, Ministry of Lands and Country Planning, Ministry of Works and Technical Maintenance, and Ministry of Mineral Resources.

An estimated 39% of Sierra Leone is forested with twenty-two percent of the forests in 48 forest reserves and conservation areas; 1% is on chieftain land but managed by the Forest Division; and 23% are within a wetland and marine ecosystem protected areas (ARD 2010). The 48 forest reserves are under the custody of government occupying approximately 285,000 hectares of total land cover. In addition, there are 300,000 hectares of mangrove forests and 30,000 hectares of constituted community forests. In 2003, Sierra Leone developed a National Biodiversity Strategic Action Plan (NBSAP) which described the status of biodiversity, and action plans for its sustainable management. According to the FAO 2010 Forest Resource Assessment, 38% of Sierra Leone's land area, or over 2.5 million hectares, comprises wooded landscapes. Fifteen protected areas are proposed, eight in the terrestrial ecosystem and seven in the wetlands.

Wood products from the forest have traditionally ranked as an income earner, while fuel wood, bush meat, medicinal plants and other non-timber products have continued to contribute significantly to the welfare of most Sierra Leoneans; charcoal production and trade is also a source of income, especially for rural people. Forests also provide important services such as

serving as a carbon sink in climate mitigation; they are a source of water supply and recreational facilities.

The major challenges of forest management include, amongst others (a) poor governance; (b) weak law enforcement (c) lack of coordination among sector ministries and (d) illegal harvesting. To alleviate these challenges identified objectives and strategy for effective forest management include (a) to review and formulate new forestry and wildlife policies; (b) to review and amend the Forestry Act of 1988 and the Wildlife Act of 1972 and to accommodate emerging issues such as forest co-management, eco-tourism, biodiversity conservation and climate change; (c) to undertake a national assessment of the forests and woodland resource base; (d) to develop a benefit sharing mechanism that will increase benefits from forest revenue flowing to stakeholders; (e) to promote private sector involvement, including small-holder involvement, in production and value-added activities, including agro-forestry and the long term sustainable utilisation of wood energy resources (f) to mainstream the contribution of forestry and wildlife to sustainable agricultural practices and food security, in cooperation with other agencies; and (g) to mainstream climate change in the forestry and biodiversity policies, strategies, plans and programmes.

1.4.7: Tourism Sector

The tourism sector of Sierra Leone contributed about \$25 million to GDP in 2007, growing to around \$37 million in 2011 and \$42 million of Government revenue generated in 2012. Tourist and foreigner arrivals into Sierra Leone almost doubled from 32,000 in 2007 to 60,000 in 2012. In 2012, of the 59,730 visitors who arrived at Lungi International Airport, 23,619 were on business, 14,074 were visiting friends and relatives, 9,464 visited for leisure purposes, 6,034 for conferences, and 6,539 for other reasons. Visitors from Europe accounted for 26% of arrivals in 2012, compared to 21% from ECOWAS countries, 18% from the Americas, and the remaining 35% from elsewhere. Over the last few years, Government has developed a seven-year strategic plan for tourism, a marketing programme, and a tour guide training programme, among other activities.

There is clear potential for growth of Sierra Leone's tourism industry, but some challenges include (a) only a small number of holiday-goers arrive from abroad because of limited infrastructure, Sierra Leone's international image and relatively high costs of travelling to Sierra Leone; (b) weak institutional and legislative frameworks for the sector; (c) long-term sustainability of key tourist sites could be under threat if necessary steps are not taken and, (d) though may be short term, the misconceptions about the transmission of Ebola virus disease.

To remove these challenges and accrue the potential benefits of the sector, particularly under the Agenda for Prosperity, strategic objectives and priority activities would include (a) to investigate the causes of high travel cost to Sierra Leone, adopt strategies to reduce these costs and increase

the number of tourists; (b) to improve infrastructure and energy, and ensure that sustainable infrastructure, roads, reliable electricity, safe drinking water, and ICT services are provided or rehabilitated in key tourist areas; (c) to improve the safety and efficiency of the options for passenger transfer to and from Lungi International Airport; and (d) to improve the international image of Sierra Leone, particularly at strategic destinations through the development and implementation of a National Marketing Strategy and launch an aggressive promotional drive (including promotional materials, international trade fairs, improving tourism websites); (e) to improve and strengthen the institutional, legislative and regulatory framework and planning for tourism; (f) to increase coordination and networking between key stakeholders; (g) to improve the skills of tourism sector workers-strengthen the Hotel and Tourism Training Centre to provide appropriate training to tourism sector workers; (h) to construct Arts and Crafts Centres to facilitate marketing of locally produced handicrafts; and (i) to promote eco-tourism, develop ecotourism sites and provide ecotourism sites with adequate resources to ensure sustainability.

1.4.8: Land issues (legal, distribution, tenure, etc)

Land is arguably the basis for all natural resources. It faces competing demands from industry, forestry, agricultural production, mining, demographic changes and rapid urbanisation, environmental management, and water catchment areas. Land use and land tenure are the twin factors that determine the optimal use of land (GoSL/A4P, 2012).

The Ministry of Lands, Country Planning and Environment is responsible for managing state lands; compulsory acquisition of land; surveying and mapping; planning; development; and establishment and enforcement of building codes. Paramount chiefs in Sierra Leone's 149 chiefdoms are considered the traditional custodians of the land in their chiefdoms. These traditional authorities allocate land-use rights to extended families for their further division among family members. In principle, the paramount chiefs hold the land in trust for those extended families or lineages attached to a particular chiefdom. No significant land-related decision is final until the paramount chief approves. Chiefs can grant or obstruct any individual's access to land, especially if they are migrants from outside the chiefdom (known as "strangers") or have abandoned their land. The chief presides over land disputes and determines which claims are valid. The paramount chiefs are assisted by sub-chiefs at the lower administrative levels. In post-war years, the government's efforts to decentralize various functions to local and district council have (to varying degrees) recognized the need to work with the chieftaincy in land matters.

In the Agenda for Prosperity (GoSL/A4P. 2012), the top priority for this subsector is the adoption of a comprehensive land use policy that is understood by all, and aimed at ensuring optimal gains for the overall development of the country. The overarching strategy for Land Management aims to (a) improve and strengthen the existing land administration system and land laws; (b) institute reforms in relation to regulation that govern the way in which land ownership rights and obligations are determined; (c) ensure and promote participation of local

communities and relevant stakeholders in planning, design and implementation processes, with special emphasis on gender equality; and (d) support programs for improved landscape management to sustain long-term land productivity. Important strategies for the land management sector include the development of a legal framework for land ownership; developing land-use planning; creating sustainable infrastructure for social improvement and economic growth; and training farmers in sustainable land and water practices.

1.4.9: Mineral Resources Sector

Sierra Leone has had a vibrant mining sector since the 1920s and resources include rutile, diamond, bauxite, gold, iron ore, platinum, tantalite, zircon, limonite, chromate and colombite. The sector provides 15–18% of GDP and 90% of export earnings. Oil reserves have been discovered off Sierra Leone’s coast. The 2009 Mines and Minerals Act and the 2009 Mines and Minerals Regulations regulate the mining sector. The Act (a) addresses previously unregulated areas of health and safety, environmental protection, and community development; (b) tightens rules for administrators and mineral rights holders, including application and reporting requirements; (c) promotes investment and minerals sector development by ensuring security of tenure and preventing companies from holding land under license without demonstrable activities; and (d) rebalances fiscal benefits among companies, communities, and the government (GOSL 2010; GOSL 2009d).

The Ministry of Mineral Resources is responsible for regulating the industry, including the issuance of licenses, field monitoring, enforcement, and maintenance of records. It values and levies export taxes on all official diamond exports. The Director of Mines exercises regulatory administration and supervision over all reconnaissance, exploration and mining operations. The Director of Geological Survey is responsible for geological mapping. A Minerals Advisory Board advises the Minister on issues associated with the sector’s development and certifies that applications and renewals for mineral rights are fully compliant with the law. The Mining Cadastre Office is responsible for registering all mining applications and mining rights and maintaining a cadastre survey map. Petroleum exploration and extraction is within the purview of a Presidential Petroleum Commission (GOSL 2009d; GOSL 2010; Cemmat 2004). The Gold and Diamond Department of the National Revenue Authority implements the country’s participation in and compliance with the diamond trade control requirements of the Kimberly Process Certification Scheme (USGS 2008).

The National Minerals Agency Act was enacted in 2012 creating the institutional framework through which the mineral sector will be effectively managed. The National Minerals Agency provides effective and efficient licensing, geological services and regulatory agency services in a consistent, accountable and transparent manner. The Agency leads in implementing detailed sector strategies, to ensure that Sierra Leone benefits from exploitation and minimizing negative impacts.

As indicated in Sierra Leone's medium-term strategy, the Agenda for Prosperity (GoSL/A4P, 2012), with projected annual production growth of between 4% and 10%, and new investment in the mining sector, Sierra Leone's GDP per capita can be 6% higher in five years than it would otherwise be, and 17% higher by 2020. The two main strategic priorities of the Mineral Sector are to ensure that Sierra Leone's mineral wealth supports national economic and social development in a sustainable manner and that the mining sector becomes transparent and accountable, and promote good investment. It will be necessary to (a) review and amend the Core Minerals Policy, (b) update the Mines and Minerals Act, (c) issue regulations and associated laws to make the sector as attractive as possible; (d) set up the Mining Cadastre Office to process, record and monitor mineral rights applications, mineral rights licenses and revenue data; (e) design incentives to add value to mineral products and facilitate trading opportunities for mined products; (f) improve the regulation and efficiency of Artisanal and Small-Scale Miners; and (g) promote improved employment practices, encourage participation of women in the mineral sector, prevent the employment of children in mines and give preference to employment of nationals as well as provide for training of Sierra Leoneans.

The Ebola Viral Disease outbreak has resulted to restrictions on non-essential travel and repatriation of personnel and drop in investor confidence. Some miners in Sierra Leone are afraid to enter high-risk districts, and several firms (including Australian mining firm Tawana Resources and Canadian Overseas Petroleum) have suspended operations or sent foreign workers home. Investments may be postponed and even cancelled thus reversing much economic gains in the Mining Industry

1.4.10: Decentralisation and Local Governance

The Government of Sierra Leone is committed to a policy of decentralisation by devolution, characterised by, for example, (a) the transfer of power, authority and resources from the centre to democratically elected local councils anchored within the national Constitution and articulated in law, promoting autonomy without prejudice to the sovereignty of the national Government; (b) engendering people's ownership of their local development agenda; (c) stimulating economic growth in local communities, including public-private partnerships; and (d) promoting inclusiveness and equality of all citizens within any locality regardless of gender, origin, religion or political persuasion.

The goal of Sierra Leone's decentralisation policy is to ensure that the local people and their communities are empowered and fully involved in political and socio-economic development processes and actually formulate and implement development plans, while government working in collaboration with the private sector and civil society provide the enabling environment, oversight and effective management of national and local development. This goal is achievable through, among others, (a) firmly establishing the legal and regulatory framework for embedding the policy of decentralisation by devolution while defining roles, responsibilities and functional

relationships therein; (b) improving local governance by shifting political, administrative and fiscal responsibilities closest to the areas where services are delivered; (c) devolving service delivery functions to local councils systematically and in a coordinated fashion; (d) strengthening capacities of key stakeholders especially the local councils, to be able to carry out their mandates effectively and efficiently; (e) building local ownership and operational efficiency of the decentralisation process through effective development planning and budgeting, financial management, monitoring and evaluation, and other managerial functions; (f) strengthening local councils to effectively harness local revenue potentials to complement other revenue sources; (g) mainstreaming gender perspectives in the entire decentralisation process; (h) effectively sensitising the citizenry about decentralisation, mobilising solid support for its growth and emphasising good stewardship; and (i) promoting transparency and accountability in local governance by making local councils directly accountable for their actions to their citizens and nationally.

1.4.11: Gender Issues in Sierra Leone

Government has recognised that gender equality and women's empowerment contribute significantly to national development and cohesion. Sierra Leonean women constitute approximately 52% of the population. They continue to suffer from extreme inequalities in terms of literacy rates, per capita GDP, access to land, and legal protection. Women account for approximately 55% of agricultural production, but they have little or no access to credit facilities, improved technologies, extension services and post-harvest technologies. Furthermore, they do not have permanent land rights and can be dispossessed of their lands by male relatives or through divorce or death of their spouse. Public Administration still has one of the lowest female employment ratios in the country, with female employment averaging between 3.6% of total employees (2007) and 8.7% (2012). The Health, Trade, Communications, Hotel & Restaurants, Insurance and Manufacturing sectors have achieved more than the minimum 30% female employment target. On Education and Vocational Training, Sierra Leone has yet to achieve parity at even the primary-school level and it seems like a daunting task at other levels.

The dominance of women in the self-employed/informal sector with poor working conditions, low salaries and no social protection leaves them open to exploitation and increases their vulnerability to poverty. On the other hand, while a small number of women own medium- and large-scale enterprises, the majority are engaged in micro-production with no access to formal-sector skills and development-advisory services. Although the government's emerging Private-Sector Development programme is growing, not much has been done to integrate women into the mainstream of this sector.

In 1998, the Ministry of Social Welfare Gender and Children's Affairs (MSWGCA) was established and mandated to formulate gender-responsive policies and to coordinate and monitor their implementation within different sectors of the society. Two national policies, the National

Policy on the Advancement of Women and the National Policy on Gender Mainstreaming, were adopted in 2009 to guide the Government's gender equality project. These were reinforced by the National Gender Strategic Plan (2009-2012), and the Sierra Leone National Action Plan (SILNAP) on United Nations Security Council Resolution (UNSCR) 1325 on Women, Peace and Security and UNSCR 1820 on Sexual Violence were adopted in 2009 and 2010 respectively. To date, the GoSL has enacted various laws to ensure the protection and promotion of the rights of women and children, such as the Anti-Human Trafficking Act (2005), the Sierra Leone Citizenship Amendment Act (2006), the Prevention and Control of HIV/AIDS Act (2007) and the three Gender Acts (2007) on domestic violence, customary marriages and divorces and the devolution of estates, and Child Rights Act (2007). While the government's efforts are highly commendable, its refusal to expunge Section 27 (d) from the constitution and criminalise and/or ban Female Genital Mutilation/Cutting in the society makes its gender agenda questionable.

The Government of Sierra Leone is committed to supporting gender equality and women's empowerment. The 2013 – 2018 Agenda for Prosperity (GoSL/A4P, 2012) has a two-tiered approach: as a separate priority Gender Pillar, and mainstreaming gender across all Pillars. The Gender Pillar includes strategic priorities in the key thematic areas of governance and leadership, reducing violence against women, education of women and girls and economic empowerment of women and girls. The overall goal is “Empowering women and girls through education, participation in decision-making, and access to equal justice and economic opportunities by 2018. Gender was mainstreamed into the Agenda for Prosperity by considering gender dimensions of the impacts of and vulnerability to climate change, and the gender dimensions of the adaptation options in various sectors.

1.4.12: Rights of the Child

Sierra Leone ratified the Convention on the Rights of the Child in June 1990 and its two Optional Protocols in September 2001 (on the Sale of Children, Child Prostitution and Child Pornography) and May 2002 (on the Involvement of Children in Armed Conflict). These commitments were subsequently enshrined in national legislation through the 2007 Child Rights Act – which supersedes all other national laws and is considered compatible with the Convention and the African Charter on the Rights and Welfare of the Child. The Child Rights Act forms the basis of a stronger framework for protecting child rights.

During the decade-long civil conflict, children were recruited by both government and rebel forces. The Special Court for Sierra Leone, set up to try those responsible for the most serious violations of human rights, convicted all nine defendants – including former president Charles Taylor – of recruiting children to fight as combatants. Three defendants have been convicted of forcing marriage on girls and women, marking the first time that a court has upheld such a charge.

To make meaningful advances on child survival and development, the Government of Sierra Leone, in partnership with other stakeholders, faces the challenge of scaling up such essential services as immunization, micronutrient supplementation, maternal, newborn and child health care, quality education and environmental health facilities, and developing a national child protection system. These advances require continued stability and peace, and an environment supportive of the rights of women and children. Establishing and maintaining political stability and security throughout the West and Central Africa region will therefore be critical to realizing the rights of children in Sierra Leone and its neighbours during the years ahead.

1.5: Cross-cutting issues of the Climate Convention

1.5.1: Research and Systematic Observation systems in Sierra Leone

Research and systematic observation of the climate system is a key prerequisite for advancing scientific knowledge on climate change and advising informed policy making. The Climate Change Convention calls on Parties to promote and cooperate in research and systematic observation of the climate system and also commits Parties to cooperate to improve the capacities of developing countries to participate in research and systematic observation. To enable this cooperation and improvement of capacities, developing country parties, including Sierra Leone, identify priority capacity-building needs to enhance their participation in and provide detailed technical reports on research and systematic observations via their National Communications.

In the Initial National Communication (GoSL, 2007a), the National Adaptation Programme of Actions (GoSL, 2007b) and the Second National Communication (GoSL, 2012) of Sierra Leone to the UNFCCC, assessments of Sierra Leone's research and systematic observation systems was conducted.

Various national issues especially as related to human and institutional capacity gaps and needs were identified and these include (a) low level skilled manpower both in quality and quantity at all levels in the Meteorological Department and similar institutions; (b) absence of sustainable research mechanism in most of the institution of higher learning; (c) inadequate coordination among various institutions which keeps them far apart from each other and thus prevents the inter-disciplinary research that climate issues require; (d) high cost of meteorological equipment and high cost of telecommunication data transfer; (e) climate change issues have not been extended to include the necessary human dimension needed to attract the needed attention and resources for investigation or streamlining the socio-economic, political and dynamic effects; and (f) very low integration of weather/climate issues into policies and strategies of national development.

Priority activities for the improvement of research and systematic observations of Sierra Leone include: -

- a) Strengthening of the climate data base by providing up to date computer facilities and trained experts in the input, processing and storage of climate related data;
- b) Providing automatic recording equipment and instruments for continuous recording of meteorological, hydrological and climatological elements and phenomena;
- c) Rehabilitation and expansion of meteorological hydrological and other atmospheric, environmental and natural resources networks of stations for the collection and monitoring of all categories of data;
- d) Building the human capital of the meteorological department in order to meet the present and future challenges;
- e) Sensitization of the public on climate change issues;
- f) Strengthening of the national climate change committee (NCCC) to be able to advise the Government on climate change matters appropriately;
- g) Intensification of research on climate change in Sierra Leone; and
- h) Collaboration with national and international institutions in the field of research in climate change.

1.5.2: Technology

According to Article 4.5 of the Climate Change Convention, the developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly to developing countries to enable them to implement the provisions of the Convention¹. Implementation of this article of the convention requires that developing countries conduct and produce reports of technology needs assessment and include the results in their national communications. Technology needs assessments (TNAs) are a set of country-driven activities that identify and determine the mitigation and adaptation technology priorities of developing country Parties and involve different stakeholders in a consultative process to identify (i) the barriers to technology transfer and (ii) the measures to address these barriers through sectoral analyses. The process may address soft and hard technologies for both mitigation and adaptation, identify regulatory options, develop fiscal and financial incentives and build capacity. The purpose of TNAs is to assist in identifying and analysing priority technology needs, which can be the basis for a portfolio of environmentally sustainable technology (EST) projects and programmes. This can facilitate the transfer of and access to ESTs and know-how in the implementation of Article 4.5 of the Convention.

During the process of development of the Second National Communications (GoSL/SNC, 2012) of Sierra Leone a TNA was conducted through a series of expert workshops with key sectoral experts present to discuss issues relating to technology in Sierra Leone. The first workshop

¹ http://unfccc.int/cooperation_and_support/technology/items/1126.php

focused on mitigation and energy issues, while the second workshop looked at adaptation issues as they relate to the coastal zone and water sectors in Sierra Leone. Both workshops used the initial national communication of Sierra Leone as the document of reference.

A number of issues were considered with regards to criteria for the transfer and development of technologies for mitigation for Sierra Leone. These included the overall integration with the current energy policy, and the linkage to development goals. In order for a technology to be suitable for Sierra Leone, it was agreed that there a number of key criteria which have to be met. These are affordability and low cost, environmental and economic impact, social acceptability, and job creation potential.

A number of mitigation technology options were identified and include (a) natural gas technology for electricity production, especially for the bauxite alumina industries; (b) methane extraction from waste landfills for electricity production; and (c) renewable energy technologies including wind, small-scale hydro, solar, cogeneration and biomass.

Adaptation technologies were considered for the coastal zone and water resources sectors. A number of issues were considered when criteria for the transfer and development of technologies for adaptation were discussed. Stakeholder consultations and expert judgment were used to determine the criteria. It was noted that technologies for adaptation should be cost effective, proven, flexible, aid in vulnerability reduction, and easy to use. Technologies for adaptation should also look at technologies in the broadest sense. For improving coastal zone management, technologies identified include (a) each protection measures such as groynes and revetments; (b) reinstatement of the tidal gauge network; (c) beach profiling (to aid improved data collection); and (d) regeneration of mangroves. In the water sector, the needs identified include (a) improvement and rationalization of the hydrometric network; (b) additional river gauges and more automatic weather stations to aid in data collection and planning to reduce vulnerability; (c) additional flood warning systems; and (d) additional software such as water ware, river ware, and mike basin to aid in improvement of water management.

The main barrier identified in relation to the transfer of technology to Sierra Leone was the high initial capital cost of technologies. There is a need for flexible financial measures in order for new technologies to be adopted. Attitudes, perceptions, and lack of information were also highlighted as key barriers. In particular, lack of understanding about specific technologies and lack of political will prevent the transfer and adoption of potential technologies. Lack of data is a constraint, particularly with regards to vulnerability issues which prevents adoption and applications of technologies for adaptation. The lack of a central decision making entity to handle issues with regards to technology was also noted as a barrier.

1.5.3: Education, Training and Public Awareness

Improving awareness and understanding of climate change, and creating solutions to facilitate access to information on a changing climate are key to winning public support for climate related policies. The UNFCCC, through its Article 6, and the Kyoto Protocol, through its Article 10 (e), call on governments to educate, empower and engage all stakeholders and major groups on policies relating to climate change.² In particular, Article 6 of the Convention, which addresses the issue of climate change related education, training and public awareness, is the main vehicle by means of which the Convention fosters action to develop and implement educational and training programmes on climate change. Many governments and intergovernmental organizations are already working in partnership with civil society to fulfil the commitments in Article 6. However, the scale of challenges posed by climate change requires an engagement on outreach activities of a greater magnitude.

Under the initial and second national communication processes, many activities were conducted to obtain a better understanding of the level of education and understanding about climate change in Sierra Leone. Overall, the activities aided in facilitating national networks on climate change and promoting the integration of climate change concerns into the national development planning dialogue. It is pertinent to note that during the implementation of the various studies incorporated in the National Communication, sensitization and public awareness campaigns targeting grassroots level communities, high level government officials, Ministers, NGO's, CBOs, farmers, teachers, students, etc., were carried out by the project throughout the country.

SECTION II: THE LOW EMISSIONS AND CLIMATE RESILIENT STRATEGY (LECRDS) OF SIERRA LEONE

2.1: BACKGROUND

2.1.1: Regional Perspectives of Climate Change

According to the Africa Regional Chapter in IPCC, (2014), there is high confidence of the evidence of warming over land regions across Africa. Decadal analyses of temperatures strongly point to an increased warming trend across the continent over the last 50-100 years. There is medium confidence that mean annual temperature rise over Africa, relative to the late 20th Century mean annual temperature, is *likely* to exceed 2°C in the A1B and A2 scenarios by the end of this century. Warming projections under medium scenarios indicate that extensive areas

² http://unfccc.int/cooperation_and_support/education_and_outreach/items/2529.php

of Africa will exceed 2° C by the last two decades of this century relative to the late 20th Century mean annual temperature and all of Africa under high emission scenarios. Under a high RCP, that exceedence could occur by mid-century across much of Africa and reach between 3 and 6° C by the end of the century. It is likely that land temperatures over Africa will rise faster than the global land average, particularly in the more arid regions, and that the rate of increase in minimum temperatures will exceed that of maximum temperatures. Projected rainfall change over sub-Saharan Africa in the mid- and late 21st Century is uncertain.

African ecosystems are already being affected by climate change, and future impacts are expected to be substantial. There is emerging evidence on shifting ranges of some species and ecosystems due to elevated CO₂ and climate change, beyond the effects of land-use change and other non-climate stressors. Ocean ecosystems, in particular coral reefs, will be affected by ocean acidification and warming as well as changes in ocean upwelling, thus negatively affecting economic sectors such as fisheries.

Climate change will amplify existing stress on water availability in Africa. The impacts of climate change will be superimposed onto already water-stressed catchments with complex land uses, engineered water systems, and a strong historical socio-political and economic footprint.

Climate change will interact with non-climate drivers and stressors to exacerbate vulnerability of agricultural systems, particularly in semi-arid areas. Increasing temperatures and changes in precipitation are to reduce cereal crop productivity. This will have strong adverse effects on food security. New evidence is also emerging that high-value perennial crops could also be adversely affected by temperature rise. Pest, weed and disease pressure on crops and livestock is expected to increase as a result of climate change combined with other factors.

Climate change may increase the burden of a range of climate-relevant health outcomes. Climate change is a multiplier of existing health vulnerabilities including insufficient access to safe water and improved sanitation, food insecurity, and limited access to health care and education. The strong seasonality of meningococcal meningitis and associations with weather and climate variability suggest the disease burden could be negatively affected by climate change. Climate change is projected to increase the burden of malnutrition with the highest toll expected in children.

In all regions of the continent, national governments are initiating governance systems for adaptation and responding to climate change, but evolving institutional frameworks cannot yet effectively co-ordinate the range of adaptation initiatives being implemented. Progress on national and sub-national policies and strategies has initiated the mainstreaming of adaptation into sectoral planning. However, incomplete, under-resourced and fragmented institutional frameworks and overall low levels of adaptive capacity, especially competency at local

government level, to manage complex socio-ecological change translate into a largely *ad hoc* and project-level approach, which is often donor-driven. Overall adaptive capacity is considered to be low. Disaster risk reduction, social protection, technological and infrastructural adaptation, ecosystem-based approaches and livelihood diversification are reducing vulnerability, but largely in isolated initiatives, and most adaptation remain autonomous and reactive to short-term motivations.

2.1.2: National Perspectives of Climate Change

Greenhouse Gas Emissions from and Projections for Sierra Leone

According to the Second National Communication of Sierra Leone to the UNFCCC, total carbon dioxide emission (CO₂) for the year 2000 was 574.061Gg CO₂. The carbon dioxide emissions from energy generation amounted to 529.287Gg of CO₂ as Sierra Leone energy generation is based on diesel powered generators. The Land Use, Land Use Change and forestry (LULUCF) sector was the least significant source of CO₂ emissions by up taking 752,748Gg of CO₂, followed by the waste sector emitting 11.8Gg CO₂. The industrial processes are however marginal amounting to 39.55 Gg of CO₂ and these emissions came mostly from cement production.

In 2000, the total Methane (CH₄) emissions were 32,312.53 Gg CH₄. Agriculture was the most important source of CH₄ emissions (86.67%), followed by the LULUCF sector (5.631) and finally the waste sector (11.83). The other sectors were not sources of CH₄ emissions.

Nitrogen dioxide (N₂O) emissions were estimated at 13.91 Gg N₂O with 8.54Gg N₂O coming almost exclusively from the agricultural sector. The waste sector was also a source of emission and emitted 31.29Gg N₂O.

Projected Greenhouse Gas Emissions for Sierra Leone

Sierra Leone is yet to produce her Nationally Appropriate Mitigation Action (NAMA) and the National Communications have not produced projections of greenhouse gas emissions for the country. Table 2 below shows the projections of greenhouse emissions developed for Sierra Leone by the US Environmental Protection Agency.

According to these projections total emissions from all sources and sectors and for all gases, GHG emissions are projected to increase to about 4.8MtCO₂Eq in 2015 and to about 6.6MtCO₂Eq in 2030. The major greenhouse gas emitted is Methane (CH₄) with projected emissions of 3.7MtCO₂Eq in 2015 and about 5.0MtCO₂Eq in 2030. The largest emitting sectors are Agriculture and Waste and between them, they are projected to emit between 95 to 98% of the projected national emissions from 2015 to 2030. The largest emitting category is Waste Management and will be responsible for about 54% of the total projected emissions in 2015 and

56% in 2030. Waste Management is projected to emit 2.6MtCO₂Eq in 2015 and 3.7MtCO₂Eq in 2030.

Table 2: Projected GHG Emissions (MtCO₂e) from Sierra Leone from 2015 to 2030				
Sierra Leone	2015	2020	2025	2030
All Sources, Gases, Sectors	4.765	5.239	5.851	6.551
CH₄	3.670	4.029	4.458	4.970
N₂O	0.997	1.069	1.156	1.271
Agriculture	2.107	2.224	2.374	2.575
Energy	0.001	0.001	0.001	0.001
Industrial Processes	0.097	0.142	0.238	0.311
Waste	2.559	2.872	3.239	3.664
Source: http://www.epa.gov/climatechange/EPAactivities/economics/nonco2projections.html				

Climate Change Projections for Sierra Leone

Under the Second National Communication process, the climate of Sierra Leone has been projected in the next one hundred years. The current average temperature for the 1961-1990 period of 26.7°C is expected to increase by about 7-9 percent by the year 2100. All of the climate scenarios show an increase for the future in the normal annual maximum temperature for the whole country, ranging for 32 to 33°C for MIROC3.2 model to about 29.6 to 31.4°C for CSIRO-MK3 model.

The annual average rainfall in Sierra Leone is 2746 mm based on data from the National Meteorological Office for 1961-1990, which varied from 3659 mm at Bonthe in the south to 2618 mm at Kabala in the North. Projection from the 1961-1990 using the ECHAM4 and HDCM2 models for the rainfall values at 2100 are similar to the current climate rainfall amount, while the CSIRO-TR and UKTR models show a decrease in rainfall by 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 under the CSIRO-TR and ECHAM models by 5%. In Sierra Leone, based on the last reference MAGICC/SCENGEN models, CO₂ concentration of about 350 parts per million (ppm) was determined in 1990. Double CO₂ concentration levels of about 580ppm are likely to be achieved by 2025 and about 700ppm by 2100. Sea level rise (SLR) scenarios adopted in this study are 0.2m as baseline and 0.5m, 1.0m and 2.0m by 2100.

Climate Change Vulnerability and Impacts in Sierra Leone

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is

exposed, its sensitivity, and its adaptive capacity. Vulnerability increases as the magnitude of climate change or sensitivity increase and decreases as adaptive capacity increases (IPCC, 2007).

Vulnerability generally refers to as the inadequate capacity of a system to address the negative effect of climate change. It is usually a function of climatic variations, the system's degree of sensitivity to these variations and its adaptation capacity. The information relating to the vulnerability of Sierra Leone to Climate Change is limited due to the amount of available data and the incompleteness of the areas and topics being looked at. Sierra Leone is regarded as one of the most vulnerable countries because of the adverse impacts of climate change the country is experiencing and its low capacity to adaptation these impacts/

During the development of the Second National Communications of Sierra Leone, technical experts conducted sector based and other cross-cutting studies on the impact and vulnerability of key economic sectors to Climate Change. Vulnerability and adaptation assessments were undertaken for agriculture, forestry, water resources, human health, coastal zones, and tourism sectors.

1. Impacts on Agriculture including soils

Agriculture is the largest sector in the economy of Sierra Leone providing employment for over 65 percent of the labour force, and contributing about 35 to 47 percent of the Gross Domestic Product. Rice is the staple food crop in Sierra Leone, grown mainly by small-scale farmers under rain-fed conditions. The impact of climate change is already felt in the country, in changed rainfall patterns, strong winds, thunderstorms, landslides, heat waves, floods, and seasonal drought. Transporting agricultural produce continues to be a challenge in the country; most of the roads in remote areas are impassable during the rainy season. The crop specific data required for the assessment of the impacts of climate change on agriculture was obtained from the Sierra Leone Agricultural Research Institute (SLARI). In assessing the impacts of climate on the crop production sub-sector of agriculture climate change, socio-economic and crop production data and scenarios were input into the DSSAT3 biophysical model to run the simulation of impacts of climate change.

All of the scenarios show increasingly negative trends for net rice exports—though much less so in the case of the pessimistic scenario. All three scenarios show a general increasing trend in the world price for rice. Rice productivity needs to improve to meet domestic consumption demand; increasing production will also benefit farmers, through high world prices.

The scenarios for production and yield of cassava and other roots and tubers show an increase toward 2050, with only a slight increase in the area under cultivation. Net export of cassava and other roots and tubers is shown increasing up to 2030, followed by a decline up to 2050 for all the scenarios.

Groundnut production is shown to increase as a result of expansion in area under production; productivity is shown to decrease, probably due to climate change. Depending on the scenarios, net exports are shown to increase through 2020 and decline thereafter. With decreasing productivity, more area has to be brought under cultivation to meet the demand for groundnut as population increases, while increased land degradation forces farmers to use expensive inputs.

a. Impacts on Coastal Resources:

The main limiting factor for making accurate assessment of the vulnerability of the coastal sea level rise has been the lack of data of the topography of the coastal area to the desired accuracy (i.e. to allow the delineation of the appropriate contour line). Some sections of the coast, particularly the urban centres of the capital, Freetown and coastal towns of Kambia, Bonthe Sherbro Island do not have these data. As much as possible data was derived from limited information on the survey beach marks and surveys of roads within the coastal areas. The elimination of the area outside the risk zone was assisted by the availability of maps showing the 30m contour.

Climate Change is expected to impact Sierra Leone's sandy beaches in two ways: -

- a) The rise in sea levels expected from Climate Change would accelerate the rate of recession of sandy shores.
- b) Increases in littoral transport capacity arising from increases in the intensity and duration of storms.

Also, sea level rise can affect coastal structures such as the jetties along the coastline. Flooding and inundation affect some coastal segments of the Freetown peninsular (i.e. bays, estuaries and beaches). Sea level rise has the effect of augmenting a decrease in the quality and quantity of ground water resources otherwise caused by man's activities. The estimated population along the coastal areas at risk for 1m rise of sea level is about 2,315,860 persons. If no action is taken on sea level rise, a total of 26.4km square of land is estimated to be lost and areas such as the northern and southern areas are vulnerable.

The impacts of the incidences of severe weather and increase in storm frequency on the various kinds of coastline of Sierra Leone were assessed. On beaches, short term erosion is largely governed by the incidence of storms. Over longer periods, sea level rise will cause progressive retreat. Hard engineered structures such as sea-walls will probably lead to eventual disappearance of any beaches in front of them. Offshore breakwaters will be more useful in retaining near-shore sand supplies. On cliffs and rocky coasts, sea-level rise will bring the cliff top closer to sea-level and increase the frequency of overtopping of the cliff by storm waves and rock debris, including large boulders. Recession will be greatest for soft-rock cliffs, whereas

fractured hard rock cliffs will be more prone to sudden collapse, as indicated in the Sierra Leonean examples.

Wetlands present a particular problem due to their proximity to sea-level and the micro-tidal regime around Sierra Leone. Small changes in sea-level will prompt progressive retreat and migration of wetland eco-zones, unless vertical accumulation rates of wetland debris keep up with sea-level rise. Most of the wetlands of the coast of Sierra Leone are fronted by a narrow beach which will retreat over the wetland, driven by storms and sea level rise. No data on the vertical accumulation rate of wetland sediments is available for Sierra Leone.

2. Impacts on Fisheries

In assessing the impacts of climate change on productivity in Sierra Leone, the effects of temperature on annual productivity of riverine fisheries resources are evaluated on the basis of the average stream width of 250 meters for the Rokel River, the biogenic capacity of the stream, the annual water temperature, the alkalinity/acidity of the water, and the type of fish population present in the river.

Productivity of the riverine fisheries of the Rokel River is projected to increase under all climate change model scenarios. The estimated productivity of the Rokel River under the current (1961-1990) climate is 228 tons per kilometre (tons/km) reach of the river. All the climate change model scenarios project an increase in the productivity of the river. The highest increase in productivity is projected by the HADLEY 2 model scenario and it ranges from 3% (i.e. 236 tons per Km) increase by 2025 to about 8% (i.e. 248 tons/km) increase by 2100. The projections based on CSIRA model is the lowest of all the models considered for this study. The projected productivity under the CSIRA varies from about 2% (i.e. 234 ton/km) increase in 2025 to about 6% (i.e. 243 tons/km) increase in 2100.

Commercial shrimp yield was estimated for current climate for the average period 1961 to 1990 and for simulated climate change to 2100 based on the model output for the GCM models (Hardly 2, UKMOTR, CSIRA and ECHAM 4). The stabilized commercial shrimp yield (SCSY) under current climate with annual temperature of about 26.7°C is 71.5kg/ha. Simulation based on the warming of the atmosphere by 2075 to about 28.7° C under the HADLEY2, 28.3°C under the UKMOTR, 28.1°C under CSIRA and 28.4°C under the ECHAM4 models shows increases from current climate.

3. Impacts on Forestry and Biodiversity

Under current climate, the land in Sierra Leone has the potential land cover of about 6% tropical wet forest, 49% tropical moist forest, 21% sub-tropical wet forest, and 23% sub-tropical moist forest. The overall indications from the Holdrege Life Zone classification analysis are that under an equilibrium climate, the potential land cover of Sierra Leone as projected by the GCM outputs

used in this study predicted 66% (HADC), 55% (UKTR), 66% (CSIRO) and 81% (ECHAM) tropical dry forest and 30% (HADC), 55% (UKTR), 26% (CSIRO) and 13% (ECHAM) tropical very dry forest categories as a result of the projected decrease in precipitation and associated increase in bio-temperature by year 2100.

Basically, as a result of climate change, 60% of the country will be under tropical dry forest, 24% under tropical very dry forest, and 12% cover under sub-tropical moist forest particularly in the south and east of the Country. This is the reverse of the current situation and indicates a northward shift in the vegetation i.e. from tropical rain forest to tropical dry forest.

In respect of the Forest Gap simulation scheme, total biomass produced under the various climatic scenarios indicates that there is an overall gradual increase in total biomass production in the CURR, CSIR, UKTR, ECHAM, and HADC models, in ascending order of magnitude. Similarly projection trends are evident for the basal area production but with a wider difference of 450M²/ha between CURR and CSIRO. HADC continues to dominate the total basal area production.

For species distribution per size classes, *Hanna klieneana* is by far the fastest growing species attaining the 6th diameter class (over 60cm diameter) in 25 years. The slowest growth was exhibited by seven species (*Chorolphora*, *Cordia*, *Daniella*, *Gmelina*, *Khaya*, *Nauclea* and *Parkia*) out of the twelve species used in the simulation.

4. Impacts on Human Health

Most of the impacts of climate change are secondary impacts due food and nutrition insecurity, water stress and other impacts. Increased temperatures are also associated with increased episodes of diarrhoeal diseases, sea food poisoning, and increases in dangerous pollutants. Threats from higher temperatures may cause greater contact between food and pest species. Warmer seas contribute to toxic algae bloom and increased cases of human shell-fish and reef-fish poisoning. Such cases have been reported in Freetown in July-August 2011 and August 2012. Incidents of high temperature morbidity and mortality are projected to increase. Due to water shortages, the impact expected on Sierra Leone would be loss of food production and the necessity to import and/or experience food shortages. This may lead to hunger and malnutrition. The leading causes of death in Sierra Leone are non-communicable diseases – respiratory and lifestyle diseases. Cerebrovascular (stroke) that is susceptible to heat stress is among the leading causes of deaths. The problem could be exacerbated by the design and type of construction materials used in housing. Attention must be given to the design of buildings in order to reduce heat stress.

Asthma is active among young children and this is an increasing cause for concern. There is ongoing study to determine the actual incidence of asthma. There are also two climate related

factors that are causing concern. The first is the fact that rising carbon dioxide levels could increase allergenic plant pollen. The second is the correlation between the outbreak of asthma affecting children and the concentration of the Saharan dust in Sahel Africa that could lead to increase of asthma. The water and sanitation sectors of the population are dependent on water. Sources that are contaminated have implications in the spread of diseases. Typhoid was associated with and the destruction of pit latrines.

Epidemiological surveillance including entomological surveillance behaviours that promoted proliferation of rival habitats and the promotion of behavioural change are considered priorities. If the health system is efficient the country can adapt.

5. Impacts on Tourism

The local tourism is dominated mainly by resort tourism and is location specific. The Freetown coast areas (i.e., Lumley, Tokeh, No. 2 Goderich) are the dominant areas for both stopover and cruise ship visitors. This is due to the coastal resources (white sand beaches, all inclusive hotels and sea ports and attractions) and infrastructural investments which have gone into these areas.

Two socio-economic scenarios were modelled by experts that developed the Second National Communication; one without climate change variables (control scenario) and another with assumptions about a changed climate change. An independent model was also developed to examine visitor arrivals over time. For the control scenario, visitor arrivals are expected to increase by 2050. For the scenario with a changing climate, the number of visitors may fall by 2050, resulting in declines in earnings.

These impacts are likely to be exacerbated, and even overshadowed, by non-climate change factors, such as deforestation, increasing riverine floods from destruction of forest, industrial farming and from poor farming practices, leading to increased near-shore sedimentation and turbidity, increased chemical pollutants from agriculture and industrial wastes, and from increase in coastal population growth.

6. Impacts on Water Resources

In the Second National Communication of Sierra Leone, the vulnerability and adaptation of water resources to climate change in Sierra Leone is assessed by simulating the hydro climatic cycle using the monthly, spatially lumped and one dimensional water balance model, WATBAL.

In Sierra Leone, groundwater supplies most water demands (approximately 80% of production) and represents 84 percent of the country's exploitable water. The country's water sources are associated with major rock formations and their interrelationships. Existing stream flow data from the Sierra Leone Water Resources Authority indicate that several rivers are in deficit, which results in water lock offs and an overall limit in water supply. The Sewa River, Jong, and

Mano areas are under stress. It is not clear whether Sierra Leone has enough storage to provide water supplies to adequately meet all demands during periods of below average rainfall. The monitoring of wells need some improvements so that the real trends may be better identified. Additionally, more work need to be done with data collection to make it more relevant to user needs.

However, initial analysis of the Freetown Municipality, indicates that increase in population coupled with increased deforestation, after the war in 2000 increased abstraction from the Guma dam could be the main cause of lower water supplies and not so much as a direct result of less rainfall. Significant issues associated with water resources management and vulnerability and the impacts of climate change are likely to present some pressure.

2.2: The Low Emissions and Climate Resilient Development Strategy (LECRDS) Framework

2.2.1: Approach

The Government of Sierra Leone has been implementing climate change for more than 10 years but most of the activities have been based on the conduct of studies (National Communications and NAPA) and small ad-hoc and unplanned adaptation, mitigation and capacity building actions. This LECRDS and Action Plan is the initial step in developing a strategic approach to addressing climate change in a holistic and inclusive manner. It is specific to internal government operations and outlines how the Government, people and development partners of Sierra Leone will build on a foundation of experience and expertise in managing climate change. The next section defines a comprehensive and detailed action plan, developed through a consultative process, that outlines the specific activities and initiatives that the government will undertake to implement the strategy.

As climate change is a rapidly evolving issue, both scientifically and politically, the Government and people of Sierra Leone commits to a full review and revision of its Climate Change Strategy and Action Plan in line with its Medium Strategy Paper. To ensure this strategy and other follow-up initiatives will be relevant, the Government of Sierra Leone also intends to mainstream climate change into all development efforts including integrating climate change into policies, strategies, programmes and projects of the country.

2.2.2: Vision, Mission and Goal of the LECRDS

The VISION of the Sierra Leone Low Emission Climate Resilient Strategy is *to create a new era for a harmonious relationship between the economy, environment, social and long term sustainability; shifts to a green economy and provides for the identification and*

implementation of early warning systems and other ‘soft’ adjustments and infrastructure and ‘hard’ engineering adaptation options; one that facilitates and promotes mainstreaming of climate change adaptation into other resource management, disaster preparedness and sustainable development programmes; it is largely driven by a government policy package that promises to create new markets and technological advancement; and one that will foster low cost and efficient and effective collaboration between businesses, academia, providers of technology, financial institutions and civil society to see green growth.

The mission of the Strategy is to be all inclusive by engaging all stakeholders especially the most vulnerable communities and groups (women, children, elderly and physically challenged). By aligning it with the Sierra Leone Medium Term Strategy – the Agenda for Prosperity 2013 – 2018, the climate change strategy will be premised on sustainable development, reduction of greenhouse gas emissions by attaching high priority to energy efficiency and increase in the share of renewables in the national energy mix; prioritizing climate change as a security issue by increasing energy security, food security, water security and human security (transport and infrastructure); and aligning the strategy with national and sectoral policies and other development frameworks. Strategic priorities will be identified and priority activities in the form of projects and programmes will be included in a National Climate Change Action Plan for implementation towards achieving the Mission and Vision.

The goal of the strategy and the accompanying action plan is to prepare the government and people of Sierra Leone to limit their carbon footprint; reduce or minimize risks by improving adaptive capacity, adapt by reducing vulnerability to climate change impacts and increasing the resilience and sustainable wellbeing of all citizens; and to leverage new opportunities and facilitate collaboration in-country and with regional and global communities. The negative biophysical and socio-economic impacts of climate change will be minimised and the population will be well positioned to harness new opportunities presented by climate change through the implementation of low-emissions and climate resilient development policies and programs.

2.2.3: Strategic Objectives

The response strategy and action plan aims to maintain the emission levels of Sierra Leone relatively low or neutral by reducing her carbon footprint and by following green growth pathways in all economic sectors. It further aims to strengthen the Sierra Leone’s resilience to climate change and its adaptive capacity, particularly in vulnerable economic sectors and communities. To achieve these strategic objectives, the strategy (a) recommends robust adaptation and mitigation measures to be implemented as part of the National Action Plan in Section III so as to minimize risks associated with climate change while maximising opportunities. (b) recommends research and technological needs and avenues for transferring and diffusing sustainable technologies in Sierra Leone; (c) develop and implement comprehensive national and sectoral education and awareness-creation programmes and forums for engagement

in information dissemination to the public on current and future climate change risks; (c) works towards aligning this strategy and action plan to the proposed climate change policy and other sectoral policies, legal and institutional frameworks to address the adverse effects of climate change in Sierra Leone; and (d) to implement the action plan developed in Section III, including the accompanying resource mobilization and monitoring and evaluation plans.

2.2.4: Guiding Principles

The Government of Sierra Leone will demonstrate leadership in climate change through (a) building on demonstrated strengths and successes in the planning and implementation of climate change in Sierra Leone and expanding these to include public education and outreach; research on vulnerability, impacts and adaptations; and energy efficient building and transport science. Also the Government of Sierra Leone (GoSL) will continue to pursue partnerships with other governments, institutions and the private sector to leverage opportunities and address common challenges with respect to climate change.

The development of this Strategy and Action Plan is based on the following guiding principles.

1. Country-driven and specific climate change interventions:

The strategy is developed by the citizens and for the citizens of Sierra Leone and therefore seeks to provide responses aligned to the needs and aspirations of the local, regional and national conditions to effectively and efficiently mitigate and adapt to climate change.

2. Sierra Leone's response to climate change must be sustainable:

By adopting mitigation and adaptation actions that are environmentally sustainable and are compatible with economic growth and social development as spelt out in the Sierra Leone Medium Term Strategy – the Agenda for Prosperity 2013 – 2018, this strategy and action plan will ensure sustainability. These measures to be pursued must also yield complementary benefits such as being less pollutant, cost effective and cost efficient.

3. Consultative and all inclusive approach

As climate change is cross-cutting and has implications for all sectors of the economy and society, this Strategy and Action Plan is developed through a consultative, multi-stakeholder approach, of course that has been limited by the health circumstances prevailing in the country at the time of development of the document. The views of relevant stakeholders were sought through (a) e-consultation by posting the draft document on the websites of the National Environment Protection Agency and UN Country Office of Sierra Leone for online review and the provision of comments; and (b) the National Environment Protection Agency and UN Country Office of Sierra Leone lead dialogue sessions with stakeholders from the public and private sectors, elected representatives and local government authorities, civil society organizations, youth and women groups, and academia. The strategy recognises the

need to ensure the participation of women, children and other vulnerable and marginalised groups and individuals and as well, the integration of appropriate indigenous and local knowledge in responding to climate change challenges.

4. *Cost effectiveness:*

The strategy recognises that Sierra Leone is a poor LDC and thus takes into consideration the principle of achieving cost-effectiveness in the design and implementation of climate change activities identified in the Action Plan in Section III without compromising the desired output and outcome, and without lowering but enhancing the standards of living of the citizenry of Sierra Leone.

5. *Equity-based development:*

This strategy recognises the conclusions of the all IPCC studies including the projection that the most severe effects of climate change will be felt by the rural poor in general, women, children and marginalised groups and individuals. In its design and implementation, the strategy, thus embraces the fundamental rights of all humans, including gender and indigenous peoples, where ever they may be located in the country.

6. *Mainstream climate change into development frameworks*

The strategy recognises the need for the prioritisation of climate change issues in the daily lives of the citizenry of Sierra Leone and, thus the need to mainstream climate change responses in all the development frameworks of the country. Mainstreaming is a process that is achieved through enhancing knowledge and awareness on climate change and integrating climate change in all development frameworks (Acts, policies, strategies, plans and programmes). For this reason the strategy recognises the need for raising awareness, building capacities and empowering stakeholders at local, regional and national levels and at the individual, institutional and systemic levels to ensure effective and sustained response to climate change. There is the need to appropriately integrate climate change into the education system to generate awareness and capacities from the early ages of the society in order to secure long-term capacity for climate change in Sierra Leone.

2.3: PRIORITY CLIMATE CHANGE RESPONSE STRATEGIES

In response to the challenges and opportunities posed by climate change, Sierra Leone has developed this National Climate Change Response Strategy and Action Plan. In the Second National Communications of Sierra Leone (GoSL/SNC, 2012), climate change mitigation and adaptation response options were identified and the results are reported in sub-sections 2.3.1 and 2.3.2 below. Based on these response options and considering national circumstances and the policies, plans and programmes discussed in Section I, response strategies have been identified

under this section (Section II) and priority actions have been identified in the National Action Plan in Section III with costs attached.

2.3.1: Mitigation of Greenhouse Gas Emissions

Greenhouse gas mitigation affects socio-economic policies and choices involving development, sustainability and equity. Policies to limit net emissions 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 water sheds, 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 enhancing carbon sinks, Sierra Leone, following a mitigation assessment, and drawing upon the strategic direction of Vision 2025, proposed to undertake the following appropriate mitigation actions:

1. Establishment of the national secretariat for climate change (NSCC) Setting/developing air, water and soil quality standards, and ensure regular assessments and monitoring through control programs.
2. Expanding clean energy utilization (e.g. solar, mini-hydro electric power, LPG, biomass stoves etc).
3. Development of energy efficiency programmes through sensitization and awareness raising campaigns. Sustainable production of charcoal a reduce dependence on firewood.
4. Development of alternative energy sources such as bio-fuels from sugarcane, corn, rice husk, etc.
5. Developing agricultural and urban waste incineration programmes for energy production.
6. Improved waste management through composting and recycling of waste.
7. Development and enforcement of regulations on regular maintenance of vehicles (vehicle emission testing): formulation of transport plans.
8. Improved and promoting use of public transport (e.g. road and water) for passengers and cargo to reduce traffic congestion and GHG's emissions.

2.3.2: Adaptation to the Impacts of Climate Change

Adaptation in the Agriculture Sector

The Second National Communications of Sierra Leone identifies the following specific adaptation measures regarding agricultural policy measures:

1. Support the establishment of adequate weather stations around the country in order to provide reliable and adequate weather data that will be useful to properly inform farmers;

2. Provide adequate support to the Sierra Leone Agricultural Research Institute as well as Njala University to develop appropriate crop varieties and production practices that will enhance resilience to adverse weather conditions;
3. Develop and maintain seed banks to provide a variety of seed types that preserve biological diversity and enable farmers to make informed choices;
4. Promote innovative and adaptive approaches such as irrigation and water harvesting, to protect farmers from variability in rainfall;
5. Make provision for the construction of appropriate roads particularly feeder roads in the rural areas to be able to withstand increasing rainfall;
6. Take appropriate measures to control rapid increase in population as well as providing appropriate infrastructure, social services and mechanization of agriculture in the rural areas to slow down massive movements of youths into urban areas;
7. Raise awareness of the potential impact of climate change on the agricultural sector. Climate Change is not mentioned in the Agricultural Development Strategy 2005-2008;
8. Develop modelling approaches and tools to allow assessment of impacts of climate change on export and domestic crops and meat production. Detailed crop/country/climate specific assessments are required to inform an adaptation programme and policy development;
9. Develop regional links to fund and promote plant breeding programmes for common crops;
10. Adaptation strategies include the development of crop varieties with increased temperature, drought and pest resistance; and
11. Review approaches to integrated pest management under climate change. Existing pest management strategies may require modification under climate change. Care must be taken that any changes to these strategies do not have negative impacts on the environment, for example, from increased pesticide use.

Adaptation to sea level rise

The most important measure for adapting to sea-level rise involves a development of setback guidelines. This could be related to the local risk of inundation from present and future storm events (i.e., site specific). Setbacks for structures on rocky coasts where there is storm-deposited debris should be determined by the position of the debris ridge formed by sandy and rocky debris accumulated over the past four millennia. Destroying this ridge for construction materials exposes communities and buildings behind the ridge to increased vulnerability from inundation and damage from moving debris.

The vulnerability of communities such as Kroobay, Moa wharf to extreme weather events and the susceptibility of escape roads to flooding require a major effort to re-engineer other arterial roads at low elevation as all-weather highways.

Continuing research is required on perfecting setback guidelines for Integrated Coastal Zone Management; identification of offshore carbonate sand deposits for beach nourishment; expansion of the programme of co-operative for fisher-folks; and satellite-based monitoring of changes in the health of the island's coastal ecosystems.

Potential adaptation options to address management of the coastal zone in Sierra Leone are: -

1. Establishment of coastal management on coastal erosion in Sierra Leone.
2. Delineation of flood and erosion hazardous areas.
3. Improvement of the quality of topographic data for the coastal zone.
4. Monitoring of the coast
5. Sand and Gravel mining
6. Education and Research

Adaptation in the Tourism Sector

If the tourist industry is to survive sea-level rise, increased ocean acidity and sea-surface temperatures, through 2050, then identification and utilisation of suitable offshore sand deposits should commence now to avoid the growth of unregulated sand replenishment schemes.

Proposed elements of a Tourism Adaptation Strategy for Sierra Leone include:

1. Raise stakeholder awareness of the workings of both tourism and environment;
2. Stakeholder identification of detailed programme and projects;
3. Setup a comprehensive performance framework with targets;
4. Provide more varied visitor attractions to put less pressure on existing natural resources and stimulate more visitors;
5. Reflect social and environmental costs in the price of tourism products;
6. Improve environmental lobbying;
7. Implement infrastructural changes to protect the environment, e.g., groynes and levees, reforestation, and coastal zone management;
8. Implement education and sensitization programmes;
9. Intensify community tourism activities; and
10. Increase urban tourism.

Adaptation to Impacts on Fisheries

The proposed adaptation measures for the fisheries sector are: -

1. Promotion of effective formulation and implementation of the fisheries strategic management plan.
2. Effective protection of spawning sites and fishing nursery areas.
3. Promotion of research development.
4. Promotion of monitoring, control and surveillance of fishing grounds and fish stocks for sustainable exploitation.

5. Promotion of climate change related education and awareness programmes.
6. Provision of financial resources and institutional capacity.
7. Closed season - this option could be adopted when the fish is under threat of either over exploration or adverse effects of climate change. This option could allow for the restoration of either the degraded habitat or recovering of the fisheries.

Adaptation in Forestry:

The Forestry Sector is more known for mitigation measures than adaptation to climate change. In the Second National Communication of Sierra Leone, potential adaptation options identified in the Forestry sector include silvicultural interventions such as appropriate management, for example, adjusting planting and harvesting dates, switching to more drought-resistant species, and refining and liberation thinning.

Adaptation in the Health

Short-term adaptation strategies for addressing vector-borne diseases include (a) public education aimed at encouraging individuals to identify and eliminate current breeding sites and the symptoms of dengue; and (b) surveillance in outbreak communities for the purpose of environmental sanitization.

Proposed Elements of a Health Adaptation Strategy for Sierra Leone Climate change must also be mainstreamed into the health system to recognise the likely impact of vector-borne diseases. Under-financing is a major problem that can affected staff training and the ability to conduct surveillance. Climate change should be included in the mandate of the Disaster Management Department, since extremes in climate change can lead to greater incidences of flooding. Other adaptation strategies included the proper identification and upgrading of shelters to meet the demands for the outbreaks of diarrhoeal diseases and other unhygienic conditions that may be worsened.

Overall recommendations for adapting the health sector to climate change include:

1. Public education in the management of stress;
2. Elimination of taxes on electric fans;
3. Increased public education in the areas of sanitation and food poisoning;
4. Relevant agencies prepared for handling increases in the incidents of food poisoning;
5. Public health inspections for mosquitoes, including pest and rodent eradication;
6. Sustainable design standards for housing in areas subjected to high rainfall and strong winds, for example, roofs can reduce heat absorption by painting them white or silver; windows need cross ventilation; and
7. More attention to be paid to the design of settlements.

Priority should be given to:

1. Better water monitoring and management through improvements at the National Water Resources Authority;
2. Improving the capabilities of DMD to warn of hazards;
3. Improving data gathering ability and technical support staff of the Meteorological Office for monitoring and warning of air-borne type diseases;
4. More collaboration between research institutions involved in pollution control;
5. Support should be given to research institutions involved in environmental related health risks to run as many regional and statistical downscaling models as possible for calibration and inter-comparison purposes; the - Safe water storage containers;

Adaptation in Water Resources Sector

Proposed Elements of a Water Resources Adaptation Strategy for Sierra Leone must include:

1. The efficient management of water resources aimed at reducing demand and increasing the supply base. The reduction in water demand can be achieved through the identification and adoption of positive attitudes that would lead to the use of less water, and recycling and reuse of water. Also, efficient water use can be facilitated through education, voluntary compliance, pricing policies, rationing of water or the imposition of water conservation measures.
2. Improved planning and coordination of the use of the river basin, which may provide solutions to problems of water quality and supply. Planning can also help to address the impacts of population, economic growth, and changes in the supply of and demand for water. The cost of developing contingency plans is small in comparison with the potential benefits.
3. Effective monitoring and management of the watershed is considered must crucial as climate change is likely to affect the frequency of floods and draughts. Monitoring systems will assist in coping with these changes and will be of immense benefit without climate change.
4. Increasing and maintaining investment in hydrological monitoring and water use through a national database. This will result in improved data collection and storage on a national scale.
5. Funding research into adopting a water resources and water supply planning method under climate Change. With appropriate methods in place, consistent regional and national planning can take place under a changing climate.
6. Developing appropriate modelling tools to assist strategic planning of water resources. There is an urgent need to develop a consistent set of appropriate modelling approaches and tools.
7. Investigate shifting focus from ground water to surface water storage for water supply reducing the reliance on vulnerable coastal aquifers, in terms of quality and quantity with the increased use of surface water reservoirs to maintain supplies.

2.4: Priority Strategies for the LECRDS of Sierra Leone

This section identifies the priority strategies for low-carbon and climate-resilient development pathways for Sierra Leone, including general coordination and capacity building and strengthening issues. The relevant priority and fully costed actions to achieve these strategies are discussed under the National Climate Change Action Plan in Section III.

- Strategy 1:** Institutionalization of coordination, monitoring, reporting and verification of climate change issues by strengthening the Environment Protection Agency for effective and efficient provision of technical policy advice to the Government and people of Sierra Leone for relevant decision making in transitioning to green economic growth.
- Strategy 2:** Transformation of the National Meteorological Services of Sierra Leone into an Agency and strengthening of Climate Change Early Warning System of Sierra Leone

The following priority low-carbon development strategies are envisaged to support the transition to a low carbon economy in Sierra Leone.

- Strategy 3:** Estimation, in a sustainable manner, of Sierra Leone's contribution to global warming and climate change; assessment of the impacts of climate change on Sierra Leone's economy and people; and analysis and contextualization of the possibility of national and sectoral climate change integrated plans providing guidance for the development and investment pathways of the country and choice of investments.
- Strategy 4:** Promotion of energy efficiency, enhanced management (improved transmission and distribution) and expansion of the energy mix through uptake of renewable energy sources (Solar, Wind, Hydro, Biomass) particularly in the rural areas of Sierra Leone.
- Strategy 5:** Enhancement of waste management systems at all levels to reduce pollution and greenhouse gas emissions under the category so as to improve health of both humans and animals and reduce global warming.
- Strategy 6:** Diversification of economic growth through strengthened transport sub-sector, particularly the infrastructure to contribute to the reduction of regional and global emissions of greenhouses and build a stable economy.

The following climate resilient strategies will support Sierra Leone to transition to a climate-resilient economy

- Strategy 7:** Adoption and application of climate-smart and conservation agriculture that allow minimum disturbance and year-round maintenance of soil and soil cover,

including the use of leguminous crops to boost soil nitrogen; adoption of new crops, crop rotation and/or crop varieties and adjusting the time of planting/harvesting; introduction of integrated soil-fertility management systems that cater to the nutritional needs of the crop without polluting the environment; and integrated water management practices.

Strategy 8: Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation.

Strategy 9: Integrated management of crops and Livestock management including the modification herd composition: variation of species/breeds; and adaptation of grazing management practices to increase soil carbon. Reduction of greenhouse gas emissions from livestock by improving animal nutrition, breed selection and manure management.

Strategy 10: Restoration of degraded lands with high production potential; application of erosion control, soil and water conservation, organic amendments, perennial or deep root crop systems; and improvement of land and soil, including drainage, desalinization, addition of gypsum to renovate sodic soils.

Strategy 11: Management of coastal and fisheries resources through promotion of non-destructive fishing techniques to maintain resilience of marine ecosystems; aquaculture in areas inundated by rising sea levels.

Strategy 12: Promotion and facilitation of early warning and disaster preparedness through strengthening and improvement of climate early warning systems, drought contingency plans, response to drought and flooding, sensitisation and awareness-raising, and promotion of weather-indexed risk insurance.

SECTION III: THE NATIONAL CLIMATE CHANGE ACTION PLAN

3.1: INTRODUCTION

In Section I, the national circumstances including the major development policies, plans and programmes have been discussed. In Section II, the Low Emissions and Climate Resilient Development Strategy (LECRDS) of Sierra Leone has been discussed and twelve strategies to address climate change have been recommended. The process leading to the development of the LECRDS has been comprehensive and inclusive and thus enhances and strengthens the understanding of climate change science, the impacts and responses (adaptation and mitigation) in Sierra Leone.

Under this section (Section III) the National Climate Change Action Plan is developed to take the efforts (adaptation and mitigation) needed to respond to climate change in Sierra Leone to

another stage beyond identification to implementation. Under the Climate Change Action Plan, the strategies identified in Section II (the LECRDS) have been translated into mitigation and adaptation actions to enable Sierra Leone to take decisive and sustainable actions in addressing the root causes and the adverse impacts of climate change on the national economy and move the country into a green and resilient economy.

The Action Plan includes (a) prioritised activities that will support Sierra Leone to transition to a low-carbon and climate-resilient economy; (b) information on financing the LECRDS and its Action Plan; (c) mobilisation of resources and (d) monitoring, reporting and verification of impacts on the citizens and economy of Sierra Leone due to the implementation of the strategy and action plan.

3.2: PRIORITIZATION IN THE ACTION PLAN

3.2.1: Priority Administrative and Cross-cutting actions to support transition to low emissions and climate resilient economy in Sierra Leone

These administrative and cross-cutting projects and actions 1 to 3 in Table 3 are relevant to priority strategies 1 to 2 discussed in sub-section 2.4.

3.2.2: Priority GHG Mitigation Actions and Technologies for a Low Carbon Development of Sierra Leone

Based on the identified strategies under the LECRDS in Section II and this Action Plan, Sierra Leone intends to further develop and implement the GHG mitigation projects 1 to 5 in Table 4 to support transition to a low carbon economy. These projects are relevant to priority strategies 3 to 6 discussed in sub-section 2.4.

3.2.3: Priority Actions for Climate Resilient Development of Sierra Leone

Based on the identified strategies under the LECRDS in Section II and this Action Plan, Sierra Leone similarly intends to further develop and implement projects in Table 5. These climate change adaptation actions and projects are relevant to strategies 7 to 12 in sub-section 2.4. The projects support transition to a climate-resilient economy.

TABLE 3: Priority Administrative and Cross-cutting projects and actions to support transition to low emissions and climate resilient economy in Sierra Leone

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>1. Strengthening the Environment Protection Agency to serve as Climate Change Secretariat for effective and efficient provision of technical and policy advice to the Government and people of Sierra Leone for relevant decision making in transitioning to green economic growth</p>	<p>The Environmental Protection Agency (EPA) was established in 2008 through the Environmental Protection Agency Act (2008) and became operational in 2009. The Agency is housed within the President’s Office and is the main government agency in charge of all issues concerning the environment and climate change. The EPA has the mandate to coordinate, monitor and evaluate the implementation of national environmental and climate change policies, programmes and projects. The EPA is young and growing and to effectively and efficiently meet the ever growing demand for policy and technical level advisory services it is necessary to develop the institutional and human capacities of the Climate Change Secretariat of the Agency to meet the demand based on the National Climate Change Policy and the Agenda for Prosperity. With functions defined in a Climate Change Policy, the expected implementation of the proposed the Climate Change Strategy and Action Plan implementation, the future development of climate change legislation and regulations, the Secretariat would be the main implementing agency of the GoSL CCAP. Without the nurturing and strengthening of this young Climate Change Secretariat, its definition in law, with the requisite scientific and technical expertise, implementation of the GoSL CCSAP may face challenges in terms of constitutional and legal competence, capacity, resources and political support.</p>	<ol style="list-style-type: none"> 1. Build and further strengthen institutional and technical capacities of the EPA to acquire and also provide appropriate and adequate knowledge and information through well established climate change data and knowledge management systems; 2. Align with and integrate the existing fragmented, non-standardized and incompatible systems in Sierra Leone to environment and climate change frameworks: 3. Climate Change Resource Centre at the EPA 4. Acquire and utilize ICT to significantly contribute to easing of collection, storage, access, collation and dissemination of climate change knowledge and information; 5. Establish, develop and maintain a robust, technology-based and up-to-date climate change knowledge management system that will serve as a one-stop online space where most of the climate change data, information and knowledge in Sierra Leone reside, can be regularly updated and easily accessible to stakeholders; 6. Develop a network and roster of climate change actors and experts and implement a technology-based climate change knowledge management system using any of the internationally existing CORE METADATA standards. 7. regularly updated and develop cross linkages with similar systems information management systems outside Sierra Leone to capture experiences and lessons learned from other regions 8. Acquire, install and operate Display System in key locations of major cities to enable continuous display of key environment and climate change information for public consumption, and. 9. Acquire, install and document management, mapping and graphing software and functionalities 	<p>SL EPA, NDMA, MET Agency, National Climate Change Committee, Statistics Sierra Leone, the National Library, and City Councils.</p>	<p>5,000,000</p>	<p>2015 - 2018</p>
<p>2. Transform the National Meteorological Services</p>	<p>The limited and timely availability of climate data and information in Sierra Leone is leading</p>	<ol style="list-style-type: none"> 1. Establish a comprehensive business plan for deployment of effective meteorological 	<p>The EPA, NMA, Agriculture,</p>	<p>3,000,000</p>	<p>2016 - 2017</p>

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
of Sierra Leone into an Agency.	to increased challenges in managing, planning and coordinating the response to severe climate and weather events such as droughts and floods in Sierra Leone. An insufficient coverage by climate and weather observational infrastructure combined with low capacity to analyse and model the climate and environmental data, have resulted in inadequate data and information to support decision-making processes at short and long-term ranges. In addition, this prevents the creation of an effective and comprehensive early warning system that helps protect people and productive assets. This weak observational and analytical capability compounds the difficulty to foresee and manage extreme weather events, and to mitigate long term impacts of climate change on various sectors of the economy. There is a need for a transformed National Meteorological Services (NMS) with the capacity to expand current services and improve on the quality of service delivery and as such contribute effectively to national food security, poverty reduction, environmental sustainability and safety of lives and properties. The transformed NMS should be vested with authority to generate revenue from its services and thereby reduce its dependence on the national budget. It is anticipated that a transformed meteorological services will provide better contributions towards accelerating and sustaining national development efforts, which currently depend significantly on climate sensitive sectors, ensuring that the climate resource is harnessed fully, that climate is seen as a 'development' issue and that the negative impacts of climate hazards on lives and properties are minimized.	<p>service in collaboration with public and private partners;</p> <ol style="list-style-type: none"> Support the transition of the NMS into a full-fledged agency by supporting the development of a plan for its sustainable financing; Build on current political processes underway to help articulate the economic possibilities and realities of the new agency; Help produce a cost-recovery policy, including a list of meteorological products, services, tariffs and prices for public and private clients; Support the establishment of economic structures to help the National Meteorological Service gain the ISO 9001-2008 certification as required by Annex 3 to ICAO Convention and the WMO Quality Management Systems for the provision of weather and climate information and early warning services. Help provide the financial blueprint of how the new National Meteorological Agency is to be sustainable; Help identify new services the NMS can provide by virtue of investments in infrastructure and human capacity; Help identify and shape the economic partnerships and possibilities that can render the institution sustainable; Provide a wider gamut of cost-recovery services and provide tailored products that it was previously unable to due to skills and infrastructural constraints; Provide better contributions towards accelerating and sustaining national development efforts, which currently depend significantly on climate sensitive sectors. 	Water Resources. Energy, etc		
3. Strengthening of Climate Change Early Warning System of Sierra Leone	Climate and weather observations and recording of meteorological and other environmental data and phenomena are carried out at stations located on land, in water bodies and in the air. Many of the meteorological stations in Sierra Leone were destroyed during the civil war. During the current recovery period some of these stations have been rehabilitated but many more need to be rehabilitated and new stations built to enable effective monitoring of weather and climate events and the dissemination of	<ol style="list-style-type: none"> Establish a functional network of meteorological monitoring stations and associated infrastructure to better understand climatic conditions and changes at short, mid-term and long-term ranges through; <ol style="list-style-type: none"> Upgrade telecommunications equipment for internal MET service communications and real time data transmission, and design communication protocols Procure and install 15 automatic 	SL EPA, NMS, Mobile Operators, Telecommunication Agencies, Sierra Leone Broadcasting Services; etc	15,000,000	2017 - 2020

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>relevant information to users. The number of meteorological stations is currently inadequate to address all of the aforementioned climate risks. The spatial distribution and density is poor as there are some large areas of the country that are not covered by observation stations. Less than 50% of the territory is covered by some form of monitoring network. In addition to data collection systems, there are weak data analysis functions that are exacerbated by the lack of human resources, skills and tools.</p> <p>As noted previously, due to its financial constraints, the Sierra Leone NMS has an inadequate number of qualified technical and professional staff to enable it to function optimally as required by its mandate. There is a severe shortage of human resources capacity to carry-out (a) data collection, processing, interpretation and dissemination of information climate prediction and provision of appropriate weather warnings and advisories; (b) effective maintenance of instruments and equipment, (c) day-to-day operations at the climate stations; and (d) sensitization of local communities on climate risks and how to adapt to them.</p> <p>Access to capacity building and training is a central concern as there are limited resources domestically and often staff members do not have the necessary prerequisite accreditations to obtain training abroad. Inability to attract qualified staff, vis-a-vis challenges for foreign training, retirement and retention of personnel, and high costs associated with meteorological training further exacerbate this problem. Meteorological equipment and carrying out forecasts requires highly skilled and specialized personnel, which poses challenges to the existing system. There is also the major barrier of not having in-country engineering capacities for maintenance and repair of existing meteorological equipment.</p> <p>Sierra Leone Meteorological Services also has weak communication links which prevent the transfer of effective early warnings down to the local level. This challenge exists at all levels:</p>	<p>weather stations (AWS) for synoptic, climatological and agro-meteorological observations in underserved parts of the country</p> <ul style="list-style-type: none"> c) Acquire and install 3 pilot balloon stations d) Create data storage facility for satellite receiving station with backup power source and capacity to transmit information to other users e) Establish and regularly upgrade a Weather Visualization system at the Central Forecast Office f) Upgrade conventional meteorological measurement tools and infrastructure; g) Develop a Media Weather Studio at the Central Forecast Office to allow timely transmission of the TV Weather forecast to the National Television Station of Sierra Leone and other media h) Procure and install 5 tide marine meteorological stations, 5 buoy marine station and 5 acoustic wave and current profiler (AWAC) within the coastal zone of Sierra Leone; i) Develop database for centralized climate and environmental data j) Procurement, installation and use of user-friendly computer software packages for data processing, dissemination and archiving; including back-up systems k) Installation of model for climate projections and downscaling l) Develop climate atlas to generate baseline information m) Develop appropriate procedures and strategies for centralizing data and providing services to users <p>2. Strengthen the skills, competencies, standards and procedures required to run an effective meteorological network and early warning systems through;</p> <ul style="list-style-type: none"> a) Provide training on core oceanography and marine meteorology to 10 persons b) Provide training to 10 persons (2 per 			

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>within the meteorological network, intra-governmentally, down to the regional level, and finally down to the village level. The challenge exists both at the information generation level (obtaining data in real time from across the country, covering remote areas) and at the dissemination level (early warning transmission or longer-term climate communication). The inability to disseminate meteorological and climate information has been found to be the most serious failing of the National Meteorological Services. This is due in large part to the absence of an effective information and communication sharing capacity and infrastructure. The inability to provide effective warnings of severe weather includes low awareness of the user community about the meteorological services, the language and time of broadcasts of the TV weather forecasts, the absence of formalized operational procedures, and the lack of formalized user feedback mechanism between the provider and users of meteorological information. The information generated is also not disseminated to the target audience in a timely fashion and in the format and language understood by the user communities. Consultations revealed that very few people fully understand what the forecasts mean both due to language and technicality, and have low confidence in its reliability. Many of them also do not have access to televisions and electricity to be able to watch it.</p> <p>The shortage of accurate and reliable weather and climate information prevents such information from being integrated into local, regional and national development plans. Given the population's dependency on rain-fed agriculture and climate sensitive natural resources, improved climate knowledge is essential for future development planning. One of the issues for sectoral institutional partners is that they do not receive sector-relevant climate advice that they can integrate into their development planning. This is a result of all the other barriers in that currently NMS does not have the optimal equipment to generate such information, sufficient skilled staff to interpret</p>	<p>shift) for interpretation of NWP, management, operation and data analysis of content generated from visualisation software</p> <ul style="list-style-type: none"> c) Conduct maintenance and repair training for Weather visualization systems d) Provide training to 10 persons for management, operation and data collection from Geostationary and Polar orbiting Satellite imagery products e) Provide training to 5 persons for management, operation and data collection and dissemination from pilot balloon stations f) Train 20 staff members on management, use, and operations of automatic weather stations, and on analysis of data generated; g) Conduct training on data management and analysis, climate modelling and projections and scenario building downscaling <p>3. Develop and disseminate tailored weather and climate information to government entities, private sector, civil society, development partners and local communities through;</p> <ul style="list-style-type: none"> a) Provide training on maintenance and repair of hydro-met monitoring equipment. b) Develop a 10-year recruitment and retention plan to upgrade skills and capacity for hydro-meteorological services c) Incorporate climate change and weather training into certification requirements for extension workers d) Providing a forecasting course to meteorologists e) Providing Meteorologists and Hydrologists with WMO Class I training (PhD, MSC, BSC in AGRHYMET, UK, Nigeria and Nairobi) f) Providing Senior Level Technicians with WMO Class II training (Nairobi/Lagos (Met.) and Barbados 			

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>it, strong communication links to communicate it effectively, and there is also a lack of understanding of the kind of tailored climate products that are needed to serve the development needs of sectoral partners, and the resources to fund them. Sectoral institutional partners are also unaware of the kind of services that can be provided to them to obtain development-relevant advisories and warnings. Local level institutional structures such as District and Village Development Committees (DDCs and VDCs) have limited or no knowledge or concept of including climate change risk planning into their development plans. Similarly, at the Regional Administrative level, climate change is not incorporated into yearly planning. In addition to the lack of climate information, this is also due to a lack of public sensitization on climate change impacts and how they may impede future development.</p> <p>Based on the foregoing challenges related to early warning of weather and climate risks and impacts, this project seeks to establish and strengthen an effective national early warning system, along with development planning processes that are based on accurate and reliable weather and climate related services. The government's long term preferred solution to climate change induced problems is thus to enhance the country's capacity to gather and analyze climate and environmental information in order to inform its population about severe and extreme weather events as well as on long-term systemic change triggered by climate change. As a foundational adaptive measure, the deployment of effective meteorological services and early warning systems benefits the poorer segments of society, who do not necessarily benefit from large protective infrastructure projects. It also provides benefits for long term planning and helps the NMS and other institutions build capacity to service other needs e.g. for land-use and agricultural planning, hydro-electric power, etc., in the face of a changing climate.</p>	<p>(Hydrology))</p> <p>g) Providing Middle-level Technicians with WMO Class III training</p> <p>4. Support the uptake of climate information and integration of climate knowledge into local development plans through:</p> <p>a) Institutionalize effective messaging and dissemination of weather and climate early warning products (forecasts, advisories, etc) from the provider (NMS) to the users at all levels of the economy, but particularly the local communities by:</p> <p>b) Developing targeted and user-friendly early warning products (forecasts, warnings, advisories and alerts) that can be understood by targeted audience;</p> <p>c) Translating meteorological terms commonly used in weather forecasts and other early warning products into the widely spoken local languages and dialects in Sierra Leone;</p> <p>d) Using local languages in designing and disseminating weather and climate early warning information on relevant and appropriate media;</p> <p>e) Using mobile phone technology and community radios to transmit climate change early warning products to reach greater audiences, particularly at the community level;</p> <p>f) Create weather and climate early warning information communicators out of the field and community level Extensions Services, local and elected leaders, the Media, Civil Society Organizations (NGOs and CBOs), and women and youth groups;</p> <p>g) Create resource capacitated and skilled Radio Listening Groups in local communities that will receive, analyse, reformat and disseminate weather and climate early warning products to their constituencies at the local level;</p> <p>h) Support County/District and Village Development Committees to climate-</p>			

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
		<p>proof local development plans;</p> <p>i) Enhance collaboration between the National Meteorological Services and the National Disaster Management Agency and entities to issue appropriate and time warnings to enable disaster planning and response; and</p> <p>j) Render the weather and climate early warning information, communication and sharing system versatile by using a variety of communication media, and partners including the media and civil society organizations that are active at the local community level in recognition of their capacity for public sensitization and education e.g.,</p> <p>k) Identify and use most appropriate communication media at various localities and for various user communities (e.g., print and electronic media for literate stakeholders and extension services agents, and Community Radios for illiterate and grassroots level stakeholders).</p>			

TABLE 4: Priority GHG Mitigation Actions and Technologies for a Low Carbon Development of Sierra Leone

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>1. Promote Renewable (Solar, Wind, Hydro, Biomass) Energy based mini grids for productive uses in rural areas of Sierra Leone</p>	<p>As spelt out in the Medium Term Plan of the Government – the Agenda for Prosperity (2013 – 2018), it is planned to increase electricity installed capacity from the current 90MW to 1000 MW by 2018 which will require significant new investments in generation, transmission and efficient distribution. Government is therefore committed to (a) rolling out the Barefoot College Solar Strategy to all districts, so that remote areas likely to be off the national grid will have access to affordable and sustainable energy, (b) explore small scale biomass for rural electrification, (c) construction of Bumbuna II and several other potentially economically viable hydro sites, estimated eventually to generate a total of 750MW (d) investigate opportunities to use off-grid solar power services, and promote the creation of markets for solar technologies through the private sector (such as solar</p>	<ol style="list-style-type: none"> Increase electricity production capacity from 900MW to 750 MW using renewable sources to be installed in the Provinces in phases. Build the human capital and provide appropriate technologies; Install small wind turbines of 150-200KW along the coastal line, and solar and hydro plants mainly for provincial power generation; Construction Bumbuna II and several other potentially economically viable hydro sites, Create, promote and facilitate markets for renewable energy technologies; Mitigate greenhouse gas emissions and concentrations due to thermal electricity generation 	<p>SL EPA, Ministry of Energy, Ministry responsible for Forestry; Electricity Generation and Transmission Corporations</p>	<p>38,000,000</p>	<p>2015 - 2030</p>

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
	<p>photovoltaic, solar water heating, solar lanterns, solar refrigerators, solar cooking and solar water pumps), (e) investigate the potential for modern, sustainable and efficient forms of bioenergy, including improved and sustainable wood energy production, improved charcoal processing, and improved cooking stoves; and explore the potential use of biofuels such as biodiesel from palm oil or ethanol for domestic consumption. Through these efforts of fuel switching from fossil to renewable, Sierra Leone will reduce her current and future emissions of greenhouse gases.</p> <p>We assume that the current electricity generation of 90,000KW is coming from thermal generation and this is increased to 750,000KW using the same generation. Corresponding emissions will increase from 73.89MtonsCO₂ to 615.75MtonsCO₂. Under this project, it is proposed to switch from thermal generation to renewable energy sources in the electricity mix of 60% (0.6*750,000) hydro; 20% (0.2*750,000KW) solar and 20% (0.2*750,000KW) wind. Corresponding total emissions using this electricity mix will be 19.50MtonCO₂ making emissions reduction of 596.25MtonCO₂. The full or incremental cost estimate of the project is the difference between the cost of thermal generator and solar, hydro and wind technologies.</p>				

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
2. Promote the use of energy-efficient cooking stoves to reduce greenhouse gas emissions from fuel wood consumption	Fuel wood collection and burning of wood during charcoal production is reducing vegetation cover and increasing Sierra Leone's emissions of greenhouse gases. Major saving in both CO ₂ emissions and energy consumption will be realized by simply popularizing the use of improved cooking stoves that is expected to save up to 100,000 TOE fuel wood by 2020. The cumulative saving for wood and charcoal for the urban households will be around 850,000 TOE	<ol style="list-style-type: none"> 1. Develop baseline data and information on wood (fuel wood and charcoal) consumption and related greenhouse gas emissions; 2. Identify the cook stove type and technology most appropriate for The Gambia; 3. Identify and train beneficiary communities on construction of cook stoves; 4. Construct and distribute 5,000 stoves; 5. Monitor, collect and share feedback information on impacts, challenges and best practices 	SL EPA, Ministry of Energy, Ministry responsible for Forestry; Electricity Generation and Transmission Corporations	5,000,000	2015 - 2020
3. Reinforcement of transmission and distribution system to reduce losses to 45% between 2015 and 2030	According to the GoSL Medium Strategy – the Agenda for Prosperity (2013-2018) – it is proposed as a matter of priority to rebuild the National Transmission and Distribution network, involving reinforcing the Bumbuna line to evacuate more power to Freetown. Current transmission network is at the 33Kv level that requires upgrading to 161Kv to ensure stability to minimize losses due to outage. These existing transmission lines are not adequate to off-load the growing power demand and the current power flow problem in Sierra Leone. The use of Climate change funding to minimize losses through the refurbishment, upgrading (from 33Kv to 161Kv) and expanding to provinces networks is expected to remedy the shortfall. The scope of the project will include linking of provincial and the Western Area network to ensure stability.	<ol style="list-style-type: none"> 1. rehabilitation, upgrading, refurbishment and expansion the country's transmission and distribution network 2. improve electricity infrastructure; 3. expand access to health care, education and basic infrastructure services; 4. improve the quality of life, particularly in poor areas of the country; 5. Upgrading and replace transformers; 6. Upgrade the transmission line from 33kv to 161kv; 7. Link provincial centres with the Western Area networks at 161kv level; and Build dispatch centres and increase the sub-stations. 	SL EPA, National Power Authority	15,000,000	2015 2020
4. Reduce methane emissions through improved waste management by land filling, composting and recycling of waste in Freetown, and other cities and towns of Sierra Leone	The Waste sector is responsible for about 53% of the total emissions of Sierra Leone. Urban and peri-urban population of Sierra Leone is about 2.2 Million in 2014 and is projected to be 2.8 Million by 2018. In this regard, solid waste generation increases from 200,000 tons to 400,000 tons. Greenhouse gas emissions increased from about 1.8 MtCO ₂ EQ in 1990 to about 2.3 MtCO ₂ EQ in 2010. Approximately, 1 ton of MSW produces 2.17 metric tons CO ₂ EQ. Combine wastewater discharge into coastal waters from Freetown, Sierra Leone and tourism resort is expected to grow from 4,000 cubic meters per day to 5,000 cubic meters per day. Thus, methane emission from the organic component of solid waste will increase from 6.5Gg CH ₄ to 13Gg CH ₄ and 1.75Gg CH ₄ to 3.5Gg CH ₄ from wastewater. Waste management is constrained by inadequate Waste Management Framework, unplanned and illegal dumpsites designated as legal landfills, burning of most of the waste during the dry season, no sorting or recycling of waste, inadequate capacity to manage the waste and			68,000,000	2015 - 2030

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>5. Plan, develop and regulate a Green Technology Mass Transport System for the Urban and Rural Western Area of Sierra Leone</p>	<p>lack of waste treatment infrastructure in communities.</p> <p>According to the Sierra Leone Medium Term Strategy – Agenda for Prosperity (2013 – 2018), diversified economic growth will require greatly strengthened infrastructure particularly in the transport sub-sector. Developing adequate transport facilities will be to build a stable economy, founded on private sector-led growth, and diversified across several competitive sectors to achieve the country’s economic and human development vision. Improved transport services, including integrated ambulance referral systems, will strengthen areas of weakness for health service delivery. Access to safe, affordable and sustainable transport is critical toward economic competitiveness. In the Second National Communications of Sierra Leone, the improvement of bulk public transport system (buses, rail) etc. were highlighted as mitigation measures that will contribute to reduction of regional and global emissions of greenhouses. Thus, air pollution including greenhouse gas emissions caused by automobiles is recognized as a problem, and the project will provide measures to ease the load on the environment.</p> <p>The project should simulate (1) development of the areas surrounding new facilities; (2) coordination with different types of transportation services (rail, bus, etc); and (3) introduction of common ticketing systems to encourage transfer between different modes of transportation such as subways, elevated railways, and buses. The aim of this project is to mitigate current and future traffic congestions in Freetown and Western Area of Sierra Leone by planning and establishing new mass transport (bus, railway, etc) system, thereby contributing to urban economic development and environmental improvement.</p>	<ol style="list-style-type: none"> 1. Improve the road network, by reconstruction, rehabilitation and maintenance of existing roads, and expand the system where feasible. 2. Implement road network projects in the Urban and Rural Western Area 3. Widen road network from Wellington to Mamama (site for construction of new airport); 4. Construct flyovers within Freetown in strategic areas, such as East End Police Lumley round about, and other suitable areas; 5. Undertake feasibility studies of a coastal road from Cline Town to Murray Town; 6. Explore and commence reconstruction of national rail network, including the Western Area District. 7. Construct and rehabilitate civil works (new and widening of existing roads, rail system, and central command system); 8. Procure and install mechanical and electrical facilities; 9. Establish public and private partnerships; 10. Engage consulting services in implementation and operation of some facilities such as construction supervision and environmental management planning. 		50,000,000	2015 - 2030

TABLE 5: Priority Actions for Climate Resilient Development of Sierra Leone

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>1. Promotion and adoption of roof-top and surface-runoff rainwater harvesting for 2000 households as climate change adaptation technologies for human consumption, animal watering and other livelihood uses.</p>	<p>Most precipitation that falls on human settlements is lost to the atmosphere through evaporation, or runs into rivers away from settlements before it can be used. However, if the rain is collected using appropriate technologies and infrastructure, it can contribute greatly to the volume of freshwater available for human consumption, animal watering and other livelihood uses (crop irrigation, fish farming, etc), and also contribute to savings for the household and the National or Regional Water Supply Authorities.</p> <p>Climate change projections for Sierra Leone show a decrease in rainfall by about 3-10% below the current monthly and annual values. Rainwater harvesting has the potential to alleviate water shortage or pollution in Sierra Leone due to climate change.</p> <p>As a climate change adaptation activity, rainwater harvesting technology enhances availability of drinking water for human consumption and animal watering, and agricultural water in times of water shortage due to drought or in times of poor water quality and pollution due to floods. The adaptation activity also contributes to job creation and result in reduction of public and private expenditures associated with water infrastructure. The implementation of the project will lead to enhanced growth of social structures and women empowerment. It will also reduce overexploitation of ground and service water with consequent environmental benefits. Additionally, widespread rainwater storage capacity can greatly reduce land erosion and flood inflow to major rivers. It will also contribute greatly to the stabilization of declining groundwater tables.</p>	<p>1. Procure, install and operate rooftop (gutters, collection vessel, down-pipes, containers for settling particulates, storage container) and surface runoff technologies (constructed reservoir) for water harvesting;</p>		<p>1,500.000</p>	<p>2017 - 2020</p>

Project Title	Project Justification	Activities	Responsible Office	Costs/Resources (US Dollars)	Time Frame (Years)
<p>2. National agricultural land and water management development for increased rice and vegetable production and for strengthened climate resilience.</p>	<p>This project seeks to reduce rural poverty of women and young people by increasing their incomes from improved productivity based on sustainable land and water management practices. The Project will support GoSL's strategic vision for growth and development through strengthening the agricultural sector in order to increase productivity; improve farmers' income; expand the rural economy for employment generation; and reduce food imports.</p> <p>The watershed development component will concentrated on investments in public and communal economic assets in order to raise the productive potential of the limited supply of agricultural land and to boost rice productivity and ensure year-round vegetable production through appropriate agricultural water control, retention and supply technologies. The agricultural commercialization component will provide strategic support to the rice and vegetable markets, from the farm to the plate, expressly to increase real cash demand for the produce of the mass of smallholders. It will complement the watershed component with investments in private economic assets of producer organizations and enterprises. The agriculture commercialization component is to increase the profitable trade in rice and vegetables produced by small-scale farmers by broadening and deepening local and national markets in terms of volume, quality and value addition.</p>	<ol style="list-style-type: none"> 1. Promote and facilitate watershed development, and 2. Promote and facilitate agricultural commercialization. 3. Build the technical and managerial capacity of the primary producers; enterprises supplying commercial support services to production and marketing; and public and private sector agencies providing development support services. 4. Establish a strong institutional framework by engaging existing Government institutions, farmers' organizations, and credible service providers in the implementation process; and activity that would support sustainability; 5. Encourage producers and value-adders to enter into productive dialogue with Government and other private sector operators. 6. Encourage and facilitate community-led co-management arrangements and alignment of public and private interests in the shared resources with the purpose of halting and reversing the deterioration in the physical state and economic carrying capacity of agricultural lands. 7. Develop the competence and confidence of communities to take on management responsibility for their local natural resource assets; 8. Build up the nontechnical capacity and institutional knowhow of Government services to interact with villagers as partners. 		5,000,000	2016 - 2020

3.3: IMPLEMENTATION OF THE LECRDS AND NATIONAL CLIMATE CHANGE ACTION PLAN

Implementation of the LECRDS (Section II) and the National Climate Change Action Plan (Section III) of Sierra Leone is contingent on the existence of solid climate change policy, climate change legal framework and a well-established institutional structure with well-defined roles and responsibilities of institutions and individuals. In Sierra Leone both the climate change policy and the institutional structure are in their infancy stages. There is no climate change law.

3.3.1: Implementation Framework

Given the cross-cutting and overarching role that policy, legislative and institutional reform plays in enabling Sierra Leone's climate change response, the following priority actions are envisaged for the implementation of the LECRDS, NCCAP and other climate change issues. Jointly implemented, these actions constitute a comprehensive package that facilitates climate change mainstreaming and effective LECRDS and NCCAP implementation. Accordingly, the separate priority actions identified below are closely interlinked and are designed to reinforce the objectives of the other legislative, institutional and policy actions.

5. Review, revise and adopt the current Draft Climate Policy into a comprehensive Climate Policy to enable the country to achieve the adaptation and mitigation goals and strategies identified and discussed in Section 2 and priority projects/activities in sub-section 3.2.
6. Establish the enabling legislative framework to implement the LECRDS and NCCAP actions by enacting a stand-alone and overarching Climate Change Law. Amendment of key sectoral laws will be required to make them consistent with the climate change law and to ensure that all actions under the NCCAP have the legislative basis to be implemented and translated from concept to practice.
7. Establish and/or strengthen the high-level National Climate Change Council (NCCC), in the Office of the President, with the role of primary coordination, policy direction, oversight and guidance across all levels of government. The Council should ensure mainstreaming of climate change by national government agencies and departments. The Council is expected to coordinate climate change issues through an inter-ministerial and interagency committee. The NCCC will be chaired by the Office of the President as the parent body of the EPA, have a secretariat within the Office of the President, report annually to Parliament, comprise lead experts in climate change, representatives of district and county governments, and involve representatives of civil society, academia and the private sector.
8. Establish a National Climate Change Secretariat as the primary national government agency for climate change response, located within the Office of the President which is responsible for climate change political affairs. Such a Secretariat may perform defined statutory functions, key among them the proposal and continuous revision of climate policy to the NCCC, oversight of climate change strategy and action plan implementation, proposal of climate change legislation, as well as the role of national compliance and enforcement.

3.3.2: Review, revision and adoption of the current Draft National Climate Policy (NCP)

The development of the current Draft National Climate Change Policy of Sierra Leone is a manifestation by the Government of Sierra Leone that it recognises that climate change is a problem and is committed to addressing a problem through specified strategies, plans and actions. There is the urgent need to review and revise the current draft Policy and adopt it as a comprehensive National Climate Policy. The National Climate Policy (NC) to be adopted will serve as a comprehensive approach that seeks to mainstream climate change issues in all economic sectors in Sierra Leone and will enhance the commitment of government ministries, departments, and agencies to take the lead. The policy will also promote public awareness and cognizance of climate change issues into development planning. The proposed NCP will highlight the principal economic sources of greenhouse gas emissions, mitigation, vulnerability, impacts and adaptation amongst others. The NCP will be designed to (a) ensure integration of climate change into sustainable development frameworks; (b) ensure requisite institutional capacities for climate change issues at all levels; (c) enhance the use of knowledge, education, training, innovation, and information sharing to build climate proofed societies; (d) improve the identification, assessment, monitoring of the climate and early warning systems; and (e) improve effectiveness of climate change response by fully building requisite institutions and structures.

The climate change policy is to provide the opportunity for decision and policy makers to acquire understanding of climate change issues and make informed decisions on how to cope with them and this will be achieved in (a) sustainable agriculture and food security; (b) industry and manufacturing; (c) energy sources and energy efficiency technologies; (d) Forestry and land use land cover change; and (e) natural resources management.

A key element of the policy framework is to augment the resources and capability of existing entities and build new capabilities wherever necessary. It sets the Sierra Leone Environment Protection Agency as the Lead Agency which shall provide the overall coordination and direction of activities. The activities include (a) drum up and increase political commitment on the reduction of climate change impacts; (b) improve the identification and assessment of climate change risks; (c) increase public awareness of climate change risk reduction; (d) improve governance of disaster risk in climate change institutions; (e) integrate climate change risk management into development effort; (f) provide overall coordination and monitoring in implementation of the policy and strategy; and (g) support the building of the capacity of the National Climate Change Secretariat, coordination of emergencies and the development and implementation of a National Climate Change Management Plan.

The NCCP also contains pronouncements on:

1. Greenhouse Gas Inventory development and management;
2. The Mitigation of Greenhouse Emissions and Concentration;
3. Climate change vulnerability and Adaptation research;

4. Environmental Governance;
5. Legal/Legislative arrangements for Policy Implementation;
6. Education, Public Awareness and Participation;
7. Coordination, Implementation, Monitoring and Evaluation;
8. Registration, Measurement, Reporting and Verification;
9. Emission Standards, Safeguards and Labelling;
10. Partnership and Inter-Sectoral Collaboration;
11. Financial Management; and
12. International Commitments and Technical Cooperation;

3.3.3: The Climate Change Legal Framework

A policy, such as the National Climate Change Policy of Sierra Leone, is not binding and thus there would be no legal consequence on the government or the citizens of Sierra Leone for failing to implement the policy. To be binding, the NCCP should be translated into law for effective implementation. This legal framework is the foundation for an effective policy and it can take the form of a stand-alone National Climate Change Act or an existing law can be amended to (a) provide legitimacy for actions (programmes and activities) to address the climate change concerns and issues, (b) set the goals that a society desires to accomplish in light of a climate change implementation, (c) to serve as the only acceptable tool in regulating human behaviour and conduct on climate change, and (d) provide official sanctions and can ensure compliance.

This study is bias towards the institutionalization of a stand-alone and comprehensive National Climate Change Act of Sierra Leone that addresses and provides legitimacy for all climate change issues and activities including (a) the continuous inventorying of the anthropogenic emissions sources and sinks of Sierra Leone; (b) institutionalization of a national framework for carbon finance; development of national and regional programmes to mitigate the anthropogenic emissions by source and sinks; (c) promotion of education, training and awareness on climate change; (d) appropriate technology transfer arrangements and their authorisation, and (e) access to environmentally-sound technologies.

3.3.4: Institutional Framework

In determining an appropriate institutional framework for the implementation of climate change in general and specifically the LECRDS and National Action Plan, careful consideration should be accorded to (a) government's obligations towards meeting the implementation of the Climate Change Convention at national, regional and international levels; (b) national development frameworks (policies, strategies, action plans and programmes); (c) existing institutions that already conduct climate change activities and how they can be co-opted in the implementation of climate change at the national level; and (d) any other plausible effective options.

In the preceding sub-sections, it is revealed that Sierra Leone currently has a draft National Climate Change Policy but no Climate Change Law. The LECRDS therefore recommends that

the current draft climate change policy be reviewed and be made more comprehensive and a related legislation be put in place by developing a new National Climate Change Act of Sierra Leone. It is also recommended that during the development of the Climate Change legislation, comprehensive review of existing laws that are related to climate change (Environment, Natural Resources, Agriculture, etc.) should be undertaken to make these laws climate change responsive.

In addition, during the process of development of the LECRDS, it has been established that institutions currently in place to govern climate change affairs are in their infancy and are inadequate. Consequently, it is urgently recommended that the Environment Protection Agency of Sierra Leone houses a dedicated and adequately resourced climate change secretariat under the Office of the President of Sierra Leone to oversee climate change issues including the implementation of the LECRDS, its National Action Plan, and other adaptation and mitigation programmes. In addition to the National Climate Change Policy, Act and Secretariat, it is recommended that relevant Divisions and Units of the Secretariat should be established and/or strengthened and some national, sub-national and thematic committees should be established to support the Secretariat in the implementation of climate change, particularly the LECRDS and National Action Plan. This institutional framework should be inscribed and anchored on the provisions of the proposed new National Climate Change Act.

It is important that the package of activities needed to combat climate change be anchored within a policy and legal framework that enables Sierra Leone to meet its long-term development goals while fulfilling its global obligations towards combating this problem. A dedicated climate change institution is important as it establishes a coordination instrument which ensures that all cross-sectoral activities match the overall vision of the LECRDS and National Climate Change Action Plan.

The following are some of the various Divisions and Offices that are being proposed to be established under the new Climate Change Secretariat of Sierra Leone.

Policy, Law and Strategy Office

This office of the Climate Change Secretariat shall comprise key government agencies with policy- and law related functions including the Office of the Attorney General and key NGOs. This Office shall initiate all necessary policy, legal, strategy and planning processes, and promote and cooperate on legal information on matters related to climate change. This office shall also play a key role in coordinating international climate change negotiations and work closely with the climate experts at the National Meteorological Services and the foreign diplomats at the Ministry of Foreign Affairs.

Programmes Office

This office shall serve as the central administrative office for all climate change programmes, with focal points (representatives) in each programme division. In addition, it shall serve as the

liaison office between the programme divisions and the Secretariat. Its divisions or departments shall include:

- a) a Designated National Authority (DNA), responsible for carbon emissions/CDM trading and technology transfer under the Kyoto Protocol or its future successor,
- b) a REDD and Land-Use Division,
- c) an Adaptation Programmes Division,
- d) a Communications, Education and Public Awareness Division,
- e) a Research, Early Warning and Disaster Management Division, and
- f) a Monitoring & Evaluations (M&E) Division.

This office shall coordinate the functions and activities of various Programme divisions to ensure that all of them work towards achieving the overall aim of reducing the country's GHG emissions, and will take responsibility for administrative matters of the programmes in collaboration with the Programmes divisions. In addition, it should also be the office to develop appropriate climate change mainstreaming strategies and action plans for all key sectors, and to ensure mainstreaming of climate change adaptation and mitigation measures in ongoing and future activities of all key sectors.

The new Climate Change Secretariat shall require close cooperation and collaboration with national, regional and international organizations and bodies dealing with climate change. To be effective and efficient in discharging its functions, the Climate Change Secretariat under the EPA will need to work closely with some existing or proposed Thematic Committees and/or Working Groups. The recommended Committees and/or Working Groups include:

1. **The National Climate Committee** which will be responsible for (a) the technical implementation of the Climate Change Convention and all related instruments, (b) serve as an advisory body on climate change technical matters, and (c) support the Climate Change Secretariat under the EPA gather and collate input and advice from key climate change stakeholders for its use in the coordination of Sierra Leone's climate change activities. The Climate Change Secretariat will provide secretarial functions for the committee. The IPCC focal point based in the National Meteorological Services will augment the NCC and strengthen its scientific advisory capacity.
2. **Multi-sectoral task force on mobilization and coordination of climate finance:** The establishment of the Sierra Leone Climate Fund in the Ministry of Finance to facilitate the sourcing of finance from domestic budgets and international climate funding mechanisms is crucial to ensure effective implementation of the LECRDS and the National Climate Change Action Plan. A multi-sectoral taskforce is recommended to mobilise resources and coordinate climate finance-related issues. In addition, the institutional structure recognises the role of the National Designated Authority on the GCF to be established, the Designated National Authority (DNA) on the Clean Development Mechanism (CDM) and the National Implementing Entity (NIE) for the Adaptation Fund, to be located at the Climate Change Secretariat under the EPA, which requires capacity building to effectively contribute to the implementation of the Action Plan.

3. **Inter-ministerial working group on adaptation to climate change (IWGA):** Knowing the importance attached to climate change adaptation by the Government and people of Sierra Leone, it is recommended to set up an inter-ministerial working group on adaptation to climate change in which all ministries are represented. The Working Group will be headed by the Office of the President and the EPA will serve as its Secretariat. The IWGA will prepare the Adaptation Action Plan, bring together the initiatives of the various ministries and other stakeholders, and play an active part in shaping and accompanying the dialogue and participation process for the Adaptation Strategy, with the aim of ensuring a consistent conceptual approach by the Government of Sierra Leone. It will submit regular reports for the purpose of updating the LECRDS and NCCAP and evaluating their implementation.
4. **Established a Specialized Forum/Centre on Climate Impacts and Adaptation:** It is recommended to create a Specialized Forum on Climate Change Impacts and Adaptation to be supported by a unit within the Climate Change Secretariat under the EPA. The Forum and Unit will support the preparation of the national adaptation strategy with technical and environmental advice. Major functions of the Forum and supporting Unit could be:
 - Processing of technical knowledge about national, regional and global climate changes, climate impacts and adaptation with a view to risk assessment and deduction and evaluation of possible adaptation requirements;
 - Communicating this knowledge to decision-and policy-makers and networking the stakeholders;
 - Conduct sensitization and awareness raising fora to inform potentially affected stakeholders and the public; and
 - Compiling and evaluating adaptation projects, adaptation options and measures.

The range of services offered by the Forum can be constantly expanding and is open to all stakeholders. Specifically, the Forum, via an information platform and as a portal, will offer facilities for gaining access to a wide range of adaptation-specific data, programmes, activities and results.

3.3.5: Partnerships and an Integrated Approach

Collaboration with organizations, communities, and other partners is one of the most important and sustainable means to face the challenges of global climate change and adapt to its impacts. The scale of climate change impacts far exceeds the ability of any one country, agency, or organization to effectively respond as a single entity. It is necessary to foster partnerships among national and sub-national governments, organizations, private, academic, and non-governmental entities at local, regional, national, and international levels. Existing sustainable partnerships, which have evolved over time, are an ideal platform to support combined efforts towards mutual goals for climate change response. Additionally, new partnerships specific to climate change should be forged to provide the enabling environments for closer working relations on a range of science and adaptation tools for decision making.

Focus and commitment should be directed to areas where there is greater hope to achieve successful collaboration and partnerships with respect to climate change. Partners are essential to acquire new knowledge about climate change and its impacts, raise awareness regarding those impacts to places people care about, and evaluate and implement strategies and actions that require cooperation outside park boundaries. Investing in effective partnerships, or augmenting existing partnerships, is an example of actions the Sierra Leone EPA and partners can take now to provide multiplier effects into the future.

Mechanisms will be established and made functional to engage and partner with key stakeholders in order to maximise effective climate change mitigation and adaptation programmes. These partnerships will be developed in such a way that government plays a supporting role to some programmes and projects and a leading and oversight role in others. The integrated approach to addressing climate change needs to be highlighted throughout these partnerships and it is important that the activities developed as part of the LECRDS and NCCAP are not limited to those actions that are managed by the public sector.

Examples of partnerships that Sierra Leone could foster during the implementation of its LECRDS and NCCAP include:

1. The EPA should collaborate in full partnership with the Districts and Municipalities to support mass transit, especially in the Western Region and Freetown, with vehicle- and fuel-replacement activities that increase Sierra Leone's use of high-efficiency/ low GHG-emitting vehicles and reduce petroleum use.
2. Creating financial mechanisms for climate risk management and invest in regional partnerships through the use of the National Climate Change Policy to (a) facilitate the introduction of sub-national climate trust funds, risk transfer mechanisms and formal donor partnerships; (b) build and strengthen regional partnerships to share costs and expertise, and pool resources at the district level with the engagement of NGOs, private sector and government special projects; (c) invest in institutional capacity building, collaborative projects and networks (to increase awareness on international funding) and strengthen links with development banks and donor agencies; (d) facilitate decentralised responsibilities and skills, and ensure community participation e.g. through skills sharing forums/initiatives.
3. Fostering partnerships between government, private sector, academia and international partners to support Sierra Leone in meeting her climate change response, poverty reduction and sustainable development needs including donor facilitation to access funding facilities such as the Nordic Climate Facility (NCF) to facilitate the transfer of their advanced technologies such as energy efficiency, water resource management, solar technologies, etc, to Sierra Leone. The partnerships will develop indigenous innovation capabilities in firms, universities and research institutes to adapt, develop, deploy and operate clean technologies effectively. The acquired innovation capabilities (a) can provide an opportunity for competent personnel to train others on new technologies, and encouraging local and regional institutional partnerships in technology development and transfer; ensure and encourage equal representation of men and women in technology

development, training and transfer; (b) provide incentives to local innovators e.g. awards for best technologies; (c) establish forums for students' participation in technological development e.g. through professional student bodies such as Engineering Students' Associations, Physics Students' Associations etc; and (d) establish linkages between the private sector (production centres) and local research and academic institutions to develop and commercialise local technologies and innovations. These Sierra Leone technology partnerships will place the country into advantaged and strategic positions in which it can benefit from technology transfer through the UNFCCC Technology Mechanism.

4. Foster partnerships between the public, private and voluntary sectors to raise awareness on Climate Change and encourage individuals and organisations to work towards transitioning Sierra Leone into a low carbon and climate resilient economy. These partnerships could undertake actions that help sectoral and community planning partners to achieve significant carbon reductions across sectors of the economy and city and district communities.
5. Although current levels of awareness of global warming issues in Sierra Leone are fairly high at the technical level in the public sector, misconceptions are still common outside of this level of the society. Partnerships with Ministry of Education and its partners, the EPA, media, civil society, academia, elected representatives, and private and business sector can develop and deliver a wide-ranging education campaign to exemplify best practice and enable both individuals and organisations to reduce their carbon foot-print, adapt to the impacts of climate change and build resilience to climate risks. These positive outcomes of the education and awareness partnerships will ensure that local public service organisations and their partners work towards common objectives that will tackle the climate change challenges and capitalise on funding and joint working opportunities. The partnerships can be used to (a) promote educational initiatives in both schools and local communities and encourage local action to mitigate factors that contribute to climate change and raise awareness of adaptation measures that can be taken to prepare for the changing climate, (b) develop training programmes linked to green job opportunities; (c) organise training events for community groups in their local area; (d) offer training to schools and communities and support them to take part in greenhouse gas mitigation projects; and (e) communicate information effectively to all stakeholders to actively promote understanding of climate change and encourage people to do their fair share to tackle climate change.

SECTION IV: RESOURCE MOBILISATION STRATEGY FOR THE LECRDS AND NCCAP

4.1: FINANCING AND RESOURCING THE LECRDS AND NCCAP

Climate finance refers to local, national or transnational financing, which may be drawn from public, private and alternative sources of financing. Climate finance is critical to addressing

climate change because large-scale investments are required to significantly reduce emissions, notably in sectors that emit large quantities of greenhouse gases. Climate finance is equally important for adaptation, for which significant financial resources will be similarly required to allow countries to adapt to the adverse effects and reduce the impacts of climate change. In accordance with the principle of common but differentiated responsibility and respective capabilities set out in the Convention, developed country Parties (Annex II Parties) are to provide financial resources to assist developing country Parties in implementing the objectives of the UNFCCC. It is important for all governments and stakeholders to understand and assess the financial needs developing countries have so that such countries can undertake activities to address climate change. Governments and all other stakeholders also need to understand the sources of this financing, in other words, how these financial resources will be mobilized.

Equally significant is the way in which these resources are transferred to and accessed by developing countries. Developing countries need to know that financial resources are predictable, sustainable, and that the channels used allow them to utilize the resources directly without difficulty. For developed countries, it is important that developing countries are able to demonstrate their ability to effectively receive and utilize the resources. In addition, there needs to be full transparency in the way the resources are used for mitigation and adaptation activities. The effective measurement, reporting and verification of climate finance is key to building trust between Parties to the Convention, and also for external actors.

The National Climate Change Action Plan (NCCAP), as set out in this document, identifies the key priorities for Sierra Leone to successfully transition to a low-carbon, climate-resilient growth path whilst realising the ambitions of Vision 2030 of becoming a middle-income country. In terms of mitigation, the LECRDS provides mitigation strategies and the NCCAP provided mitigation activities that ensure energy efficiency, expansion of the energy mix to include renewables, and establishment of Mass Transit system. Important mitigation opportunities are also available from waste management sector and domestic energy. Adaptation priorities discussed in the NCCAP focus on building adaptive capacity including early warning for increased ability to respond to current and future climate extremes, and the provision of water harvesting technologies and infrastructure investments.

The realisation of these bold ambitions identified in the Sierra Leone LECRDS and the NCCAP will require substantial financial resources. To be successful, Sierra Leone will need to access resources from both public and private sources and from both within Sierra Leone and overseas. The cumulative expenditure commitment estimates in the LECRDS and NCCAP is about **205.5 Million US Dollars**. Raising the necessary capital is currently impeded by a number of barriers some of which include policy and regulatory weaknesses, difficulties in accessing commercial finance and technical capacity shortcomings. However, the judicious use of public resources can play a key role in overcoming these barriers through improving access to finance or ameliorating some of the negative social and redistributive impacts that might otherwise be experienced from, for instance, higher electricity prices. It is also broadly recognised that the characteristics of an important component of climate change activities and programmes – such as some adaptation

activity and capacity building – will require public resources in the form of concessional or grant finance.

There are three main options for the delivery of the public resources:

1. Continue with the status quo and scale-up the current project-oriented, development partner-led approach.
2. Enhance direct flows of international finance to the Government of Sierra Leone, i.e. budgetary support, to be disbursed using existing government structures and mechanisms; and
3. Create a dedicated National Climate Fund.

For sustainability, it is recommended to create a stand-alone dedicated Sierra Leone Climate Fund (SLCF) because (a) the SLCF would have more clarity of purpose relative to greater budgetary support and it will allow the development of Sierra Leonean expertise and transparency on climate financing; and (b) relative to maintaining or augmenting the current development partner-led approach, the SLCF would offer greater opportunities for alignment with national priorities (the ‘ownership’ principle).

A well-designed and well-managed Sierra Leone Climate Fund would have a number of key features. It is proposed that the SLCF would focus both on mitigation and adaptation activities; it would evolve in a phased manner starting with providing grant financing before evolving to offer a wider palette of financing instruments; it would aim to catalyse private sector funding through interacting with other financial intermediaries (e.g. commercial banks); and its governance structure would allow broad and equal representation from the government, civil society and the private sector leading to improved capacity of the Government to absorb international public climate finance.

In this way the Fund would have the potential to evolve to become the main recipient of multilateral and bilateral climate finance flows mobilised by Sierra Leone. There are admittedly challenges to using the Fund to channel public resources, but with careful design and management these can be overcome. The Fund will enable Sierra Leone to contribute to the achievement of the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC). In the context of sustainable development, the Fund will promote the paradigm shift towards low-emission and climate-resilient development pathways by financing activities that ultimately allow Sierra Leone to limit or reduce greenhouse gas emissions and to adapt to the impacts of climate change.

The ability of the Government of Sierra Leone to absorb international public climate finance, as well as to use its own public resources expeditiously towards climate change activities could be improved. Low absorption rates arise from a range of factors, from budgeting and fund flow challenges on the part of the Treasury and line ministries, to limited alignment of government and development partner fiscal policies and procedures, capacity constraints and a limited prioritisation of climate change within the budget. These barriers can impact the speed of fund

disbursement from development partners to the Treasury and implementing agencies (e.g. line ministries and NGOs), and consequently, the effectiveness of climate-relevant project implementation. The scope for improving absorptive capacity of climate change finance in Sierra Leone provides further justification for the creation of a Climate Fund that can manage and disburse funds more quickly and efficiently.

Future carbon market conditions are likely to be difficult, both for Sierra Leone and in general. The combination of an unfavourable demand/supply balance globally has already led to low carbon credit prices. Sierra Leone's future actions in relation to carbon market activity need to balance the fact that these conditions suggest government support is more urgent with the fact that they make it more difficult for that support to be effective. A primary trading platform is more appropriate to Sierra Leone's needs than a secondary platform. It is possible to distinguish 'primary' carbon trading platforms from 'secondary' carbon trading platforms. Primary platforms facilitate the origination of carbon credits from individual projects, and their initial purchase from project developers; secondary platforms allow trading on a larger scale, treating carbon credits as a uniform commodity and allowing ultimate compliance purchasers and market intermediaries to purchase credits and manage their carbon price exposure. A primary trading platform would be more appropriate for Sierra Leone's needs in the current market environment.

Based on the foregoing and as a matter of priority, the GoSL should begin the process of creating the Sierra Leone Climate Fund (SLCF) by undertaking the:

1. Design of the LCF based on the detailed analysis within and accompanying the NCCAP
2. Appoint the Governing Board and Operations Committee;
3. Establishment of a multi-departmental Task Force within the GoSL to steer the process of establishing the SLCF;
4. Convene a climate finance pledging conference;
5. Create the 3 Financing Windows of the SLCF (see Resourcing the SLFC below);
6. Communicate and consult nationwide about the SLCF, its mandate, and the target date for the launch of operations;
7. Draft terms of reference for the Fund Administrator, and recruit the SLCF Administrator;
8. Establish a joint financing agreement with development partners;
9. Develop and approve key policies, guidelines, procedures and templates; and
10. Prepare and approve the initial budget.

4.2: THE CONCEPT OF THE RESOURCE MOBILIZATION STRATEGY

This Resource Mobilization Strategy has been developed with cognizance of the tremendous climate change impacts, the identified strategies to respond to the impacts and address the root causes of climate change, and the priority mitigation and adaptation activities that will support Sierra Leone to transition to a low-emissions and climate resilient development as identified in the National Climate Change Action Plan (Section III) of this document. The strategy also considers current trends in domestic and donor funding of climate change in Sierra Leone and then assesses internal structures and challenges on the basis of which this strategy has been developed. The strategy consists of the major approaches of (1) improve communication and

information flow; (2) institute processes, systems and tools; (3) introduce incentives and empowerment; (4) enhance skills and capacity; (5) pursue donor interaction; (6) strengthen interpersonal relations and (7) produce results and monitor impact that address a variety of challenges impacting effective resource mobilization. It is anticipated that the execution of these strategic approaches and activities will generate adequate resources for the implementation of climate change in Sierra Leone and facilitate resource mobilization efforts.

Considering the scale of action to address climate change challenges in Sierra Leone, there is no doubt that the significant funding gap threatens to jeopardize the country's response to climate change. Utilizing detailed information about current donors and funding patterns, this document aims to provide a strategy on how the Government of Sierra Leone can mobilize resources for activities planned to address climate change at the national and sub-national levels. The document, furthermore, seeks to improve processes for funds flow, provide information about distribution of funds and highlight the importance of improving capacity to deliver and absorb funding at country level, paying attention to under-funded climate change response priorities.

Due to the absence of a climate change policy, strategy and action plan, grant expenditure to address climate change in Sierra Leone has been ad-hoc and most of it has neither been channelled towards government priorities nor applied towards contributing to developing a holistic approach to strengthening climate change resilience. In addition, the grant aid has always been unpredictable, short-term, and volatile which restricts the ability of Government to make long-term plans. The GoSL may also not be in a position to impose harmonization, coordination and/or alignments with the multiple and fragmented sources of funding for climate change, which carries unpredictable risks and transaction costs.

It is for these foregoing reasons and to ensure that the proposed mitigation and adaptation strategies and actions are fully implemented that this resources mobilization strategy is developed. This strategy and the LECRDS and NCCAP cover the duration of 20 years, coinciding with the country's Vision 2030.

Resource mobilisation needs to be informed by the mainstreaming of climate change into the planning and decision-making of government, private sector, and civil society. This can be achieved by (a) creating an enabling environment whereby government, private sector and civil society collectively respond to the economic and social changes necessary for climate-resilient development and job creation, providing for the economic and social upliftment of communities, while minimising negative impacts in the future; (b) promoting the green economy as an effective means of contributing towards the climate change response, and securing resources to support climate change and green economy interventions; and (c) consolidating and extending existing initiatives towards a climate resilient economy.

4.3: RESOURCING THE SIERRA LEONE CLIMATE CHANGE FUND:

The emerging climate change response finance options include grants for research and development co-operation; commercial finance through debt and equity, concessionary finance,

risk insurance, specialised environmental funds, and new capital market innovations, such as green and climate bonds. These options may be extended by integrating financing for natural resources, such as payment for ecosystem goods and services. By necessity, the climate change finance framework needs to comprise a suite of measures to create and maintain a long-term funding framework for mitigation and adaptation actions and to trigger swift and urgent action towards climate resilient development. Importantly, while accessing funds is a crucial aspect of implementing the LECRDS and NCCAP of Sierra Leone, removing the barriers to and creating enablers for using these funds is as important and will need to be given focus.

It is recommended that resources should be mobilized both domestically and internationally. For this reason, the SLCF should be designed to have three (3) windows: (1) Domestic Climate Finance; (2) International (Bilateral and Multilateral) Climate Finance; and (3) Private and Market Climate Finance.

4.4: RESOURCING DOMESTIC CLIMATE FINANCE WINDOW (DCFW) OF THE SLCF

The Domestic Climate Finance Window (DCFW) should be resourced from about 10% of the National Income Tax and 10% of current and future domestic environment levies collected annually. The Sierra Leone Tax System is based on a self-assessment system and comprises domestic taxes and international taxes (direct taxes and indirect taxes). These taxes are administered by the Income Tax Department for all domestic taxes (direct taxes) and the Customs and Excise Department for all international taxes (indirect taxes). The Income Tax Department carries out its functions within the framework of the tax law known as the Income Tax Act. The Customs and Excise Department carries out its functions through offices located at major ports, airports, industries, and mining areas in the country as well as at international border ports and posts.

It is proposed in this Resource Mobilization Strategy that the funds in the DCFW should be managed based on the decision of EPA and be allocated to Local Authorities at the District/Chiefdom level in Sierra Leone.

Local government structure in Sierra Leone essentially consists of a system of 19 elected councils. The Local Government Act, 2004 largely subordinated the central government and Paramount Chiefs authority and powers to the supremacy of local councils for virtually all development activities in the relevant council localities³. As a participatory constitutional democracy, a legal basis thus exists within the constitutional framework for political checks and balances on the central government, in the allocation of funds and resources in a transparent manner with a concomitant responsibility by the local administrations to be held liable by their constituents for failures to “initiate, draw up and execute development plans for the locality”, as mandated for the Local Government Act. As clearly enshrined in Part V, section 20 (1) of the Local Government Act: *“A local council shall be the highest political authority in the locality*

³<http://sierraleone365.com/feature-stories/sierra-leone-local-council>

and shall have legislative and executive powers to be exercisedand shall be responsible, generally for promoting the development of the locality and the welfare of the people in the locality with the resources at its disposal and with such resources and capacity as it can mobilize from the central government and its agencies, national and international organizations and the private sector”.

4.5: RESOURCING THE INTERNATIONAL CLIMATE FINANCE WINDOW OF THE SLCF

It is proposed that the International Climate Finance Window (ICFW) of the Sierra Leone Climate Fund be resourced from Bilateral and Multilateral sources including the UNFCCC funds.

Examples of Bilateral and multilateral funds from which the SLCF can benefit include:

1. AFD French Development Agency
2. Australia AID (AUSAID)
3. Canadian International Development Agency (CIDA)
4. CCCFL China Climate Change Framework Loan (of EIB)
5. CCPL Climate Change Program Loan (of AFD and JICA)
6. DANIDA
7. DFID
8. European Investment Bank (EIB)
9. European Union Emission Trading Scheme
10. European Commission Global Climate Change Alliance
11. FGEF French Global Environment Facility (of AFD)
12. GEEREF Global Energy Efficiency and Renewable Energy Fund (advised by EIB)
13. German International Climate Initiative
14. Global Facility for Disaster Reduction and Recovery
15. International Climate Initiative (ICI)
16. Initiative for Climate and Environment Protection (IKLU of BMZ)
17. Japan Cool Earth Partnership
18. Japan Bank for International Cooperation (JBIC)
19. Japan International Cooperation Agency (JICA)
20. KfW Development Bank (Germany)
21. Nordic Climate Facility
22. NEFCO Carbon Fund
23. Nordic Environmental Development Fund (of NEFCO)
24. Nordic Development Fund (NDF)
25. PCF Prototype Carbon Fund (of World Bank and JICA)
26. Swedish International Development Agency (SIDA)
27. The European Investment Bank (EIB)
28. The German Development Bank (KfW)
29. The Japan International Cooperation Agency (JICA)

30. US Agency for International Development (USAID)
31. World Bank Climate Investment Funds
32. World Bank Pilot Program for Climate Resilience

The UNFCCC Funds that Sierra Leone can target in resourcing the SLCF include:

1. **Green Climate Fund (GCF)** which is intended to be the main fund for global climate change finance in the context of mobilizing USD 100 billion by 2020. The GCF was established by the COP at its sixteenth session by decision 1/CP.16, designed throughout 2011 by a Transitional Committee and launched at COP 17 through decision 3/CP.17.
2. **The UNFCCC Special Trust Funds** which include (a) the Special Trust Fund for the Core Administrative Budget of the UNFCCC (the "core budget"); (b) the Special Trust Fund for Facilitating Participation of Parties in the UNFCCC Process (the "participation fund"); (c) the Special Trust Fund for the Voluntary Supplementary Financing of the approved activities under the UNFCCC (the "trust fund for supplementary activities"); and (d) the Special Trust Fund for the Host Country Contribution to the UNFCCC (the "Bonn Fund").
3. **The UNFCCC Special funds** which include (a) the Special Climate Change Fund, (b) the LDC Fund and (c) the Adaptation Fund.

Sierra Leone will need to establish a coordinated strategy and operational capacity for accessing these Funds. For accessing the GCF and its Private Sector Facility, a National Designated Authority (NDA) is required and Sierra Leone needs to go through the GCF Readiness Programme which is open to all developing country parties of the UNFCCC. For accessing the CDM Adaptation Fund for mitigation, a Designated National Authority is required, and guidelines are available on what is expected. To access funding for technology, a Designated National Entity (DNE) is required and guidelines are available from the Climate Technology Centre and Network located at the UNEP Collaborating Centre in Denmark. It is also important to define institutional competence in measurable terms such as organisational mandate, staffing, resource budgets, information systems, pilot actions, even sectoral leadership and local champions.

4.6: PRIVATE AND MARKET CLIMATE FINANCE WINDOW (PMCFW).

The PMCFW can be resourced from funds mobilized from national and international private and business sector financiers and from funds accrued from carbon markets. Examples include (a) the Africa, Latin America and the Caribbean Fund (AFLAC); (b) the Africa Capitalization Fund, which invests in banks in Africa; (c) the *Green for Growth Fund* (GGF); (d) the Climate Catalyst Fund; (e) the Africa Climate Change Fund hosted by AfDB; (f) the EU's Emissions Trading Scheme; and (g) the World Bank's Community Development Carbon Fund (CDCF). All efforts should be made at the national level to put in place relevant structures and instruments to facilitate linkage and cooperation with the Private Sector Facility of the Green Climate Fund.

It is recommended that the management of affairs of the Private and Markets Climate Finance Window of SLCF must be in conformity with the management of SLCF itself. It is proposed that a Private Sector Working Group, to be led by the Sierra Leone Chamber of Commerce, should be setup to manage and direct the initial structuring and operations of the PMCFW and also design the financial instruments of Window. The instruments setup for the operations of the PMCFW must ensure transparency and consistency, with low transaction costs and at speeds that are consistent with private sector decision-making. Such instruments will facilitate the mobilization of private investment and capital. Membership of the Working Group must be balanced and should include the public and private sector entities and civil society. Such a balance in membership is required protect the public interest while enhancing innovation and leverage, greater cost and value consciousness, and speedier decision-making (Sierra, 2012). The Working Group and the structures will be accountable to SLCF. Emphasis must be placed on getting the PMCFW running quickly without compromising efficiency. The Window should be ready to receive and disburse funds at the same time that the overall SLCF becomes operational.

The leadership of the Private Sector Working Group by the Sierra Leone Chamber of Commerce is expected to bring private sector skills and experience in the activities of the Group and the operations of the Window. Risks in the operations of the Working Group may include conflicts of interest and lack of trust which can undermine the effectiveness of engagement. These risks can be managed through careful design and selection processes. Selection criteria and processes must be rigorous to ensure members are independent and selected on the basis of individual skills and experience, not by constituency. The selection criteria must also ensure that at least 50% of the membership is held by individuals who bring deep experience from markets and they have previous experience with companies or organizations which operate within the sub-region.

4.7: INTERNATIONAL COOPERATION

The LECRDS and the CCAP must contain a systematic “climate check” designed to ensure that cooperation between development partners and Sierra Leone contributes to climate protection and to improving the adaptation of Sierra Leone and her citizens to the effects of climate change. This is particularly true and important in the building and strengthening the capacity (see sub-section 3.6) of Sierra Leone so that the country and her citizens can largely take over ownership of the task of adapting to climate change, planning and implementing the most appropriate measures. This includes expanding climate research capacity, identification and adoption of most appropriate technologies relevant to climate change response strategies in Sierra Leone, and setting up the climate finance portfolio and most appropriate resource mobilisation strategies (see sub-section 3.3 and 3.4 above) required for implementation of this LECRDS and NCCAP.

Implementation of the LECRDS and NCCAP requires the creation and strengthening of the institutional capacity required for the enhancement of international cooperation. International cooperation is an important and necessary prerequisite for leveraging of inputs – investment, financial assistance, technical support, capacity building, etc – for the implementation of the LECRDS and NCCAP. Enhancing international cooperation, linking with international and regional programs, receiving international supports in terms of experience and technology

relating to climate change mitigation and adaptation in different areas of the economy will enhance implementation and monitoring and evaluation. International cooperation with bilateral governments and multilateral organizations and institutions are required in order to mobilize resources such as knowledge, experiences and funds for implementation of the LECRDS and NCCAP, promote international collaboration in scientific and technological activities, and effectively apply and transfer climate friendly technologies.

A good example is the close collaboration between the World Meteorological Organisation (WMO) of the United Nations and the National Meteorological Services around the world. The WMO has its own strategy for supporting adaptation measures. The Environment Protection Agency in close collaboration with the National Meteorological Agency will provide key information for the development of successful and sustainable adaptation measures. The Government of Sierra Leone will continue to make resources available to assist it in performing these tasks. Cooperation between the Government of Sierra Leone through the National Meteorological Agency will enable the provision of technical and technological expertise between the Government of Sierra Leone and Governments and Multilateral Organizations that are members of WMO and/or close collaborators of WMO.

4.8: CAPACITY BUILDING AND STRENGTHENING

The identification of capacity building needs for implementation the Climate Change Convention and its Kyoto Protocol is a continuous process and a recent assessment was conducted during the validation of the National Communication. Of highest priority are capacity constraints due to inadequate data and information; inadequate institutional capacity and skills for development of National Inventory of greenhouse gases; assessment of Mitigation of Greenhouse Gases; Vulnerability and Adaptation assessment; low level of scientific and technical/capacity for effective climate change management; and inadequate, weak and ineffective research bodies and programmes in the country. Of second order priority are capacity constraints related to lack of enabling environments for an effective climate change management; low level of means of implementation of adaptation measures; inadequate national policy- and decision-making processes for sustainable climate change management; and low national capacity for diagnosis of environmental problems. Other identified needs that are more of cross-cutting nature that need to be addressed on a continuous bases include public sensitization and awareness raising; citizen, community, media and private sector engagement; poor information management for planning and monitoring; poor networking between climate and climate change actors at the national and sub-national levels; inadequate access to climate and climate change implementation enablers such as finance, technologies and capacities; limited number of experts with climate change negotiation and project development skills and the need to integrate climate change risks and responses in national and sub-national programmes and projects and to mainstream climate change in national and sectoral policies. Some of these are discussed in the following sub-sections.

4.8.1: Capacity building and strengthening for gathering, processing, and providing and communicating meteorological and socio-economic data and information

All research endeavours and assessments rely on a body of data collected with the aid of specialized instrumentation. Basic data is gathered from a network of sensors monitoring changes in atmospheric, oceanographic and terrestrial variables over Sierra Leone's territorial jurisdiction. The efficient and sustainable management of climate change, environment and natural resources of Sierra Leone will benefit from the continuous availability of data and information relevant for decision making, planning and implementation of national programmes including the LECRDS and the NCCAP of Sierra Leone.

Capacity building for data gathering, processing and exchange of information is necessary and beneficial to all facets of life. Capacity building activities will include the rehabilitation and expansion of the data collection networks, provision of infrastructure and equipment for processing the data to provide relevant information, identification and development of data and information exchange strategies and infrastructure, identification of the most efficient and effective channels of communication and exchange of the data and information generated, and finally the institutionalization of monitoring and feedback mechanism on the accessibility to the data and information, the impacts of the data and information and means of enhancing the positive impacts.

4.8.2: Improving National GHG Inventories and Assessments of GHG Mitigation and Climate Change Adaptation Technologies

Compiling a national greenhouse gas (GHG) inventory requires a fairly lengthy and interconnected series of tasks, including collecting emission factors and activity data, selecting appropriate methods, estimating GHG emissions and removals, implementing uncertainty assessment and quality assurance/quality control procedures, reporting the results, and documenting and archiving all relevant data and procedures (Braatz, Barbara V. and Michiel Doorn, 2005). The greenhouse gas inventory process requires fundamental decisions about data and methods, the establishment of a network of contacts for accessing data and reviewing results and the design of a system for data management, quality assurance, quality control, documentation and archiving. The inventory process should be planned, operated and managed to ensure optimal quality and efficiency, given available resources.

The UN defines mitigation in the context of climate change, as a human intervention to reduce the sources or enhance the sinks of greenhouse gases.⁴ Mitigation measures include voluntary emission reduction efforts, project-level emission reduction efforts, reductions for regulatory compliance, and reductions for some form of credit. Assessment of greenhouse mitigation measures involves quantification of baseline, business-as-usual, types of emission reductions, project scope, lifecycle analysis, accuracy and reliability, additionality, and verification.

⁴<http://mra.org.mt/climate-change/mitigation-of-greenhouse-gas-emissions/>

Examples include using fossil fuels more efficiently for industrial processes or electricity generation, switching to renewable energy (solar energy or wind power), improving the insulation of buildings, and expanding forests and other “sinks” to remove greater amounts of carbon dioxide from the atmosphere.

The development and publishing of National Inventory and National Mitigation Reports, as part of the National Communications are strategic and logical approaches that are continuous and should be sustainable and institutionalized. Mitigation assessment reports must include the provision of transparency and enhancement of the understanding of underlying strengths and weaknesses, and detailed approaches and methods used in developing the quantification of the mitigation measures. The availability and sustenance of human and institutional capacity to undertake the process of inventory and mitigation reports development and publishing on a sustainable manner are critical but not easy to come by in a developing country such as Sierra Leone. Sierra Leone’s capacity to sustain the development of greenhouse gas inventory and mitigation assessment is severely hampered by a number of factors and these can only be lifted through capacity building and strengthening.

Building the human and institutional capacity of Sierra Leone to produce high-quality national GHG inventories on a sustainable basis would include the creation of a critical mass of experts qualified to estimate emissions on all IPCC source and sink categories. These experts would then use their expertise in the execution of IPCC methodologies to develop high quality, well-documented inventory, and a sustainable inventory management system. The capacity-building activities must be highly targeted, focusing on specific, measurable, and realistic outcomes with the ultimate goal of preparing a complete, transparent, accurate, consistent, and comparable national GHG inventory that provides a solid foundation for developing future national mitigation assessment data, projects, information and reports that are relevant for the review and revision of the LECRDS and NCCAP. Typical example of capacity building for greenhouse inventory development that would be useful for Sierra Leone is the US EPA (EPA/USAID, 2011) approach through:

1. **Institutional Arrangements for National Inventory Systems (IA)** where inventory teams are assisted in assessing and documenting the strengths and weaknesses of existing institutional arrangements for inventory development to ensure continuity and integrity of the inventory, institutionalization of the inventory process is promoted, and prioritization of future improvements is facilitated.
2. **Methods and Data Documentation (MDD)** where inventory teams are assisted in documenting and reporting the origin of methodologies, activity datasets, and emission factors used to estimate emissions or removals.
3. **Description of Quality Assurance and Quality Control Procedures (QA/QC)** where countries are guided through the establishment of a cost-effective QA/QC program to improve transparency, consistency, comparability, completeness, and confidence in national GHG inventories.
4. **Description of Archiving System (AS)** by which an archive system is established that allows estimates to be easily reproduced, safeguards against data and information loss are

provided, and the development of subsequent inventories by future inventory staff is facilitated.

5. **Key Category Analysis (KCA)** approach supports the identification of the sources and/or sinks that have the greatest contribution to national emissions, and thus should be the focus of improvement efforts.
6. **National Inventory Improvement Plan (NIIP)** development provides synthesis of findings and describes specific priorities for future capacity-building projects based on the needs identified in the first five steps, and facilitates continual inventory improvements.

4.8.3: Improving climate Vulnerability (impacts and adaptation) Assessment

Vulnerability to climate change is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability to climate change is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity. Vulnerability to climate change is determined by the sum of impacts of climate change and adaptive capacity. Assessments of impacts and adaptive capacity are scenario and model dependent both of which also require highly qualified and technically skilled human resources. The capacity of the National Climate Committee (NCC) of Sierra Leone needs to be built to undertake Vulnerability Assessment on sustainable basis.

Capacity building for sustained vulnerability assessment requires that the NCC receives adequate training and relevant tools for the development of socioeconomic and climate scenarios for better projections of the future climate of Sierra Leone and to serve as input into biophysical models for better climate change vulnerability (impacts and adaptation) assessments. The availability of socioeconomic observations also provides data for integrated, coupled, human/geophysical models at national and sub-nation levels. It is necessary to integrate demographic data with critical climate data and information using geographic information systems (GIS). Demographic data need to be processed in reference to the geography of climate hazards using the opportunities provided by the major advances in GIS infrastructure.

4.8.4: Engaging Extension Agents, Civil Society and the Media in partnerships

Generating weather, climate and climate change data, and developing information such as weather forecasts, advisories and warnings is the beginning of a process of providing climate services. These data and information provided by scientists and scientific organizations such as meteorologists at the National Meteorological Services are often too technical and scientific for the understanding of the most vulnerable communities at the grassroots level. The format and mode of communication of the information is also not helpful in decision making at the policy making level.

To alleviate this challenge, the Government of The Sierra Leone has been and must continue to embarked on a process to enhance climate change information dissemination and communication to end users by developing information and communication capacities at the NMS for packaging

and sharing weather forecasts and early warning messages in ways that capture the interest and attention of specific and targeted stakeholders and by using, in addition to the television, which is most popular media of information dissemination, other media to access a greater number of stakeholders.

Many channels and methods of mass communication that can be useful in reporting climate change warnings and advisories must be identified and should be employed in a sustained information, education and communication as well as advocacy and social marketing and mobilization venture. There is the need to employ the totality of all available channels in this effort.

The providers and users must be linked. The providers are scientists and technician who do not understand the language of the users. The majority of users are illiterate who do not understand the technical and scientific language of the providers. Partnerships with intermediaries between the providers and users must be developed and sustained to promote the effectiveness and efficiency of the provision of climate services. The Extension Agents from both the public and private sectors and civil society can serve as the most appropriate organ to link the providers and users of weather, climate and climate change information and warnings. Capacity building and training of these Agents throughout Sierra Leone will prove to be useful and will enhance the performance in sensitization of communities and the communication of forecasts and early warning information effectively.

The Non-formal education sector provides means of educating the less fortunate in obtaining formal western education through adult education and the translation of English text into local language. Most of the population in rural areas of Sierra Leone speak and communicate in the local languages. Partnership between the National Meteorological Services and the Non-formal Education Department of the Ministry of Education can provide a translation of the most common meteorological and weather terms in the leading local languages and the capacities of the local community to understand the weather forecasts and warnings provided in the media can be enhance through training media reporters and communities on the translated terms and their communication to the public. The involvement of the National Radio and Television Services and Community and FM radios will be beneficial.

SECTION V: MONITORING, REPORTING AND VERIFICATION OF THE IMPLEMENTATION OF THE LECRDS AND NCCAP

Monitoring, evaluation, reporting and verification will be critical activities of the implementation of this Sierra Leone LECRDS and NCCAP. These activities are expected to ensure that implementation actions of the strategies and projects identified in this document are effective. Activities under the LECRDS and the NCCAP put more emphasis on integration of climate change risks and responses into development frameworks and so go beyond the implementation

of the project activities. These activities should be able to influence and effectively contribute to the achievement of sectoral, national and regional development objectives and goals and also complement national efforts and on-going and planned initiatives by other bi-lateral and multilateral development partners.

The overarching objectives of the Monitoring and Evaluation (M&E) System will be to track the transition of Sierra Leone to a low carbon and climate resilient economy. This will include:

1. Provision of a clear picture of the various response measures included in climate change mitigation and adaptation areas;
2. Providing an assessment of the effectiveness of these response measures;
3. Applying a consistent approach to these assessments to allow for greater comparability;
4. Increasing co-ordination of climate change response measures;
5. Demonstrating impact of response measures to Government and development partners;
6. Increasing transparency on financial flows relating to climate responses; and
7. Increasing awareness of observed and projected climate impacts.

It will be necessary to develop and apply an integrated framework for measuring, monitoring, evaluating, verifying and reporting results of response (mitigation and adaptation) actions and the synergies between them. Effective implementation of the NCCAP is highly dependent on the internal “feedback” generated through monitoring, reporting and verification (MRV) processes. The framework must be able to assess the effectiveness of investment in mitigation and adaptation actions because the mobilization and continuation of financial and technological support are contingent on the effectiveness of the MRV framework. National, bilateral and multilateral financial partners and other providers of finance need the results of MRV systems to validate the effectiveness of funds they provide. Therefore, securing further financial support for the implementation of the NCCAP will be dependent on the successful establishment and implementation of a MRV framework.

Such an ideal MRV framework for Sierra Leone should:

1. Build on existing institutions and skills;
2. Take into account the planned climate change governance structures;
3. Provide guidance on the implementation of climate change response actions, whether in the form of policies, projects, programmes or investment ventures;
4. Help Sierra Leone fulfil her international reporting obligations;
5. Demonstrate Sierra Leone’s climate finance readiness; and
6. Provide a strong platform for attracting international climate finance flows from multilateral and bilateral development partners.

For effective and efficient monitoring, reporting and verification, criteria with quantitative and qualitative indicators disaggregated according to gender and covering various sectors and levels of the national economy need to be developed and utilized in the monitoring process. Particular attention should be paid to coverage of the activity whether it be at the grassroots level community, sub-national and/or national; agriculture, water resources, ecosystem, etc; local

level, middle-level and high-level decisions-makers and national policy-makers. The monitoring and evaluation criteria must also include the assessment of the impacts of the activity on the community and at the national levels such as change in knowledge and awareness on climate change, improvement in the livelihoods and influence on decision and policy making at the local and national levels.

Indicators to be developed for the MRV system should include for example institutional adaptive capacity indicators that provide measures of the effectiveness of national initiatives to build institutional adaptive capacity at the county level such as the number of Ministries and Departments, Civil Society Organizations, Youth and Women Groups, Media Agents, etc, that have received training for staff operating at district/county and national levels on the cost and benefits of adaptation to climate change. The indicators should also include vulnerability indicators that may be a mixture of process-based and outcome-based indicators and should measure the effectiveness of local and national level initiatives to reduce vulnerability at the national level. Such indicators include (a) number of people (disaggregated according to gender) permanently displaced by climate change induced floods due to storm surges and/or sea level rise; (b) percentage of roads and other relevant infrastructure maintained or rehabilitated; and (c) number of households that are in need of support such as pipe-borne water, food aid and shelter.

Win-win and/or synergistic indicators where mitigation and adaptation responses support each other or provide trade-offs and also enhance sustainable development should also be determined and applied. Typical win-win indicators are (a) ton of soil carbon per hectare in agricultural land targeted for conservation tillage practice; (b) improved human health from improvements in vehicle efficiencies and reduced air pollution and replacement of kerosene lamps with renewable lamps in the home; (c) food shortages and price rises for cereals caused by increased growth of biofuels; (d) improvements in passenger vehicle emissions resulting in lower mobility for the poor if cost passed onto consumer; and (e) the restoration of land in flood plains by planting trees, which helps to reduce impacts of floods, improve water quality, and lead to co-benefits such as restoring biodiversity and sequestering greenhouse gases.

SECTION VI: CONCLUSIONS AND RECOMMENDATIONS

The strategies and activities proposed in the LECRDS (section II) and the Climate Change Action Plan (section III) are intended to transition the economy of Sierra Leone to low emissions and enhance resilience of the economy and citizens to climate change. Together, the LECRDS and NCCAP set the framework for future strategies and actions to alleviate the adverse effects of climate change, to raise awareness within the local population about the challenges ahead and to establish Government's commitment to work in partnership with the wider community to achieve a more sustainable future for the country and her citizens.

As global greenhouse gas emissions are continuing unabated, climate change impacts are likely to intensify an already precarious situation into the future. If no action is taken to reduce or

minimize expected impacts from climate change, the costs to society and the economy will be immense. The Sierra Leone LECRDS therefore identifies the sectors that are most vulnerable to climate change impacts and proposes interventions to reduce or mitigate these impacts, while promoting a low-carbon economy and climate change-resilient production systems. In addition, the Strategy proposes the establishment of a dedicated climate change secretariat that will oversee its implementation.

Activities identified in the NCCAP require substantial additional and adequate financial resources for their implementation, and funding is therefore required from both domestic and international sources. Partnership must be forged and all stakeholders should mainstream climate proofing and climate change responsive activities in their programmes and projects.

While Sierra Leone stands to benefit immensely from the advanced technology of developed countries, efforts should be made to support local technology generation and application through institutional capacity building programmes. Consequently new and additional resources are needed to support Sierra Leone's research, development as well as strengthen academic institutions

Tracking and measuring progress towards low-emissions and climate resilient economy in Sierra Leone will not be easy because the links between the biophysical, economic and social relationships are not clearly understood. Ultimately, the objective would be to institute an ongoing process of policy monitoring and evaluation which could become a tool to increase collective knowledge about how policies contribute to green growth.

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