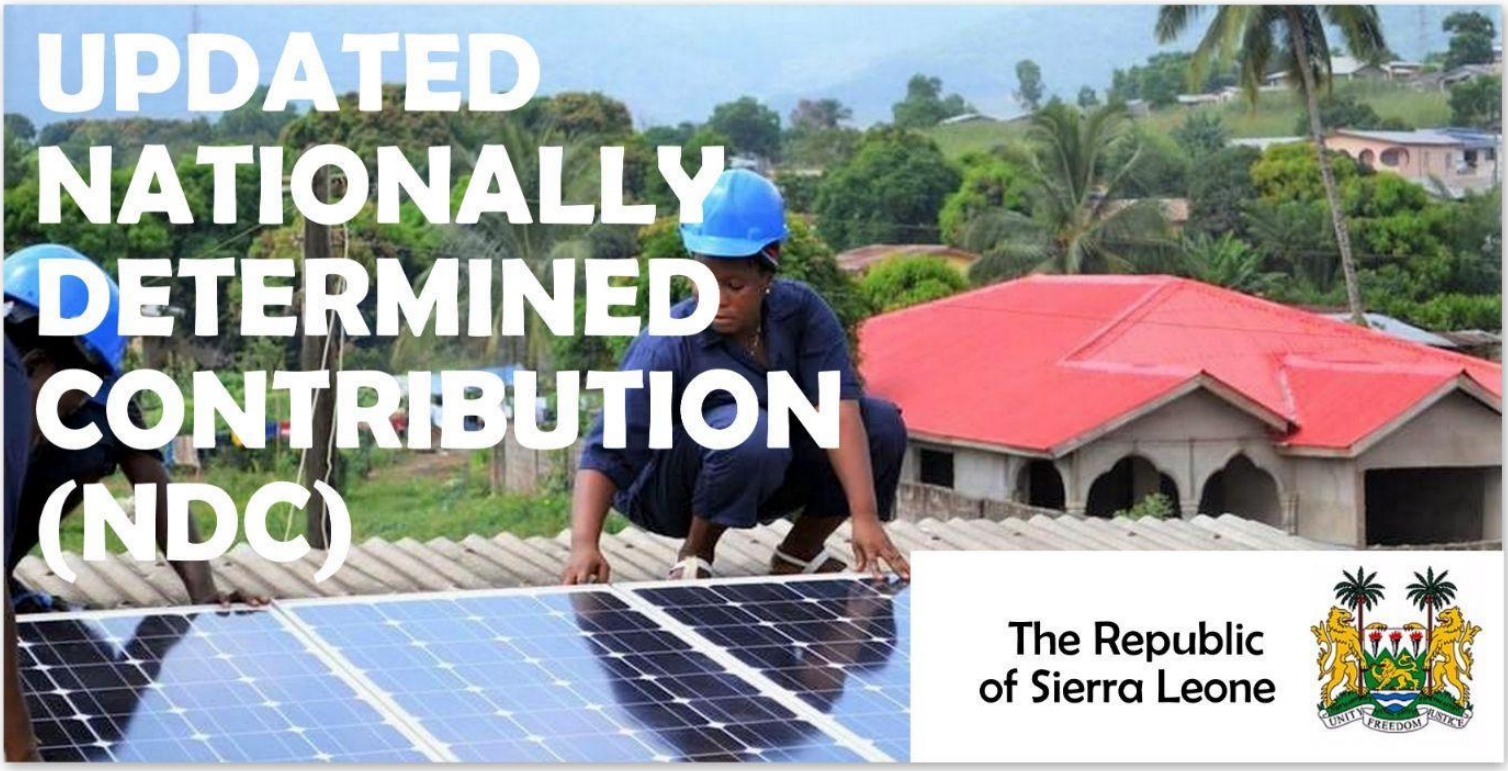
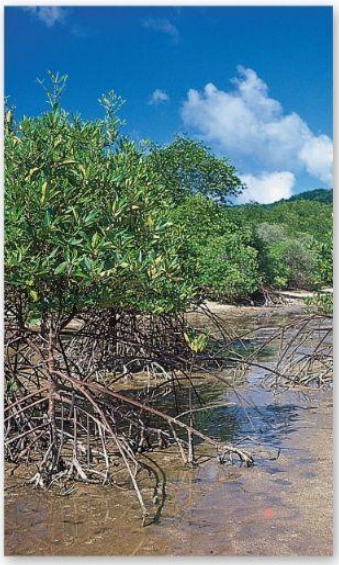
UPDATED NATIONALLY DETERMINED CONTRIBUTION (NDC)



The Republic of Sierra Leone





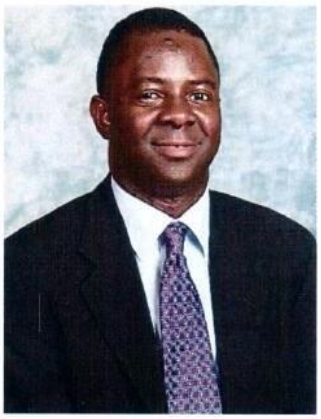






July 2021

FOREWORD



On behalf of the Government and people of the Republic of Sierra Leone, I am pleased to present the updated Nationally Determined Contribution (NDC) document, the cornerstone of Sierra Leone's climate change response, to the United Nations Framework Convention on Climate Change (UNFCCC).

Conscious of the threats posed by climate change to the development process, Sierra Leone remains committed to addressing climate change based on science, equity, and sustainable development. Like all other Parties to the UNFCCC and its Paris Agreement (PA), Sierra Leone is obliged to increase its climate ambition through necessary actions to fulfill its commitments in the updated Nationally Determined Contribution (NDC) achieve inclusive and sustainable development. This updated NDC is a road map and strategic document that will place Sierra Leone at parity with contemporaries of other parties in their quest to reduce greenhouse gas emissions (GHGs) to the global temperature rise well below two degrees centigrade above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees centigrade. The updated NDC serves as an instrument to guide the country's climate actions of the various mitigation and adaptation options in reducing GHG emissions and accompanying climate change challenges. Sierra Leone is, therefore, committed to keeping national greenhouse gas emissions within an accepted range to avoid dangerous climate change and actualize the global inspirational goal of achieving green growth and for Sierra Leone's transition to a low carbon climate resilient economy and society.

The updated NDC addresses priority sectors that are affected by the impacts of climate change, including energy, agriculture, and food security, forestry and other land-use, blue economy, water resources, fisheries, and coastal zone management, tourism, disaster management, gender and social inclusion, industry, infrastructure waste, loss, and damage.

It also contains sections on the means of implementation and the support requirements of Sierra Leone as a developing country, including the costs of priorities and actions outlined. Clearly, it defines the country's goal for accessing international support to meet adaptation and mitigation needs.

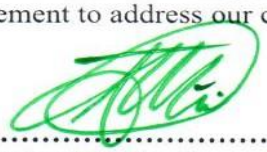
The Government of Sierra Leone has prepared this NDC document through the Environment Protection Agency and strong collaboration with the Sierra Leone Meteorological Agency, with a broad-based consultative process involving all key stakeholders across all sectors under the supervision of the Ministry of the Environment. I am happy to note, with appreciation, that the updated NDC document was developed based on stakeholders' needs and has given special consideration for vulnerable groups such as poor rural women, children, and youths.

The document is also consistent with Sierra Leone's Medium-Term National Development Plan (2019-2023) and the National Climate Change Strategy and Action Plan to provide opportunities

for accessing international climate finance to fund climate change programmes. The updated NDC document will serve a valuable purpose to the Government policymakers, development partners, universities, and other relevant stakeholders to make decisions on climate change issues. It will also help the government unlock new technology, new investment, and new green jobs as we meet our commitments to the Paris Agreement. The government of Sierra Leone has demonstrated commitment to establishing a Ministry of Environment in addressing environmental challenges and climate change.

It is my hope and firm belief to work with government ministries, departments and agencies, national relevant stakeholders, and development partners to actualize our climate ambition in the updated NDC and contribute to the global climate change effort.

I wish to take this opportunity to thank all those who contributed in diverse ways to produce such a brilliant national blueprint for climate resilience, GHG emissions reduction, and sink enhancement to address our climate change challenges.



.....

Prof. Foday Moriba Jaward, PhD
MINISTER
MINISTRY OF THE ENVIRONMENT
SIERRA LEONE
WEST AFRICA

ACKNOWLEDGE

The Environment Protection Agency, on behalf of the Government of Sierra Leone is grateful to the UNDP-Climate Promise, for their immense financial support to the process of review and update of the NDC document through the UNDP Sierra Leone country office. The Agency remain beholden to GCCA+WA and CILSS team for the peer review, data generation compilation support to the document. Special thanks to the Consultants, MDAs, Academic institutions, CSOs, NGOs, etc., who contributed in diverse way to this work. We thank the coordinating team for facilitating meetings, consultations and validation of the NDC document.

LIST OF ACRONYMS

AFOLU	Agriculture, Forestry, Land use and Others Land Use
AfDB	Africa Development Bank
BUR	Biennial Update Report
CCS	Climate Change Secretariat
CCSAP	Climate Change Strategy and Action Plan
CDM	Clean Development Mechanism
CILSS	Permanent Inter-State Committee for Drought Control in the Sahel
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CSO	Civil Society Organizations
EPA-SL	Environment Protection Agency Sierra Leons
GCCA+WA	Global Climate Change Alliance + West Africa
GESI	Gender empowerment and Social Inclusion
GoSL	Government of Sierra Leone
GMDSAP	Guidance Material for the Development of States' Action Plans
ICAO	International Civil Aviation Organisation
IFAD	International Funds for Agricultural Development
iNAP	initiate National Adaptation Plan
IPCC	Intergovernmental Panel on Climate Change
LECRDS	Low-Emission Climate-Resilience Development Strategies
MDA	Ministry, Department and Agency
MIA	Ministry of Internal Affairs
MIC	Ministry Information and Communication
MOD	Ministry of Defence
MOH	Ministry of Health and Sanitation
MOT	Ministry of Tourism
MRV	Monitoring, Reporting, and Verification
MBSE	Ministry of Basic and Secondary Education
MFMR	Ministry of Fishery and Marine Resources

MGCA	Ministry of Gender and Children's Affairs
MLCP	Ministry of Lands and Country Planning
MSW	Ministry of Social Welfare
MTI	Ministry of Trade and Industry
MTNDP	Medium-Term National Development Plan
MWR	Ministry of Water Resources
NARTGA	National Reforestation and Timber Governance Agency
NAP	National Adaptation Plan
NCP	National Climate Policy
NCCP	National Cancer Control Programme
NC3-SL	Third National Communication- Sierra Leone
NCCSAP	National Climate Change Strategy and Action Plan
NDC	Nationally Determined Contribution
NDP	National Development Plan
NEZ	National Exclusion Zone
NGO	Non-Governmental Organization
NMVOC	Non-Methane Volatile Organic Compounds
NWRMA	National Water Resources Management Agency
OCM	Office of the Chief Minister
PA	Paris Agreement
PPP	Private Public Partnership
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SDG	Sustainable Development Goals
SLCAA	Sierra Leone Civil Aviation Authority
SLMA	Sierra Leone Maritime Administration
SLMET	Sierra Leone Meteorological Agency
SLPA	Sierra Leone Airport Authority
SLS	Sierra Leone Statistics
SLCFF	The Sierra Leone Climate Finance Fund
SWG	Sector Working Group

SLMet	Sierra Leone Meteorological Agency
TW	Territorial Waters
UNCCD	United Nations Convention to combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change

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EXECUTIVE SUMMARY

The Paris Agreement (PA) seeks to limit the global temperature increase to under 2°C- and towards 1.5°C- above pre-industrial levels. This calls for a radical change across countries, reflected in commitments made in their Nationally Determined Contributions (NDCs). Such a call to action for climate change mitigation is particularly crucial for Sierra Leone in terms of adaptation, being ranked one of the least able countries to adapt to climate change in the world. The country is highly vulnerable to the adverse impacts of climate change, with a growing number of people at risk to extreme events, and significant impacts on the economy. This reality drives proposals made in the country's Medium-Term National Development Plan (MTNDP) in 2019, which both stresses the need for aligning environmental, climate, and economic development plans to stage proactive efforts to *mitigate* the causes of global warming and help vulnerable citizens in both rural and urban settings to effectively *adapt* to climate change over the long term.

Sierra Leone's NDC responds to Article 4, paragraph 2 of the PA, which requires parties to the UNFCCC to prepare, communicate and maintain successive NDCs that they intend to achieve. It also aligns with the MTNDP, AU Vision 2063, and Sustainable Development Goals (SDGs). These national and regional strategies lay a solid foundation for determining (i) opportunities for adaptation and mitigation, in terms of actions to prioritise; (ii) sectoral policies, plans, and strategies that align with NDC priorities; and (iii) institutional arrangements and organisational structures to strengthen for effective, efficient, and equitable climate action over the next ten years. Accordingly, the updated NDC is grounded in the country's development and sectoral policies, strategies, and frameworks. Such an alignment will improve results tracking, identification of potential implementation partners, and maximising local resources. Moreover, demonstrating linkages between the NDC and national and international plans and strategies helps to map where the resources and well-functioning institutions and processes already exist, including which actors at the national, subnational, and sectoral levels to involve in implementation, monitoring, verification, and reporting activities.

With climate risks and impacts affecting various sectors and population groups in different ways, differentiated, sector-based measures for both adaptation and mitigation have been proposed (as project and policy actions) to deal with current and emerging vulnerabilities, as well as contribute to the reduction of Greenhouse Gas (GHG) emissions. The measures build upon lessons learned and experiences gained from implementing actions in the previous NDC1 and working with international and local development partners on various environmental and climate actions. Development partners and national structures can implement these measures through their own strategies, policies, and operations, although current arrangements for coordination will be in full swing to ensure joint planning and shared action, which is critical to closing current gaps in data, finance, and project standards.

Accordingly, the NDC envisions to achieve long-term goals for mitigation: a reduction in CO2 emission levels to 5% by 2025, 10% by 2030, and 25% by 2050, with a transformational shift toward a low-emission development pathway, by targeting priority sectors, implementing REDD+ (Reducing Emissions from Deforestation and Forest Degradation) as well as promoting innovation and technology transfer for sustainable breakthroughs in energy, waste

management, transport, agriculture, etc. Technology transfer through private sector partnerships will create new markets, provide jobs, and support economic growth, while reducing GHG emissions.

In terms of adaptation, the objective drawn from the iNAP is to enhance adaptive capacity, strengthen resilience and reduce vulnerability by half by 2030. The NDC seeks to mainstream climate considerations into sustainable development strategies to build resilience at the local level while promoting environmental benefits in an integrated manner at the national level. Given the scope for action in the proposed action plans, the Government of Sierra Leone will push for actions that drive synergies at the national and subnational level. Such actions will typically focus on promoting policies and developing institutional links that drive both mitigation and adaptation, highlighting synergies in proposed actions at multiple scales (from local to global), mainstreaming climate considerations into broader development actions, and ensuring that the financing architecture addresses synergies between adaptation and mitigation.

In practice, NDC actions will roll-out broad-based measures covering all main emitters and vulnerabilities using a range of instruments, including financial and technological support. The actions have a total value of around USD 2,764 billion (including both conditional and unconditional contributions).

National contributions send a strong message about the current political commitment to climate action and demonstrate that NDC implementation will be domestically driven and owned-undertaken to strengthen national and subnational institutions and governance systems. At the same time, the Sierra Leone updated NDC measures reflect the growing local focus on merging top-down policy guidance with bottom-up planning, which is essential to a circular learning process that builds capacity for long-term support and commitment to implementation. Similarly, the long timeframes proposed promote long-range planning and allows for accessing long-term financing, which is critical to delivering large-scale results. Furthermore, institutions identified for implementation and the gender and social inclusion issues covered, lays a solid foundation for strategic partnerships and cross-level learning, and grounds measures in social justice.

Overall, the sectors prioritised for both mitigation and adaptation provide a pathway toward strengthening local knowledge systems and improving access to technical knowledge. Moreover, the sectors provide a means of expanding access to renewable energy by increasing access to renewable energy technologies and improving energy efficiency. Likewise, enhanced attention will be given to removing barriers to the adoption of low-carbon technologies in the transport, agriculture, and waste sectors, and limitations to the development and transfer of climate-resilient technologies. Similarly, proposed actions promise to encourage sustainable transport and urban development by shifting from traditional infrastructure to greener alternatives for urban mobility (such as mass transit systems), waste management, and fuel-efficient vehicles. Also, the NDC will enhance the commitment to managing land use, forests, as well as other land use changes to enhance carbon sequestration. These approaches will include targeted policy and institutional interventions that support implementation nationally and locally, including using innovative vehicles to meet financing needs, participatory methods for generating and disseminating knowledge, and deliberate actions to cultivate and foster partnerships.

1. INTRODUCTION

Sierra Leone submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC in September 2015, setting out its adaptation and mitigation goals. With the entry into force of the Paris Agreement in November 2016, the INDC became Sierra Leone's first Nationally Determined Contribution (NDC1). NDC1 was built upon the 2013 Green Growth and the country's National Climate Change Strategy and Action Plan (NCCSAP), as well as other key national policies and guiding documents.

Today's NDC updates and strengthens NDC1 for both the mitigation and adaptation contributions, informed by improved data collection, in-depth technical analysis and extensive stakeholder engagement. In the case of mitigation, detailed sector- and project-based modelling has been undertaken to now estimate the country's mitigation potential and develop quantified conditional and unconditional contributions until 2030.

Approaches used to gather information included organising workshops across the country to consult on various aspects of the document and working with consultants to deliver specific work packages. These methods and procedures for data collection, analysis, and integration are presented in the next section.

The document is divided into the following seven chapters.

Chapter 1 provides an overview of the document, focusing on the relevant articles of the Paris Agreement and defining national circumstances that underlines the actions proposed in the NDC. It also gives an overview of NDC1 actions and the achievements to date.

Chapter 2 describes the revision process, including documents reviewed, stakeholder consultations held, technical assessments are undertaken and validation of the current NDC.

Chapter 3 reviews the national circumstances, covering the geographic, climatic, economic, and sociological issues that rationalize the steps put forward in this document for addressing climate change risks, vulnerabilities, and impacts.

Chapter 4 presents the country's vision for climate change, the strategies and actions that it reflects and builds upon, including various adaptation plans, the LECRDS, the NFCS, climate change policies and strategies, and commitments made at various climate negotiations.

Chapter 5 presents contributions for mitigation, highlighting the main sources of emission, changes in emission levels since 2015, and actions for reducing emissions until 2030.

Chapter 6 examines previous proposals for adaptation to identify achievements and gaps and delineate next steps. New actions proposed reflect on past commitments, lessons learned from various adaptation interventions, and opportunities for innovation and policy change;

Chapter 7 brings the different strands of the document together by proposing strategies for implementation, including appropriate, sector-based, and gender-transformative plans for mobilising resources, meaningfully engaging the public to increase NDC visibility as well as community and policy learning, increasing social inclusion, influencing policy change, building capacity, and promoting monitoring, reporting, and verification. The chapter also describes the institutional arrangements and organisational structures for implementing the NDC.

2. NDC REVIEW PROCESS

Many reforms and developments took place since the submission of the INDC in 2015, which form an important basis for the revision of the NDC. These developments are presented in the table below.

Table 1: List of actions taken in line with the previous NDC1

Developments since 2015	Year	Value added to revised NDC
Establishment of an Environment Ministry	2019	Institutional framework established for improved coordination of bodies responsible for environmental management and climate change
Enactment of the Sierra Leone Meteorological Agency Act of 2017	2017	Capacity to collect meteorological data enhanced climate information and early warning
Transformation of the National Meteorological department to the Sierra Leone Meteorological Agency	2017	Allows for greater synergy and corporation with similar institutions and the WMO worldwide
Development of and validation of an initial National Adaptation Plan (NAP)	2021	Greater access to existing adaptation funds to enhance the longer-term building of the country's adaptive capacity
Development and adoption of the fourth generation Poverty Reduction Strategy Paper (PRSP), also known as the Medium-Term National Development Plan (2019-2023)	2019	Opportunity to align the NGC to this plan and implement resilience building projects
Establishment of a Renewable Energy Directorate in the Ministry of Energy	2021	Facilitation the switch to available renewable sources of energy.
Establishment of a National Water Resources Management Agency	2017	To enhance the capacity of the water sector to strengthen its adaptive capacity.
Establishment of a National Disaster Management Agency	2020	Timely intervention to respond to disasters in terms of preparedness and response to disasters including those related to extreme weather events.
Review of the Disaster Management Policy	2021	To update and bring in line with the NDC
Development of a capacity development plan for disaster management	2020	To strengthen the capacity to prepare and respond to disasters
Development of new acts for forestry, wetlands management, and conservation of wildlife	2021	To add value for the protection and conservation of carbon sinks.
Development of a National Framework for climate services	2020	Will enhance the delivery of climate services to strengthen adaptive capacities of crucial sectors.
Development of a national document for Land Degradation Neutrality target setting	2018	Will help to reduce anthropogenic activities that degrades the land.
Revision of National Climate Change Policy and a climate change communications strategy	2021	To guide the implementation of the revised NDC
Development of the third National Communications to UNFCCC	2017	To establish an incremental baseline and report on the country's emissions.
Development of a contingency plan for drought management	2018	To strengthen coordination for the effective management of drought and help improve land productivity.
Development of a Coastal Climate Change Adaptation Plan	2018	To respond to sea level rise and its effects.
Nationally Appropriate Mitigation Action	2020	A vehicle to implement mitigation measures
National Biodiversity Action Plan	2017	To enhance carbon sinks though conservation of biodiversity
Development of the Renewable Energy Policy	2016	To guide the transition to low emissions technology
Off-Grid Solar Energy Strategy	2020	Will enable access of the wider populace to cleaner and cheaper energy sources

Developments since 2015	Year	Value added to revised NDC
National Renewable Energy Action Plan	2016	To implement actions that are geared towards a low emissions development pathway
Development of the Energy Efficiency Policy	2015	Will facilitate technology transfer to cleaner energy sources

These developments provided insights for consultations held with sector experts in 2021 to determine costs for meeting conditional and unconditional targets for mitigation and adaptation until 2025 and 2030. The consultation process involved working with various stakeholders to review the progress made with implementing the INDC and identify gaps and actions for the future. The consultative workshops conducted in the different regions of the country, offered a format for bringing together stakeholders who are informed about or have a felt experience of climate change. Overall, the meetings and workshops held helped to problematize concerns about climate risks and propose pathways for adaptation and mitigation moving forward.

3. NATIONAL CIRCUMSTANCES

This section provides a brief overview of Sierra Leone's national circumstances, including the country's geography and polity, climate and climate change impacts, environment and natural resources, and social and economic characteristics.

3.1 Geography and polity

Sierra Leone is in the West of Africa and lies between latitudes 7 (6degree 55minute) and 10 (10degree 00minute) degrees North of the equator and longitude 10 (10-degree 14 minutes) and 13 (13-degree 17 minutes) degrees West of the Greenwich Meridian. It is bordered by Liberia to the southeast, Guinea to the northeast and the Atlantic Ocean to the West. The country is divided into four main physical regions, namely coastal plains, interior lowland plains, interior plateau, and hills and mountains.

Sierra Leone is subdivided into five Administrative Regions: Northwest, North, South, East and Western and into sixteen (16) districts (see map). The country is richly endowed with natural resources, including forests, wildlife, fisheries, land, and minerals. There are 50 protected areas according to the UNEP WDPA database (UNEP 2015).The country is also globally acclaimed for its wildlife, including 147 known species of wild mammals, 172 known breeding bird species, 67 known reptile species, 35 known amphibian species, 750 species of butterflies including the giant African swallowtail, one of the largest butterflies, and about 200 known species of fish. Fisheries and other coastal and marine resources include small pelagic fish, tuna, billfish, shrimps and demersal fish resources, as well as migratory birds, threatened manatees, seals, monks, marine mammals, sea turtles, porpoises, sawfish and crocodiles. At the same time, minerals such as diamonds, titanium bauxite, gold and rutile, and the recently uncovered iron ore were major contributors to the country's GDP growth between 2012 and 2015. Land is also widely available, although only 10 percent is cultivated for food crops such as rice, cassava, yams, and other root crops.



Figure 1: Administrative map of Sierra Leone (source: GoSL 2018)

The coastline, stretching 506km, is characterized by sandy beaches, cliffs, lagoons, estuaries, mudflats, creeks, bays, and mangrove swamps. It is located on the edge of the Atlantic Ocean and is made up of four distinct regions, also known as the Sierra Leone Coastal Landscape Complex (SLCLC): the Scarcies River Estuary (SRE), Sierra Leone River Estuary (SLRE), Bonthe-Sherbro River Estuary (BSRE), and Yawri Bay. The SRE hosts historically important localities such as Tombo, Tasso, Bunce Island, and the Queen Elizabeth II Quay (the largest natural harbour in West Africa). Generally, the SLCLC is characterised by sea mounts, large gulfs, offshore banks, shoals and islands, and upwelling. It also comprises the bays and estuaries of the Rokel, Great and Little Scarcies, Sherbro, Jong, Moa, Sewa, and Mano.

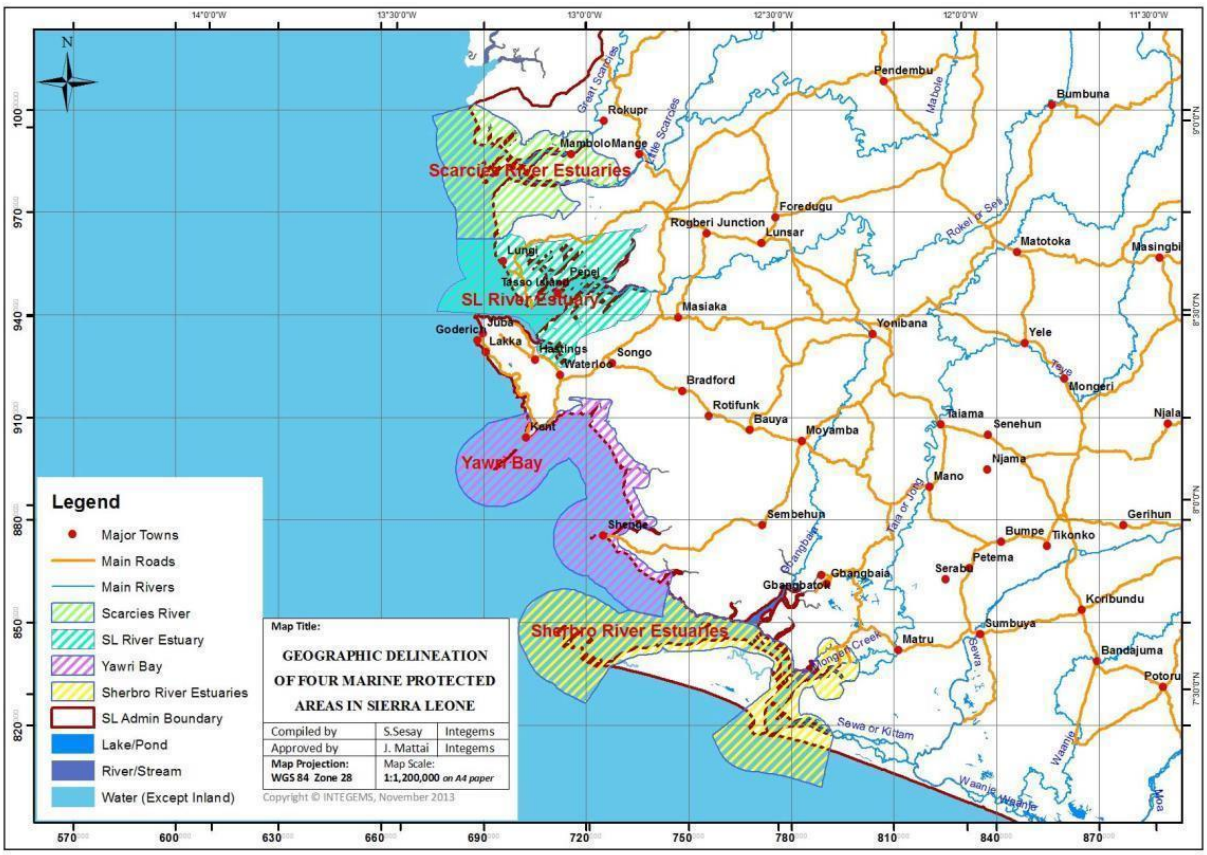


Figure 2: Regions of the SLCLC (source: WABiCC 2018)

The interior lowland plains, the largest of the four physical regions, extend from the coastal terraces in the west to the east of Sierra Leone, occupying approximately 43% of the total land area. They rise to elevations of 200m in the east where they are separated from the plateau by distinct escarpments. At the edge of the lowland plains is the interior plateau, which covers 22% of the total land area and is made up principally of granite. The plateau region seldom rises above 700m and is composed of alluvial ironstone gravel in the south-eastern region, while the northern end is composed of weathered outcrops of granitic rocks. The eastern and southern parts comprise dissected hills. In the north and east of the country are found two of the highest mountains. The highest peak on the Loma Mountains is Bintumani, which rises to 1945m while Sankan-Biriwa on the Tingi Hills, rises to 1805m. The Freetown peninsula is made up of dissected mountainous Peaks with Sugar Loaf and Picket Hills being the highest.

3.2 The local climate

Although the local climate can be classified as tropical monsoon, it could also be described as a transition between a permanent rainforest and a tropical savannah climate. The climate is characterized by two distinct seasons: the rainy season which runs from May to November, and a dry season from December to May. The average temperature is 26°C and varies from about 24°C to 28°C throughout the year. However, the daily maximum temperature can reach 35 °C while the daily minimum temperature is above 20 OC. The country's average annual temperature has increased by 0.8°C since 1960, an average rate of 0.18°C per decade (McSweeny et el 2010). Temperatures often remain below 30 °C (86 °F) during the day during the rainy season, and humidity makes the air quite stifling. Average annual rainfall ranges from 2300 mm to 3100 mm. Rainfall peaks from June to September when it exceeds the monthly average of 250 mm (10 in). It can often be torrential in coastal areas, especially in July and

August. Monthly climatologies of precipitation and mean temperature between 1991 and 2020 for the regions are provided in Figures 3. For each region, the seasonal cycle of temperature and precipitation is similar, but the distribution of monthly precipitation is location specific. The largest changes in precipitation occurred between July and August each year, with more precipitation recorded in the western province. At the same time, the greatest increase in temperature was observed between March and April, with the greatest increase occurring in the Northern Province (see fig.3 below).

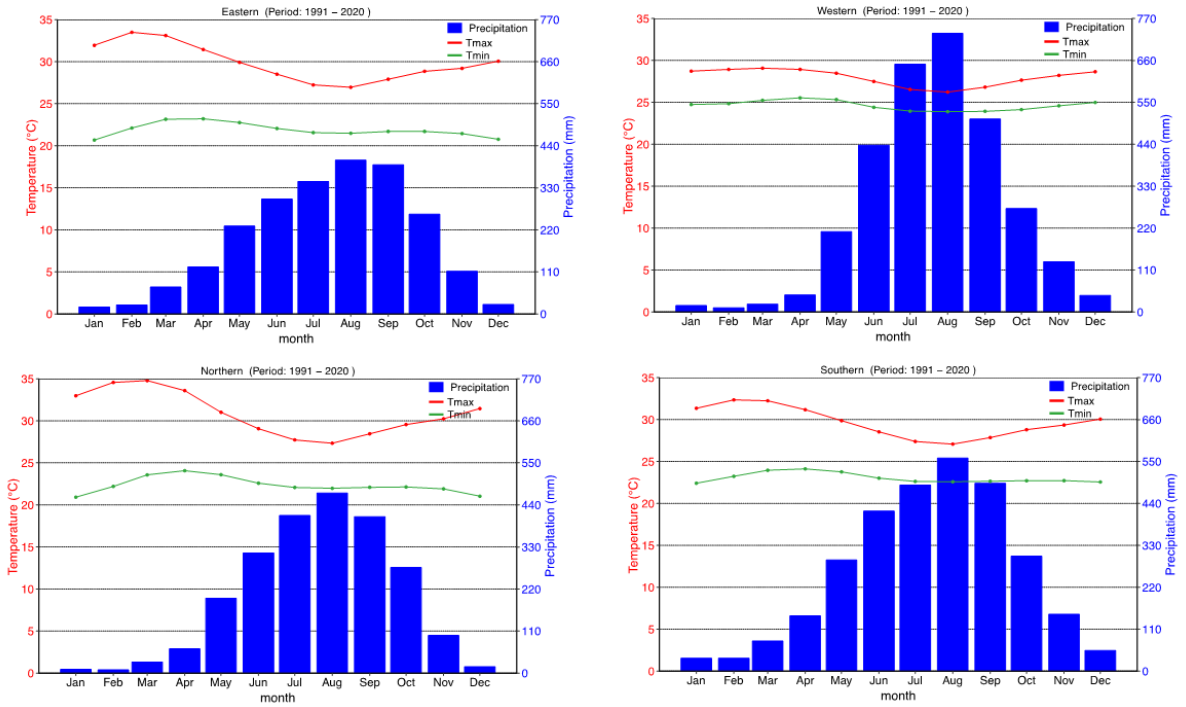


Figure 3: Monthly climatology of both precipitation and temperature (source: SLMet, 2021)

3.3 Current and future impacts of climate change

3.3.1 Agriculture and Food Security

Agriculture is an important livelihood, primary food source and large component of the economy. Current climatic conditions are ideal for the production of the primary crops: rice, sugar cane, banana, coconut, citrus, cocoa, pineapple, yam and cassava. With regional climate modelling projections demonstrating increased temperatures (approx. +1.7 °C for RCP4.5 and 2.3°C for RCP8.5) and rainfall changes from -5% to 5% with high variability, this is likely to change agriculture practices and production. For instance, rice being the staple food crop in Sierra Leone and being grown mainly in smallholder farming under rain-fed conditions, agriculture and farmers' livelihoods are especially vulnerable to changes in precipitation. This is compounded by the persistent rural poverty and farmers without insurance or the resources to invest in irrigation and other agricultural technologies. These climate impacts are also likely to increase water requirements for crops, competition for water resources, as well as incidence of pest and disease outbreaks.

Table 2: Projected precipitation and temperature changes in Sierra Leone

Country/Region	Scenarios							
	RCP 4.5				RCP 8.5			
	2021-2050		2051-2080		2021-2050		2051-2080	
	Mean	range	Mean	range	Mean	range	Mean	range
Precipitation	[-5% to 5%]	[-20% to 30%]	[-5% to 10%]	[-30% to 30%]	[-5% to 10%]	[-20% to 30%]	[0% to 10%]	[-20% to 40%]
Temperature	[1°C to 1.8°C]	[0.5°C to 2.5°C]	[1.5°C to 2.5°C]	[1°C to 3°C]	[1°C to 2.3°C]	0.5°C to 3°C]	[2°C to 3.5°C]	1°C to 14.5°C]

The extreme events are expected to increase in the future. For instance, RCMs projection for RCP4.5 and RPC8.5 has shown a significant positive trend of warm spell days and high rainfall events (Fig. 4). The increased occurrence of warm spells is going to increase crop water requirement and therefore play a key role in crop and livestock production by reducing water availability in water limited areas. With the expected increase of height rainfall event, which will potentially lead to flooding, rain fed agriculture is at risk of crop and livestock losses and could significantly affect food security.

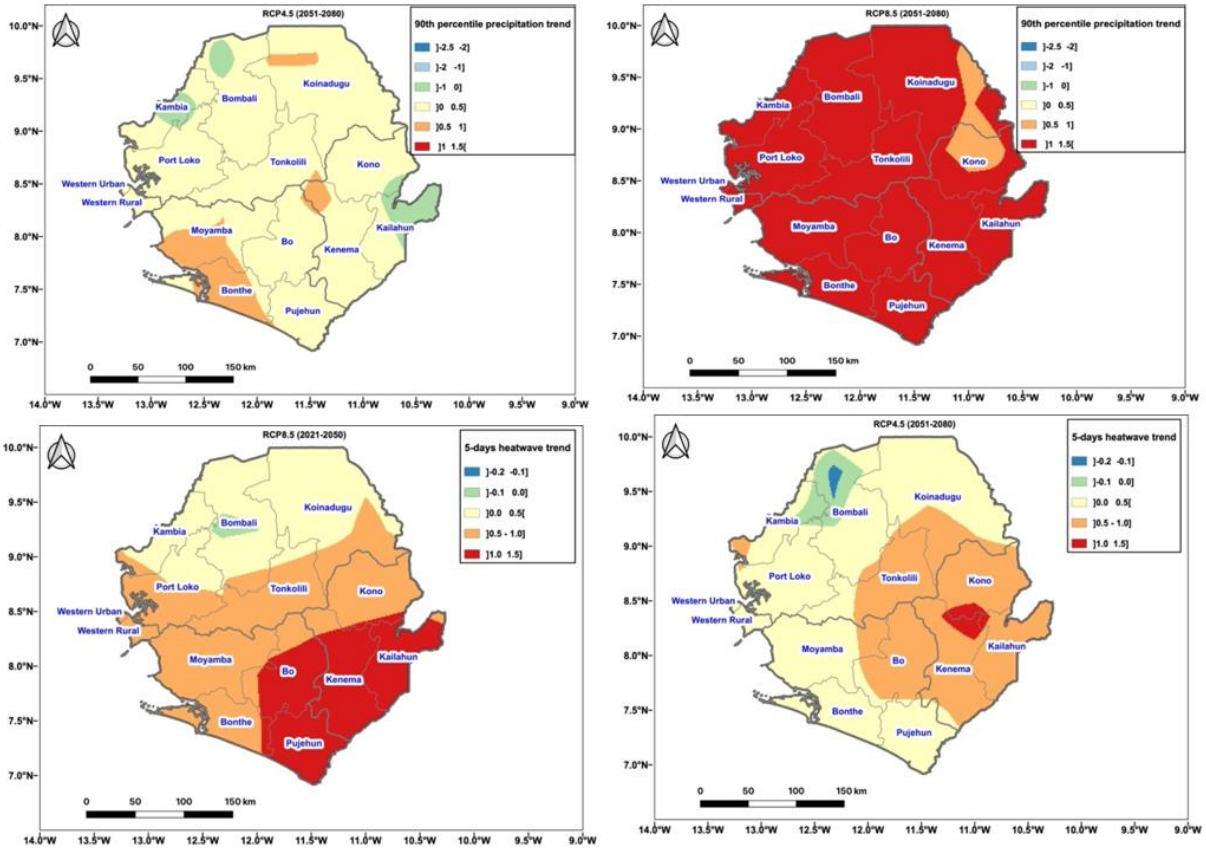


Figure 4: 90th percentile rainfall (top) and Warm spell day (bottom) trend in Sierra Leone

3.3.2 Water Resources and Energy

Water quality and availability are highly vulnerable to climate impacts. Major water uses include domestic (drinking, cooking, hygiene), agriculture (irrigation), industrial (beer, spirits, soft drink, cooling and waste disposal), and hydroelectric power production. Additionally, rural migration to Freetown, during and since the civil conflict has increased pressure on urban water resources. Reliable and clean access water is essential for these multiple uses and populations with implications for social vulnerability and poverty.

Shifting rainfall patterns has created water and energy supply problems (Fig. 5 and 6). This has led to decreasing access to water and reduced stream flow of rivers and streams, as well as

lower supply of energy to meet cooling, lighting, and heating needs. Stream flow has decreased as there has been a decrease in rainfall since the 1970s. For example, the stream flow to the Mano River fell by 30% between 1971 and 1989. This has large impacts on access to water since about 80% of the rural population receives water from surface sources, including many streams and ponds. These streams also dry up during severe droughts which are likely to become more common. There is also seasonal variation where 40% of the protected water points suffer water shortages in the dry season (USAID 2016), demonstrating that existing vulnerability is already acute.

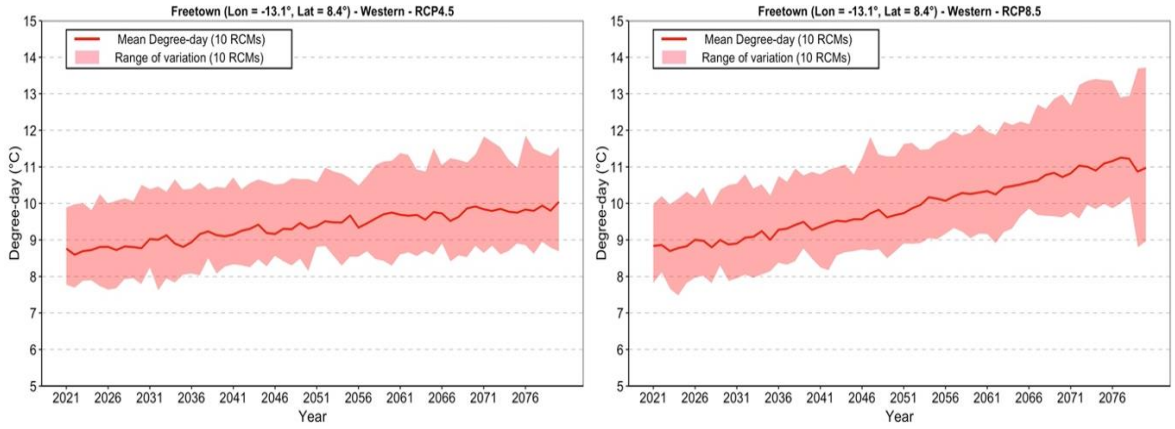


Figure 5: Change in cooling degree days in Sierra Leone -Freetown (SLMet, 2021)

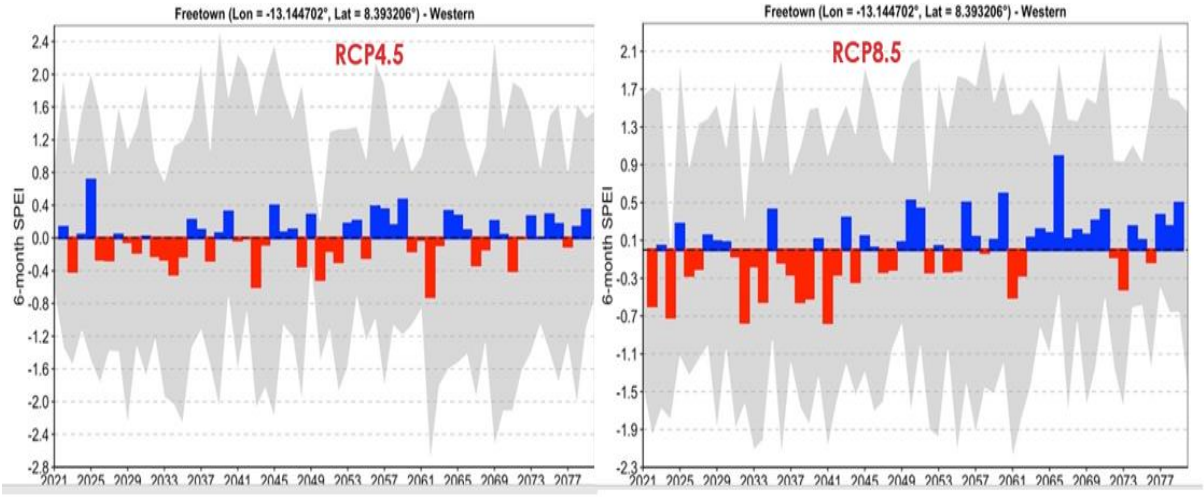


Figure 6: Potential for drought due to changes in water availability (SLMet, 2021). Drought (in red) and Wet (in blue) conditions in Sierra Leone for period 2021-2080

3.3.3 Fisheries and the coastal zone

Climate change is having impacts on coastal communities, fisheries, and coastal environments which are important ecosystems and support livelihoods including tourism. Decreasing river flows, rising salinity of estuaries, loss of fish and aquatic plant species and reduction in coastal sediments are likely to damage coastal economies and the food security for coastal and riverside populations. With sea level rise, loss of coastal ecosystems inundation from major rivers, flash floods during the rainy season and saline intrusions due to decreased low water flows in the dry season, there are increasing challenges to livelihoods. Coastal erosion is already a significant challenge in some coastal areas in Sierra Leone (such as Konakridee,

Lakka, Hamilton and Plantain Island) where the coastline is shifting by about 4 to 6 meters a year (WA BiCC 2019). Sea level rise has the effect of augmenting a decrease in the quality and quantity of ground water resources otherwise caused by human activities.

3.3.4 Infrastructure

Infrastructure in Sierra Leone is vulnerable to climate impacts across the country. This is especially true as the current infrastructure is non-existent or poor due to the war and deferred maintenance. Roads are the primary mode of transport with limited or non-existent rail. River transport systems are often impassable during the current rainy season. The coast, which will be impacted by sea level rise, beach erosion and coastal flooding, is densely populated and is an important economic centre with ports and tourist facilities. Coastal communities such as Kroobay, Moa Wharf lack flood escape routes due to the low elevation of roads. Other roads also flood during the rainy season. This makes it difficult for farmers to transport their agricultural goods. Additionally, as future infrastructure investment occurs construction materials and design should be climate sensitive and consider heat stress and flood risk.

Water and sanitation infrastructure are sensitive to storm surge, sea level rise and flooding. Already a large percentage of the population lack access to clean water and sanitation facilities. Wastewater collection and treatment facilities are often situated at the lowest point possible as their operation often depends on gravity flow and can easily be inundated by water level rise. Therefore, climate-sensitive innovative designs of sanitation infrastructure are critical in adapting to climate change.

3.3.5 Health

Sierra Leone has one of the highest malnutrition and child mortality rates in the world, making the country's population extremely vulnerable to climate shocks. Incidents of high temperature morbidity and mortality are projected to increase as the climate change projections revealed a significant positive trend in warm periods and a 5 to 10% increase in warm nights over the period 2021-2080 (Figure 4 and 7). Increased temperatures are also associated with increased episodes of diarrheal diseases, seafood poisoning, and increases in dangerous pollutants. Waterborne diseases are also expected to increase with more frequent and intense flooding. Currently the heavy rains have increased the likelihood of the outbreak of communicable diseases. More intense dry seasons (with increased temperatures) in the north and west have been linked to reduced water quality, warm spells, and disease outbreaks. Warmer seas contribute to toxic algae bloom and increased cases and food poisoning from consumption of shellfish and reef fish. The Ebola outbreak revealed a deficient health system, including understaffed, unavailable or unaffordable health care that will be further stressed by climate change impacts (USAID 2016).

3.3.6 Environment

Ecosystems will be severely impacted by climate change and existing development stressors. With increased storm surges, flash floods, and high winds, these conditions will be exacerbated by pollution, landslides, coastal erosion, deforestation, biodiversity loss, and invasive species which will further stress ecosystems. Land cover is expected to 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. This will change the flora and fauna of these areas. The major challenges of forest management include, amongst others, poor governance, weak law enforcement, lack

of coordination among sector ministries and illegal harvesting. Deforestation also increases both landslides and floods, by removing tree roots that stabilize the ground.

3.3.7 Disaster Management

Sierra Leone is vulnerable to the increasing severity of droughts, floods and severe storms and their impacts on sectors such as agriculture, fisheries, as well as infrastructure and hydroelectric power production. Urban and rural seasonal flooding, recurrent flash flooding, and coastal flooding are the most commonly observed, leading to seasonal flooding of agricultural fields and low-lying areas, flooding along the coast areas and flood waters overflowing into roads and into residents' homes. Vulnerable areas include Western Area, Eastern, Southern and Northern regions. More specifically, the most affected areas in the recent past during these last years include: Kroo Bay, Susan's Bay, Granville Brook, Lumley area in Western Area, Port Loko and Kambia Districts, the Newton catchment area, Pujehun and Bo areas, Kenema and Moyamba Districts, and coastal beaches of the Western Area Peninsula (Government of Sierra Leone 2018). There are also transboundary issues as heavy rainfall in neighbouring countries may cause floods in Sierra Leone due to the overflowing of three rivers: Great Scarcies and Little Scarcies rivers from Guinea and Mano from Liberia (World Bank 2017). There are also cascading impacts from flooding. Many communities in Sierra Leone, especially the rural poor, depend on streams and swamps, which dry up during severe droughts. Floods overwhelm existing systems, contaminating drinking water and creating sewage overflows.

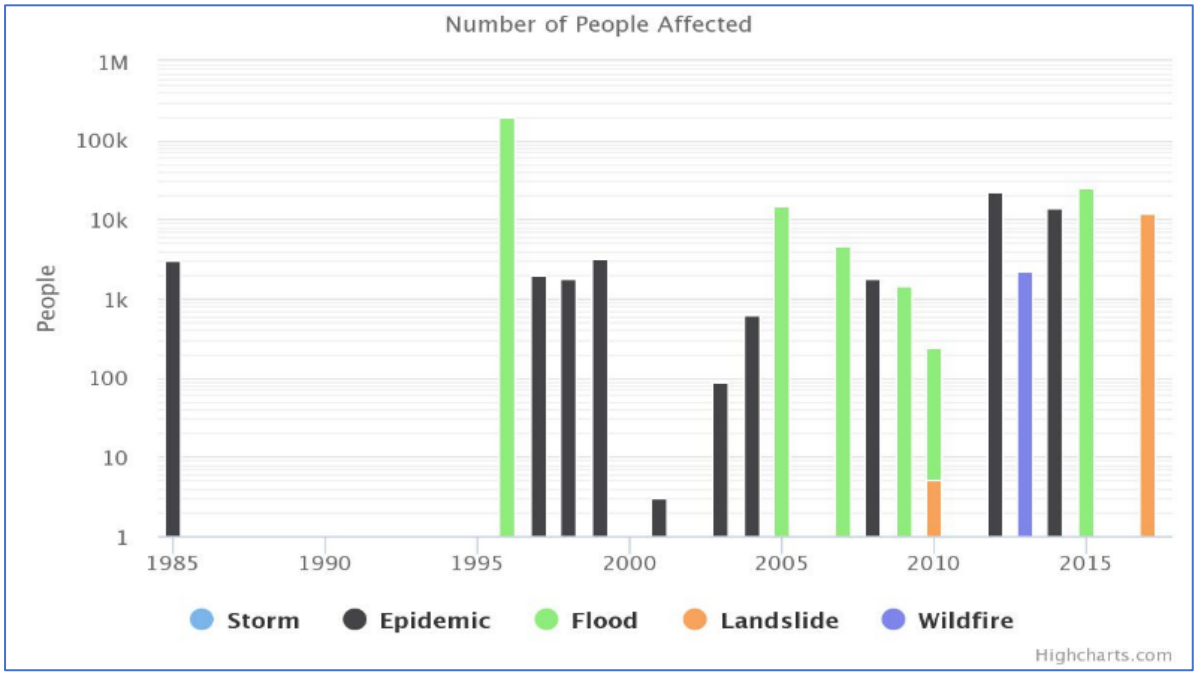


Figure 7: Key national hazard statistics for 1985-2018 (World Bank 2021)

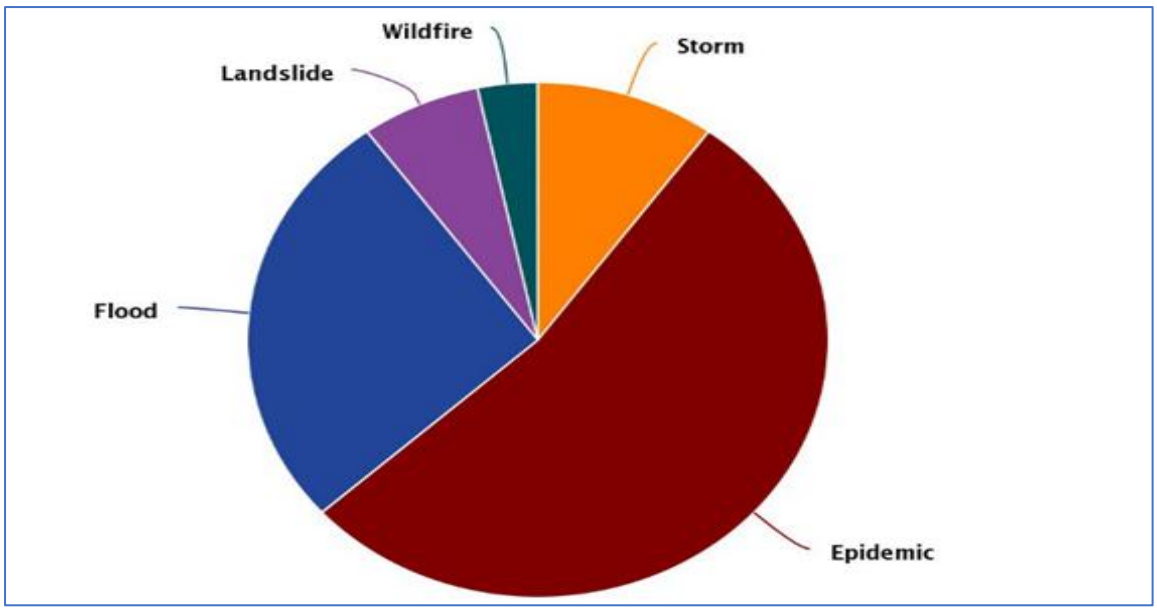


Figure 8: Annual natural hazard occurrence for 1900-2018 (World Bank 2021)

3.3.8 Environment and Natural Resources

The key natural resources in Sierra Leone include land, water, forests, fisheries, wildlife, and minerals.

3.3.8.1 Land

The land cover is approximately 72,300 sq. km, 74% of which is cultivable. The upland areas, which represent 80% of all arable land, have low fertility but are suitable for cultivating a wide variety of food and cash crops. The lowlands, which make up the rest of the arable land area, are more fertile and are suitable for high productivity under sustainable management conditions. These comprise 690,000ha of inland valley swamps, 145,000ha of bolilands, 130,000ha of grassland, and 20,000ha of mangrove swamps (Sannoh 2015 cited in Martiny, Massaquoi, and Blackwell 2021). A 2017 UNCCD-funded research on three land-based indicators- land cover, land productivity, and soil organic carbon- shows that between 2000 and 2015, there was an increase in forestland conversion to cropland and an overall reduction in tree-cover by 26.9% and water bodies by 0.7% (see fig. 13 adapted from Massaquoi 2018). This explains the increase in degraded land

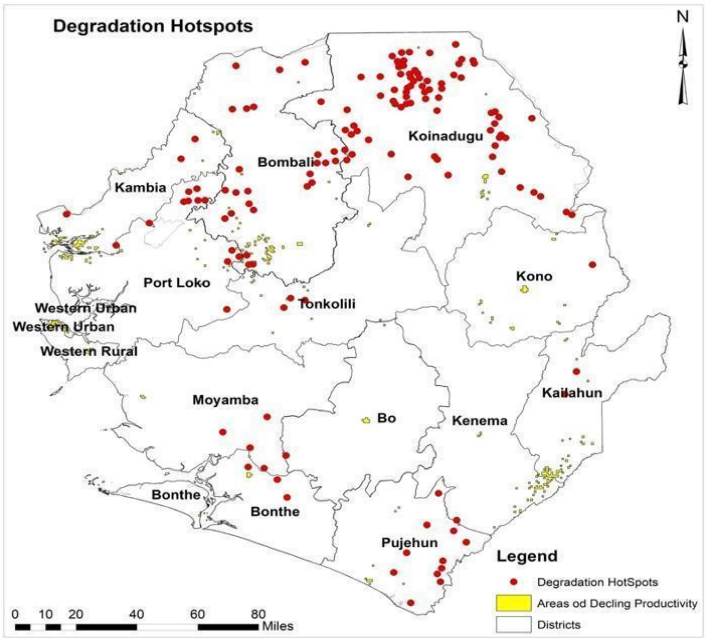
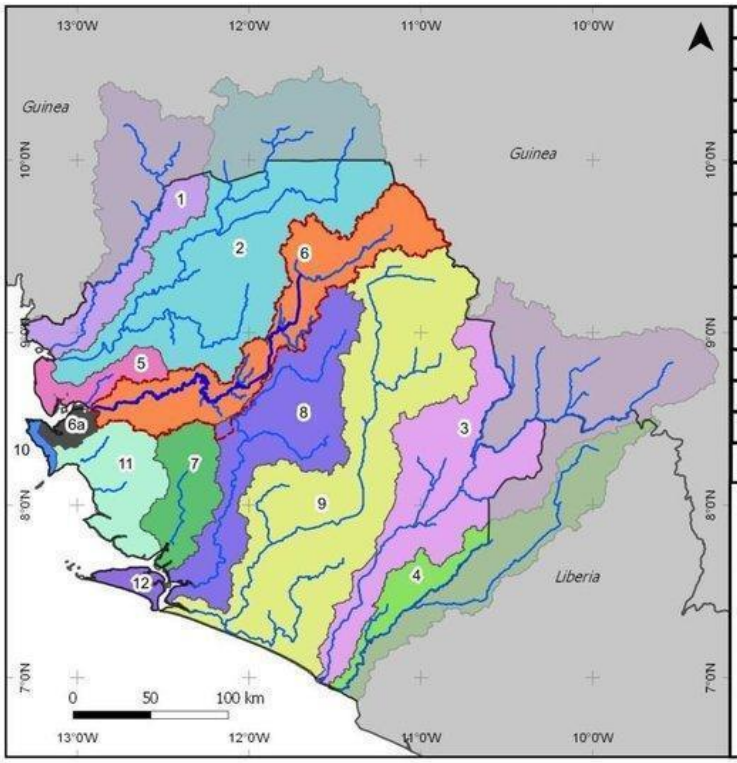


Figure 9: LDN hotspots (source: GoSL, 2018)

areas across the country, now identified and mapped as hotspots by the UNCCD target setting report (see fig. 14 adapted GoSL 2018).

3.3.8.2 Water

Water resources include atmospheric (treated under the Climate sub-section above), surface and groundwater. 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 Moa Rivers originate from the Fouta Djallon 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 km^2 for the coastal streams and creeks, to 14,140 km^2 for the Sewa River. The total mean annual runoff from the river basins is of the order of 160 km^3, with monthly runoff following rainfall variability. Internally, renewable water resources are over 29,000 km^3 per capita, which is six times the average for Africa. Produced groundwater is estimated at 50 km^3 annually and much of this (80%) overlaps between surface and ground water.



Basin	Name	Country Area	Total Area
B 1	Great Scarcies Basin	2979	8303
B 2	Little Scarcies Basin	13383	18955
B 3	Moa Basin	9583	19835
B 4	Mano Basin	1959	7776
B 5	Lokko Basin	1565	1565
B 6	Rokel Basin	8236	8236
B 6a	Rokel Estuary (South)	579	579
B 7	Gbangbaia Basin	3121	3121
B 8	Jong Basin	8288	8288
B 9	Sewa Basin	19022	19022
B 10	Western WRA	223	223
B 11	Ribbi/Thauka WRA	3670	3670
B 12	Sherbro WRA	612	612
	Totals	**73220**	**100185**

Notes:
* Source HydroSHED catchment boundaries http://hydrosheds.cr.usgs.gov/index.php
* Rokel basin area has been modified after manually digitising the Rokel boundary (Red line)
* All areas are in square kilometres
* WRA - Water Resources Area
* "Country Area" is basin area inside Sierra Leone
* "Total Area" is total basin area
* Basin 6a is part of the Rokel River management area shown in GOSL documents. It is subdivided here for clarity

Figure 10: River basins of Sierra Leone (Sources: reproduced with permission from the Ministry of Water Resources/ASI (2015))

3.3.8.3 Forests

An estimated 39% of Sierra Leone is forested with twenty-two percent of the forests in50 forest reserves and conservation areas (UNEP, 2015); 1% is on chiefdom land but managed by the Forest Division; and 23% are within a wetland and marine ecosystem protected areas (ARD 2010). The 50 forest reserves are under the custody of the State 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 2017, Sierra Leone revised its

National Biodiversity Strategy and Action Plan (NBSAP) to assess the status of biodiversity, including forest resources, and propose action plans for sustainable management.

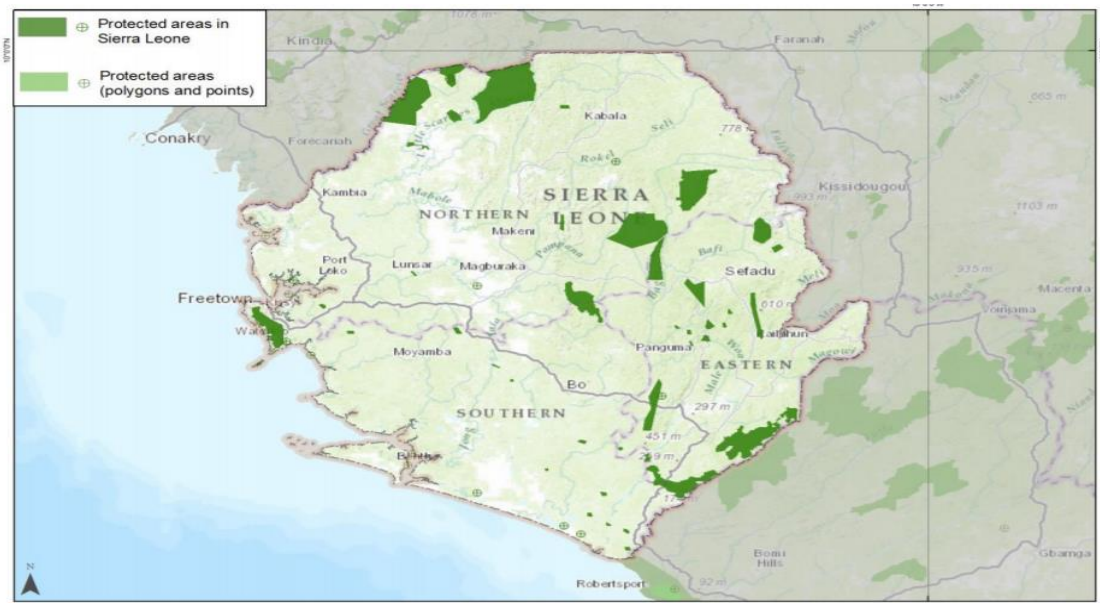


Figure 11: Protected and conservation areas of Sierra Leone (UNEP 2015)

Analysis of the land use data by CILSS highlights the most significant land cover changes in Sierra Leone, including the loss of woodland and forest areas across the country. The primary forest losses occurred in Tonkolili, Kono, and Koinadugu districts. Sierra Leone has lost over 34% of its forests between 1975 and 2018. This forest degradation is most noticeable in the eastern region. Most of the forested areas have been degraded to savannahs and agricultural land. The expansion of cultivated land, slash-and-burn agriculture and logging have been the dominant factors explaining forest loss. As for agricultural areas, they have increased by 76.57% between 1975 and 2018 with a strong expansion from 2000 (Fig.10).

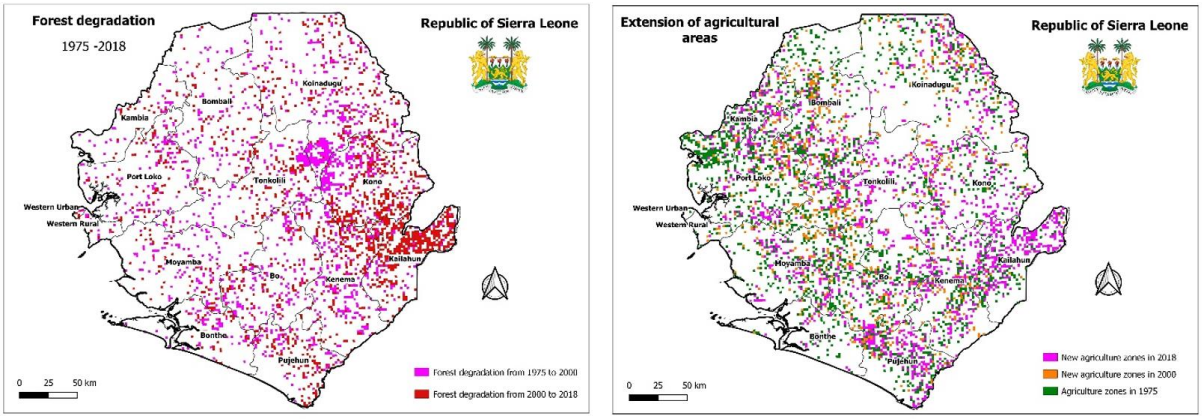


Figure 12: Expansion of the forest degradation (left) and agricultural land (right)

3.3.8.4 Fisheries

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.

3.3.8.5 Wildlife

Furthermore, there are approximately 147 known species of wild mammals, 172 known breeding bird species, 67 known reptile species, 35 known amphibian species, 750 species of butterflies including the giant African swallowtail, one of the largest butterflies, and about 200 known species of fish. In 2010, more than 5500 Chimpanzees were found, double the number previously thought to live in the country. This is the second largest population of the endangered subspecies of western chimpanzee, after Guinea, with the largest density in the Loma area, 2.69 individuals per sq. km, and the Outamba-Kilimi, with 1.21 individuals per sq. km. Several species of whales and the African manatee can also be found in the country, along with 630 known species of birds, ten of which are considered endangered, including the rufous fishing-owl and the Gola malimbe. There are 67 known species of reptiles, three of which are endangered: the Nile crocodile, the slender-snouted crocodile which lives in forest streams, and the dwarf crocodile found in mangrove swamps. All the species of sea turtles can be found in the waters of Sierra Leone and both the green turtle and leatherback turtle routinely nest on the Sherbro and Turtle Islands These species are under some form of protection in coastal and terrestrial ecosystems by the Government of Sierra Leone (based on review in Martiny, Massaquoi, and Blackwell 2021).

3.4 Socio-economic characteristics

Sierra Leone has had an unstable modern history marked by a civil war from 1991-2002 and the two-year Ebola crisis (2014-2016). These events and political instability have led to severe socio-economic repercussions and contributed to the underlying vulnerabilities which persists today. The country is one of the poorest countries in sub-Saharan Africa and globally, with a GDP per capita of US$499 in 2017. It ranked 182 out of 188 countries on the United Nations 2020 Human Development Index, below the average for countries with similar GDP per capita (UNDP 2020a). The overall poverty rate in Sierra Leone is 57 percent, with 10.8 percent of the population living in extreme poverty (Government of Sierra Leone 2019). The Comprehensive Food Security and Vulnerability Analysis (CFSVA 2015- MAFFS/WFP/FAO) reported that 49% (3,475,135.37) of people in Sierra Leone are food insecure, of which the majority are poor smallholder farmers that are living in the rural areas of the country (Government of Sierra Leone 2018).

The population is around 7.4 million (2018). The population growth rate has increased rapidly from 1.8 percent between 1985 and 2004 to 3.2 percent between 2004 and 2015. This has led to a 40 percent increase from about 5 million in 2004 to more than 7 million today. At the current rate, the population will reach 10 million people by 2026 (Government of Sierra Leone 2019). Forty percent of Sierra Leone's population are youth. There is high unemployment among low and semi-skilled youth most of whom were unable to complete their education due to the civil war. These challenges have been exacerbated by two recent economic shocks, the Ebola epidemic and the collapse of iron ore commodity prices, which lead to shrinking GDP growth. Since then, economic growth has fluctuated. Real GDP growth was weak in 2018 at

3.5% but improved slightly to an estimated 5.0% in 2019, driven by agriculture and services, and in the first half of 2019 by extractives (African Development Bank 2019).

Sierra Leone is especially vulnerable to external shocks. The country does not have any control over the price of its major imported goods, such as rice and fuel, which account for over 50 percent of total import value. Additionally, its dependence on primary commodity exports makes it more vulnerable. The African Development Bank projects that international iron ore prices will drop from $77.70 per dry metric ton in 2019 to $72.40 in 2022, which is more evidence for the need for economic diversification away from extractive industries (African Development Bank 2019). Covid-19 has added additional shocks and GDP growth is expected to fall to 1.7%. This is primarily due to the decline in commodity prices and depressed trade, FDI inflows, tourism revenue following travel restrictions and declines in remittances. An analysis by the African Development Bank projects inflation to reach between 15.3% and 17% (African Development Bank Group 2020).

Agriculture plays a crucial role in ensuring food security, poverty reduction and improving public health. Agriculture employs more than half of the country's formal and informal workforce and accounts for about half of GDP and is a women dominated sector (Government of Sierra Leone 2019). Although 75 percent of its land is arable, only about 10 percent is cultivated, mainly for food crops such as rice, cassava, yams, and other root crops (Government of Sierra Leone 2018). Farmers, however, have limited access to improved varieties of seeds, equipment and fertilizers. Additionally, farming is mostly rainfed, making it more vulnerable to climate impacts (Government of Sierra Leone 2018). Fisheries activities currently contribute about 10% of GDP, is a primary livelihood for 500,000 people and a main source of animal protein for over 80% of the population. Additionally, fish processing and marketing is a sector led primarily by women, similar to agriculture, making women's work more climate sensitive (Government of Sierra Leone 2018).

3.5 Urbanization and infrastructure

Sierra Leone ranked 46 out of 54 countries on the bank's Africa Infrastructure Development Index in 2020 (AfDB 2020). This points to the significant infrastructure investment needed across all sectors including water and sanitation, health, energy, transport, and ICT. The poor infrastructural landscape in Sierra Leone has had a tremendously negative impact on economic diversification, health and livelihoods. Infrastructure is a centrepiece of the Medium-Term Development Plan and key to Sierra Leone's long-term development goals of becoming a middle-income country.
Access to affordable and reliable electricity is essential for human development. Currently, this is severely limited in the country. Biomass from wood and charcoal is the source of energy for 80% of the population with related significant environmental and public health impacts such as deforestation and respiratory illnesses. As Sierra Leone addresses its climate goals in an integrated way, renewable and reliable energy sources are an essential component.

Many of the major causes of death and disability in Sierra Leone can be traced to challenges with environmental health and sanitation. Most of the country's population obtain water from unsafe open water sources and waterborne diseases are very common. There is also a dearth of sanitation facilities and almost 30% of the rural population practices open defecation. Sanitation is far below the reasonable SDG target of 66% for the country and the budget allocation for the sector is less than .02 percent of GDP (Government of Sierra Leone 2019).

Infrastructure issues are compounded as more people move into urban centres. In Sierra Leone, urbanization has been accelerating since the civil war. The share of the population living in urban areas almost doubled from 21% in 1967 to almost 40% in 2015, with a high concentration in the capital Freetown, which has grown to a population of more than 1 million. This growth is now rapidly increasing. From 2004 to 2015 the population has increased 43% from approximately 5 million to approximately 7 million (Statistics Sierra Leone 2016). Urbanization has not been accompanied by sufficient resources to plan and manage this fast growth and cities have lacked the financing to make the necessary investments to cope with the accelerated demand for infrastructure and services. This has climate risk implications as this can increase vulnerability for an already vulnerable population especially those in informal settlements or working in the informal sector.

3.6 Waste

Sierra Leone has a paradigm shift of increase in rural urban migration in search of better opportunities and basic social amenities. This increase has resulted in a significant increase in waste generation and high demand in public services including solid waste management services. The waste sector is branded by improper waste management. Urban expansion across the country has exacerbated the problems of waste, sanitation, and drain flows.

Freetown the capital of Sierra Leone has a population of around 1.2 million, and a waste generation per capita per day of 0.5 kg, at least 600 metric tons of waste could be generated per day or 219,000 metric ton of waste annually (Ngeba A. and Bertin, 2020). The increasing population in cities and towns in Sierra Leone is quite likely to increase the amount and diversity of wastes and subsequently the relative quantum of emissions of GHG from the sector, especially methane (CH_4) from dump sites, and carbon dioxide (CO2) and precursor gases (NOx, CO).

Wastewater treatment is a source of NO_2 or N_2O. Where significant industrial activity exists in a country, such a sector makes a significant contribution to the total nitrous-oxide emission. In the case of Sierra Leone, few industries or factories exist. The few industries in the country mostly in Freetown simply discharge 160 their wastewater into the general drainage system and this eventually runs down into the Sierra Leone River Estuary. This component of waste was therefore not regarded as a significant source of NO_2 or N_2O.

3.7 Gender and Social Inclusion Issues

Women are 51% of the population and suffer from gender inequality and discrimination. Sierra Leone historically stands in the bottom ten of the Gender Development Index (UNDP 2020b). Inequalities are apparent in terms of literacy rates, per capita GDP, access to land, and legal protection. Increased poverty among women in Sierra Leone results from a combination of factors, which include limited skills and knowledge; unfriendly market structures that concentrate women in lower paying and time-consuming work and restrict their access to capital and credit; traditional family structures perpetuating gender inequality through patriarchal norms of property ownership and inheritance; discrimination in the public domain; weak and unequal trade and economic patterns (USAID, 2019).

Over the past decade, the government has developed and enacted a range of national laws, policies, and strategies to address gender inequality. This included the passage of the three ‘gender justice’ laws’, which respectively address domestic violence, improve women’s access to land through inheritance, and strengthen women’s rights in marriage and divorce through a

registration process. Several government entities have also been established to support gender equality including the Ministry of Social Welfare, Gender and Children's Affairs; the Human Rights Commission; the Family Support Unit in the Sierra Leone Police; and the Legal Aid Board. This institutional development, however, has been insufficient. For example, women occupy less than 20 percent of elected positions although the Gender Equality and Women's Empowerment Bill, which establishes a minimum of 30 percent representation of women in governance at all levels. The Medium-Term Development Plan seeks to address this issue and includes empowering women as a key focus including to support implementation of current legislation.

4. SIERRA LEONE'S VISION FOR CLIMATE CHANGE

Sierra Leone recognises the importance and emergency of combating climate change, which poses a major global threat and a common concern of humankind, as rising temperatures increasingly result in severe, pervasive and irreversible negative impacts for people, economic activities, ecosystems and the regenerative capacity of the planet.

Sierra Leone is strongly committed to contribute to the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, in the light of its national circumstances.

As a least developing, very low emitting but also very vulnerable country, Sierra Leone's vision for fighting against climate change in the context of this revised first NDC is based on fairness, putting a strong emphasis on adaptation in order to protect its people, culture and environment while striving its best efforts to contribute to the mitigation of global emissions.

Sierra Leone's vision for adaptation is drawn from the iNAP, with the objective to enhance adaptive capacity, strengthen resilience and reduce vulnerability by half by 2030 through increased risk awareness, improvements in rule compliance, increased institutional capacity and an integrated approach to adaptation in development policy and programs across sectors and scales. The above visions support proposals in the National Climate Change Policy (NCCP), which was revised in early 2021.

It also expands on the goals set for adaptation in the iNAP, which include increasing resilience capacity at all scales; supporting an integrative approach to climate change adaptation programming and policymaking; allocating 10% of annual national budgets to climate change adaptation across sectors; harmonizing climate-relevant policies and regulations to improve coordination and cross-sector linkages; mainstreaming adaptation into local development plans by 2025; institutionalize NAP implementation through laws, policies, and regulations; establishing a National Trust Fund for channelling adaptation support across sectors; and securing 40% of international development funding to support adaptation priorities across different sectors.

These national goals contribute to achieving the Global Goal on adaptation by reducing vulnerability through integrating adaptation considerations into all relevant plans, policies, and strategies, and prioritizing and planning for adaptation. They also ensure that the adaptation component of the NDC becomes a strategic and ambitious vehicle for capturing, reporting and updating commitments and progress, as well as aligning long-term national development priorities with the SDG framework. Moreover, the goals contribute to improving the delivery of climate services as prescribed in the National Framework for Climate Services (NFCS). The NFCS will benefit a wide range of sectors and climate intervention areas, including biodiversity, health, energy, agriculture, human settlements, water etc. By implementing the NDC, key actors, including SLMet, can produce sector-specific products to enable informed decision-making in the context of the effective, efficient and equitable delivery of climate services.

Sierra Leone's vision on mitigation is drawn on the LECRDS, with the objective to achieve GHG emission reductions in priority sectors through well targeted programmes of activities and projects, including through the implementation of REDD+ (Reducing Emissions from

Deforestation and Forest Degradation) programmes, which can deliver significant mitigation and adaptation co-benefits in Sierra Leone.

Most importantly Sierra Leone's vision for fighting against climate change through the implementation of both mitigation and adaptation components of the revised NDC is embedded in the Medium-Term National Development Plan, specifically in its Clusters 2, 3, 5 and 7 which are aligned to it. Therefore, the revised NDC will contribute directly to meeting various climate and non-climate objectives at the national level in a consistent and well-coordinated manner.

Considering the nature and extent of Sierra Leone's climate impacts and low adaptive capacity, the commitments made in this NDC are fair and ambitious, and are based on conditions of equity, availability of finance, and the potential for achieving SDGs and other regional climate goals. The conditions are ambitious in relation to the global limit of 1.5°C and present a significant enhancement from the previous NDC1 by adding new sectors, strategies, and policies (enhanced mitigation and adaptation components). Overall, the measures are considered transparent as they are presented by sector and defined through extensive consultations with stakeholders at all levels and from different backgrounds.

4.1 Priority Sectors

The priority sectors for the NDC are identified based on an analysis of national priorities contained in various climate change documents, as well as prescriptions by the UNFCCC for NDC development. For mitigation, the priority sectors include energy; industrial processes and product use; waste; Agriculture, Forestry, and Other Land Uses (AFOLU); and the blue economy, while for adaptation, the priority sectors are Agriculture and Food Security, Water Resources and Energy, Coastal Zone Management (including fisheries, coastal ecosystems etc.), Environment (including tourism, land, mineral resources, forestry, etc.), Disaster management, Gender and Social Inclusion (focusing on youth, women, elderly, persons with disabilities), and hard and soft infrastructure (including for transportation, WASH, etc). Although mitigation and adaptation measures are handled separately in this document, due to differences in priorities for the measures and segregated planning and implementation policies at international and national levels, a few synergistic approaches for implementation are proposed based on the benefits they could bring at multiple scales and in multiple sectors.

4.1.1 Energy

Priorities for energy focus on reducing emissions from power plants and other energy fossil fuel-based sources. They are based on efforts in the sector to increase universal energy access through the deployment of renewable energy technologies and increased efficiency of energy sources. Generally, the sector could contribute immensely to emissions reduction through the implementation of the Integrated Resource Plan (IRP) developed by the MCCU and the offgrid solar energy strategy developed by the Foresign and Commonwealth Development Office (FCDO). Both documents complement actions in the sector to promote universal access to clean energy by 2030 and meet targets for emissions reduction by 2025.

4.1.2 Industrial process and product use

Priorities for industry focus on actions to reduce emissions from local industry and the use of various products. They are based on efforts across multiple public and private sectors to improve process and product use and enforce extended producer responsibility while reducing emissions that endanger air quality and engender persistent air pollution. The selection of

mitigation options for this sector is also based on national plans to implement the Kigali Amendment to the Montreal Protocol on substances that deplete the Ozone Layer, as well as Environmental Management Plans (EMP) adopted by various producers in compliance with the Environment Protection Agency Act of 2008 (Amended in 2010).

4.1.3 Waste

Priorities identified for waste management reflect efforts in various sectors to effectively manage waste from agricultural, healthcare, and other practices and sources. The priorities build upon national plans for managing animal waste, general solid waste, and other hazardous substances that endanger health and ecosystem vitality.

4.1.4 Agriculture. Forestry and Other Land Use (AFOLU) Sectors

AFOLU cuts across sectors that contribute to land use change and land cover change for various outcomes. It focuses on the carbon impacts of forest loss, mining, and traditional agricultural practices such as slash and burn and the use of pesticides and chemical fertilizers. It also focuses on the net carbon gain of large-scale agro-investment land leases across the country, such as monoculture oil palm and sugarcane plantations run by SOCFIN and Sunbird Energy respectively. Efforts to reclaim mined-out areas, or the general impacts of mining on forest carbon sequestration and soil carbon is also addressed.

4.1.5 Blue Economy

As a priority for climate change mitigation, the blue economy in Sierra Leone incorporates traditional maritime industries such as fisheries, tourism, mining, boat building, aquaculture systems, and carbon stored in mangrove and seagrass ecosystems. The fisheries sector for instance is a major source of jobs and a key driver of mangrove deforestation in coastal communities in Sierra Leone, which can have a major impact on the country's blue carbon stock. These analyses inform an understanding of the current change in the country's blue carbon stock, including losses or gains overtime in mangrove and seagrass resources.

4.1.6 Agriculture and Food Security

Agriculture and food security are prioritised for adaptation because climate change is already having a toll on agricultural food systems in the country, including exporters and importers as well as those at subsistence level. In the future, changes in mean rainfall and temperature as well as the increase in extreme events will affect agriculture and livestock practices. At the same time, many impacts, such as increased land degradation and soil erosion, changes in water availability, more frequent and more intense pest and disease outbreaks as well as disasters need to be addressed to reduce food security risks.

4.1.7 Water Resources and Energy

The water sector is prioritised for adaptation because future strategies will need to address many emerging trends driven by climate change. These include both demand and supply side concerns, including reduced availability, quality, and allocative efficiency. The energy sector is also a priority because the impacts of climate change will mostly affect the resource base of renewable energy sources through changes in water availability for hydropower, impacts on thermal power plants and energy infrastructure.

4.1.8 Coastal Zone Management (including fisheries, coastal ecosystems etc.),

The coastal zone and the resources they provide are priorities for adaptation because climate change will impact the health, function and productivity of coastal ecosystems, thus impacting the health and welfare of coastal communities and the people that depend on these natural resources. Climate change will have significant and immediate consequences for the country's coasts, the goods and services provided by coastal ecosystems, and coastal inhabitants. This includes accelerated coastal erosion and loss of land and property, flooding, saltwater intrusion, shifts in the distribution and abundance of valuable marine habitats, species and biodiversity, and the accelerated spread of exotic and invasive species.

4.1.9 Environment (including tourism, land, mineral resources, forestry, etc.)

Tourism is prioritised for adaptation to reduce the business risks of tourism companies and protect their natural capital (such as beaches, rainforests, and biodiversity) and ecosystem services (water supply, protection against floods, landslides, etc.). The land and forestry sectors also lie at the heart of ongoing efforts to protect ecosystem integrity and promote the livelihoods and resilience of the poor and vulnerable. The mining sector is also a priority because threats to the sector's profitability and viability, such as climate change, may have significant consequences for development in the country and undermine resilience in various communities.

4.1.10 Disaster management

Disaster risk reduction and climate change adaptation represent policy goals for the government of Sierra Leone, one concerned with an ongoing problem (disasters) and the other with an emerging issue (climate change). As these problems overlap a great deal through the common factor of weather and climate and the similar tools used to monitor, analyse and address adverse consequences, disaster management is prioritised in this NDC to allow for approaching the twin issues of climate change and disaster risk reduction in a systematic and integrated way.

4.1.11 Gender and Social Inclusion

Gender is a cross-cutting concern for adaptation planning because women and girls are subject to a disproportionate amount of risk from climate-related natural disasters. Risks during and following natural disasters are often higher for women, girls, and persons with disability due to social norms, breakdowns in law and order, and disrupted livelihoods. Women, girls and persons with disability also bear the brunt of risks and vulnerabilities brought on by droughts, floods, and other extreme weather events, which places them at the front lines of adaptation as important and necessary stakeholders in effective adaptation to climate change. The NDC considers gender-transformative and socially inclusive strategies that will empower women, girls and persons with disability, reduce gender inequality, and improve adaptation and resilience outcomes.

4.1.12 Hard and Soft Infrastructure

Infrastructure, whether hard or soft, is a priority here because such networks will be affected by the physical impacts of climate variability and change but will also play an essential role in building resilience to those impacts. The strategies proposed will ensure that infrastructure is climate resilient to reduce direct losses and reduce the indirect costs of disruption. New infrastructure assets will also be prioritised, planned, designed, built and operated to account for the climate changes that may occur overtime. Existing infrastructure will also be retrofitted, or managed differently, because of climate change.

5. MITIGATION CONTRIBUTION

5.1 Overview

In order to contribute to the mitigation of global GHG emissions, Sierra Leone's commitment is to reduce its domestic GHG emissions of 10% by 2030 as compared to a no-policy scenario of 2015 to 2030, with an intermediary indicative mitigation target of 5% reduction by 2025 against the same baseline. In the longer term, Sierra Leone's mitigation ambition is to cut GHG emission by 25% in 2050 with the inclusion of additional sectors and gases in the successive NDCs with clear and measurable mitigation targets and specific actions. Depending on available financial support, Sierra Leone is committed to enhance its mitigation efforts beyond in accordance with the progression principle enshrined in Article 4.3 of the Paris Agreement in the light of its national circumstances.
A description of the coverage of conditional and unconditional contributions is provided below.

- Unconditional contributions include efforts to enhance sinks and reservoirs of GHG through expansion of the forest cover by planting five (5) million trees over the next five (5) years (Presidential Pronouncement, June 5, 2020), and to reduce GHG emissions through policies and measures aimed at promoting a transition to off-grid renewable energy systems, setting quality standards for improving energy efficiency, increasing access to environmentally sound waste management infrastructure, testing vehicle emissions, improving road infrastructure, and restoring mined-out areas.

- Conditional contributions include specific emissions-reduction actions, such as policies or mitigation actions like advancing a feed-in tariff for renewable energy technologies, phasing out fossil fuel subsidies, gradually converting to no-tillage agricultural practices, reducing methane emissions from wastewater and providing a nutrient-rich digestate that can be used as a fertilizer, developing incineration facilities to reduce CH4 emissions from landfill sites, investment in reuse and recycling technology, e-mobility and mass transportation initiatives, and new REDD+ and blue carbon initiatives.

Further information to facilitate Clarity, Transparency, and Understanding (CTU) of conditional and unconditional contributions is presented below.

Table 3: Information to facilitate Clarity, Transparency, and Understanding

NDC time frame	**2020 to 2030 (NDC to be revised in 2025)**
Type of commitment	Sectoral policies and measures
Reference year	2015 (the year applies to a baseline scenario)
Scope and coverage	Sierra Leone prioritises the main sector categories in the IPCC 2006 GHG inventory guidelines (i.e., energy, industrial process and product utilization emissions (IPPU), agriculture, forestry and land use emissions (AFOLU), Waste and "others". It mainly provides emissions levels for CO2 (N2O, CH4, and SO2 are covered for select sources only). Emissions from Energy (mainly from combustion) and waste are included. Agriculture, Forestry, and Other Land Uses (AFOLU) are not defined as separate sectors in the NDC. The NDC compares proposed actions with previous commitments (in NDC1) and includes adaptation actions with mitigation co-benefits such as energy efficiency, renewable energy, water and wastewater management, urban planning, marine protection, and reduced desertification. The exact quantity of co-benefits in units of CO2-eq will be provided by the next review date of the NDC.
Planning processes	The country's NDC provides detailed information on the functions in government that are responsible for the implementation of the NDC, and the role supporting structures would play, including in resource mobilization, public engagement, gender mainstreaming, and monitoring, reporting, and verification. It also provides a description of the public consultation process, including engagements with local communities during the formulation process. Moreover, the NDC contains gender-transformative strategies, including priority actions for GESI (Gender and Social Inclusion) mainstreaming. Furthermore, corresponding detailed information on how planned policies and measures will support the achievement of the SDGs, AU Vision 2063, and the SDGs is provided. At the same time, all national circumstances relevant to the NDC are covered, including the social and economic consequences of proposed actions.
Assumptions and methodological approaches	The NDC contains a general description of how actions will be monitored and verified, including indicators for all the sectors prioritised. The country has included measurement indicators based on guidelines provided by OECD in 2021, which relies on best practice guidelines provided by the UNFCCC.
Fairness and ambition	The NDC describes grounds for considering NDC targets to be an ambitious contribution relating to the global limit of 1.5°C, although this has not been substantiated by references to national and international analyses in the equity literature (for example, the Climate Reference Equity Calculator, Climate Action Tracker or others). These gaps will be filled by the next review of the NDC in 2025.
Contribution to UNFCCC Article 2	Sierra Leone explicitly links its NDC target to the objectives set out in Article 2 of the UNFCCC and refers to the Low Emissions Carbon Resilient Development Strategy (LECRDS) which set a national policy goal for Reducing Emissions from Deforestation and Forest Degradation (REDD)+ in 2010.
Use of market mechanisms and cooperative approaches	Sierra Leone will explore mechanisms for cooperation as provided under Art. 6 of the PA.

Conditional contributions	**Energy:** The country's NDC considers the transition to Renewable Energy Technologies (RETs) a major means of reducing current emission levels. The goal is to improve energy efficiency and increase access to grid connections by 42% in 2025 and offgrid mini-grid and solar stand-alone systems by 27% and 10% respectively in 2030. Opportunities for expanding electricity generation, transmission, and distribution through a Millennium Challenge Corporation (MCC) Compact will be explored to increase access and promote technology dissemination.
	Industrial processes and product use: The NDC proposes investments in reuse and recycling technology to create employment opportunities for youth, as well as actions to phase down fluorinated gases in accordance with the Kigali amendment to the Montreal Protocol.
	Waste: The NDC will use assessments of the capital city's waste burden by the World Bank and waste-related emissions in the Third National Communications to set targets for reducing methane emissions from landfills and design a strategy for using appropriate technology to produce a nutrient-rich digestate that can be used for food production. Actions to reduce CO2 emissions while using technology to spur waste-derived business for youth and women in poor communities.
	Transport: Sierra Leone will use lessons from the Integrated Resilient Urban Mobility Project (IRUMP) to develop plans and strategies for building sustainable transport mechanisms (including mass transit systems, fuel-efficient vehicles, and climate-smart mobility measures that improve urban planning and enhance access to public infrastructure in cities. The country also commits to implementing performance standards aimed at vehicle purchase and use taxes, low GHG fuels, and incentives for vehicle demand reduction.
	AFOLU: Sierra Leone will adopt appropriate technologies for running large scale management of agricultural and forestry residue, manure, household kitchen and garden waste, and biosolids (organic solids from treated sewage). Technologies and tools for reducing food waste by improving value chains, and new REDD+ initiatives targeting established protected and community conservation areas will be adopted. Skills transfer for developing a national forest inventory and forest management information system will also be promoted.
	Blue Economy: Sierra Leone will develop a blue carbon initiative for the Sierra Leone River and Bonthe-Sherbro River Estuaries to conserve vast mangrove and seagrass resources while sequestering tree and soil organic carbon.
Unconditional contributions	**Energy:** Sierra Leone proposes to implement the revised National Energy Policy and Strategic Plan (2020), the Integrated Resource Plan (2019), and National Electrification Roadmap (2020), focusing on the role offgrid energy sources could play in achieving universal access and energy efficiency. Focused plans such as policies for clean cooking and the offgrid solar energy strategy (2020) will be useful in improving quality control measures, creating opportunities for private investment, addressing ambiguities around ownership of environmental attributes for solar investments, and fostering citizen buy-in.
	Industrial Processes and Product Use (IPPU): Sierra Leone will regulate IPPUs by domesticating the Kigali Amendment to the Montreal Protocol, enforcing requirements under Environmental Assessments conducted by industry players, conducting energy audits and setting performance standards for energy efficiency and waste management.
	Waste: Sierra Leone commits to waste mitigation by increased access to solid waste management infrastructure, to reduce emissions from treatment, transportation, and disposal.
	Transport: Sierra Leone makes a commitment to develop and implement policies and strategies that limit the age of used vehicles imported into the country, promote emission testing for all heavy types of machinery and vehicles, ensure quality control for spare parts for all types of vehicles, and improve road infrastructure. The country also commits to on-road efficiency improvements, including consumer education and vehicle maintenance practices.

	AFOLU: The NDC seeks to reduce emissions from AFOLU by reforesting about 14000 ha of degraded lands, as announced by the President in 2020, as well as by implementing the national policy on reclaiming mined-out lands, and meeting targets set for land degradation neutrality by 2030. The country also commits to the rehabilitation of watershed areas, reducing agricultural open burning, and installing small-scale biogas plants.
	Blue Economy: Sierra Leone proposes plans to restore, enhance, and manage about 5000 ha of its vastly degraded mangrove resources over the next 10 years. The country also proposes to support the scaling of Marine Protected Areas (MPAs) and energy-efficient deployments in fishing boats, coastal recreational facilities, and fish landing sites. Similarly, Sierra Leone commits to increasing support to smallholder (on-farm) and commercial (off-farm) aquaculture experiments as an approach to increasing food security, employment, and income generation at the local level.

5.2 National GHG Inventory

The Third National Communication (TNC) revealed that Energy generation contributed largely (99%) to the GHG emission for 2005 (about 20340.20 Gg of CO_2) in Sierra Leone. The increasing use of domestic individual diesel generators due to the lack of a well-functioning national grid system for electricity could explain this excessive consumption of fuel. The projection of CO_2 emissions by fuel type is presented in table 4. The second highest contributor to GHG emissions in the country is waste, emitting 151.68Gg of CO_2 specifically from landfills. Industrial processes contribute modestly (0.01955Gg CO_2) to GHG emissions with cement production as the main source. The overall CO_2 emission is projected to increase by 5% and 6% by 2025 and 2030 respectively from the baseline 2015.

Distribution by sectors

Table 4: Projection of CO2 emissions by fuel type (in GgCO2 e.)

Fuel Type	2005 (Baseline)	2020	2025	2030
Petrol	3414.05	11985	16850	19542
Diesel	13184.69	48805	60325	82264
Jet Kerosene	2365.78	8960	10205	13218
Marine Fuel Oil	1375.68	4905	8340	10004
Total	20340.2	74655	95720	125028

Distribution by gases

Methane emission is dominated by waste (about 93% of the total emissions) and agriculture especially livestock waste (about 4%). Both CH4 and N2O emissions are projected to increase by 1% by 2025 from the baseline 2015 (Table 5).

Table 5: 15-year projection of annual GHG Emissions (in MtCO2e) (source: Draft SL-BUR 1, 2021

Sources/type of gas	2015	2020	2025	2030
CH4	3.67	4.029	4.458	4.97
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

The above projections will be reviewed by the Fourth National Communications, which will be developed in 2023. It will offer stakeholders in the country an opportunity to further contribute to designing and implementing mitigation measures based on technically sound assessments. The process will involve GHG inventory preparation, mitigation options analysis, and forward planning to ensure key considerations are integrated into relevant social, economic, and environmental policies and actions.

5.3 Mitigation strategy

The strategy for implementing mitigation measures is made up of three main required components: mitigation goals, mitigation actions, and an action plan for implementation. These provide a framework to identify, prioritize and implement actions to reduce climate risks and vulnerabilities.

The mitigation strategy fully takes account of gaps and achievements made with the implementation of mitigation measures since 2015, when the INDC of Sierra Leone was elaborated before COP21 to the UNFCCC where the Paris Agreement has been adopted.

Table 6: Climate mitigation progress since 2015

Strategy	Associated Priority Sector (s)	Progress made (2015 to date)
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.	All sectors	● Inter-ministerial committee established for environmental and climate change coordination. ● National climate change standing committee established in 2016 to coordinate climate change actions at national level ● Regional climate change committees established in 2020 for regional level coordination.
Transformation of the National Meteorological Services of Sierra Leone and strengthening of Climate Change Early Warning System of Sierra Leone	All Sectors	● Sierra Leone Meteorological Agency Act of 2017 (Act No.64) passed ● The Sierra Leone Meteorological Department transformed into an Agency in 2017
Promotion of energy efficiency, enhanced management and expansion of the energy mix through uptake of renewable energy sources (Solar, Wind, Hydro, Biomass) particularly in the rural areas of Sierra Leone.	Energy	● National Renewable Energy policy developed in 2016 and updated 2020 r ● Energy Efficiency policy developed in 2016 ● National clean cooking strategy and action plan developed in 2020
Enhancement of waste management systems at all levels to reduce pollution and greenhouse gas emissions under the category to improve health of both humans and animals and reduce global warming.	Waste	● Municipal solid waste collection enhanced through various youth-led schemes ● Funding secured for the establishment of a landfill site in the capital
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.	Transport	● An Integrated and Resilient Urban Mobility Project is being implemented to mainstream climate change into various infrastructural development initiatives

Adoption and application of climate-smart and conservation agriculture through best agricultural practices that enhance soil fertility and improve crop yield	AFOLU	● 8,500ha of forest trees planted by Miro Forestry ● The President recently launched the 5 million tree initiative to be completed in the next 4years (1.1 million trees already planted) ● Developed and implemented the Voluntary Guideline on the responsible governance of tenure of land fisheries and forest in the context of national food security

Based on the analysis above, the following gaps have been identified:

- Most of the strategies lacked concrete actions and targets, linked partly to a lack of institutional capacity. This is gradually changing with the growing appetite for climate mitigation by both public and private entities;
- There are capacity gaps in project design for climate change mitigation, hence the low delivery on some of the proposals made previously
- Limited data and research capacity of the country to support implementation and monitoring of mitigation actions.

To fill gaps, this NDC proposes the following mitigation actions, to be implemented by 2025 (initial timeline for reviewing the NDC, and 2030 (end line for achieving measures proposed for mitigation). Table 7 below proposes an action plan with timelines, responsibilities, and costs, as well as a sense of how mitigation actions will be prioritised for implementation

Table 7: Table 7: Strategies for implementing mitigation actions until 2030

Strategies	Goal/Objectives	Actions	Sectors 1-Energy; 2-Waste; 3-Industrial processes and product use; 4-AFOLU; 5-Infrastructure; 6-blue economy						Targeted Period		Indicative Cost
			1	2	3	4	5	6	By 2025	By 2030	
Improve mechanisms for multilevel climate governance and coordination	**Goal:** To improve NDC reporting and enhance climate governance. **Objective 1:** To improve coordination and collaboration of climate actions **Objective 2:** To increase awareness of climate risks and impacts **Objective 3 :** To embarrass emerging issues Trends	Review existing policies, plans and regulations to mainstream climate change actions.									10,000,000
		Enhance technical and human capacities of MoEnv, EPA and SLMet to facilitate the implementation, monitoring and reporting of NDC actions.									
		enhance the climate change committees through policy and community engagement									
		Establish a centralised climate change MRV system at EPA/SLMet to enhance data generation analysis and management.									
		Develop a communication and visibility strategy for mitigation actions in the NDC									
		Review existing strategies/work plan									
		Enhance technical and human capacities of their relevant sectors									
Increase Energy efficiency and access through the dissemination of clean energy technologies	**Goal:** To improve on national action to reduce carbon emission **Objective 1:** To promote efficient energy use and reduce grid-based GHG emissions.	Switching and promotion for renewable energy (Solar Energy & LPG)									450,000,000
		Provider of alternative energy sources such as Biofuels (from corn, sugarcane, rice husk etc.)									
		Promoting briquettes made from grass and other waste materials									

	Objective 2: To support renewable and clean energy drive and reduce burden on the forest for carbon sink. **Objective 3**: Promote the development of clean development mechanism (CDM) and nationally adaptation mitigation action (NAMA) project.	Promote access to off-grid solar energy sources/ Street lightening in public places and buildings using energy efficient appliances/lamps									
		Develop and promote a minimum energy efficient performance standard.									
		Gradually phasedown fluorinated gases with climate friendly refrigerants as per the phasedown schedule of the Kigali amendment to the Montreal Protocol									
		Support private sector led initiative for the promotion of clean energy technologies									
		Monitor and track emission from the extractive and manufacturing sector and regulate actions through environment social health and impact assessment									
		Development of the BIO energy policy and strategy									
Promote the mainstreaming of climate actions into processes within industries	**Goal:** To reduce carbon emission from industrial processes. **Objective 1:** promote private sector investment in emission reduction actions	Promote the use of clean and renewable energy in the extractive and manufacturing sector									350,000,000
		Promote grid and/or on-site renewable power production to be replace by use of diesel/HFO by industries									
		Ensure reclamation of mine out are by extractive industries through a progressive rehabilitation and address legacy environmental issues in the mining sector									
		Monitor and track emission from the extractive and manufacturing sector and regulate actions through an Environmental Impact Assessment (EIA) Process									
Improve and maintain Sierra Leone's forests as a major carbon sink.	**Goal:** To enhance sink and promote the trade **Objective 1:** to maintain and improve the integrity of the forest biodiversity.	Develop a national forest inventory and forest management information system									50,000,000
		Develop new REDD+ initiatives for terrestrial forest									
		Reforest14,000 hectares degraded economic and agro-forestry									
		Develop REDD+ initiative for the Mangrove reserve in the Sierra River Estuary									

Enhance integrated waste management system in the country	**Goal:** to reduce emission of greenhouse gas from waste **Objective 1:** reduce Methane (CH_4) emission Objective 2: Improve hygiene environment health of the country	Increase waste management infrastructure and ease access									400,000,000
		Promote waste to energy through the extraction gas									
		Develop incineration facilities in Freetown and other major facilities to reduced CH4 emissions from landfill sites									
		Reducing methane emissions from wastewater and providing a nutrient-rich digestate that can be used as a fertilizer (Reduction of CH4 and CO2 emissions)									
		Investment in reuse and recycling technology and create employment opportunity for youth, through the circular economy approach.									
		Development of commercial scale aerobic composting systems for agricultural and forestry residue, manure, food processing, household kitchen and garden waste, and biosolids (organic solids from treated sewage). Reduction in CH4 emissions, since methane-producing microbes are not active in the presence of oxygen.									
Sustainable management of water sheds and fresh water resources for human ecological benefits		Enforcement of by-laws for land use management and water sheds (Local authorities and police)									10,000,000
		Established Watershed and fresh water committee that are gender sensitive for responsible and sustainable water management									
		Review and update of National Laws towards Water Sheds									
Maintain the integrity of the marine and coastal environment		Capacity building and sensitization of communities to waste segregation (Door to door campaign)									30,000,000
		Building the Capacity of community Youth to transform waste into wealth									
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		Designing and improvement of provincial and feeder roads using Climate resilient surfacing materials.									150,000,000
		Mass transportation (rail, road and water) for passengers and cargoes using clean alternative energy sources									
		Improvement of the water transport system									
		Quality control for spare parts for all types of vehicles									
		Promote emission testing for all heavy types of machinery and vehicles									

build a stable economy.		Development of transport infrastructure to incorporate walkways and bicycle tracks									
		Introduce E-mobility programme and plans to promote the use of electric buses, passenger vehicles (cars) and motor tricycles, resulting in displaced conventional vehicle sales, transport fuel imports and associated GHG emissions.									
		Develop strategy on the age limit of vehicles imported into Sierra Leone									
Adoption and application of climate-smart and conservation agriculture through best agricultural practices that enhance soil fertility and improve crop yield	**Goal:** to Increase agricultural productivity and reduce deforestation **Objective 1:** improvement in Agricultural practices **Objective 2:** Using the wet and low land for crop production to reduce deforestation. **Objective 3:** Using organic manure to reduce the water pollution	Using modern machinery and technology to increased production yield									250,000,000
		Shifting from high to low and wetland to reduce deforestation									
		Organic manure to reduce fertilizer use that has the tendency of depleting the soil fertility and polluting the water bodies of the wetlands									

6. ADAPTATION CONTRIBUTION

6.1 Overview

Sierra Leone is vulnerable to various climate risks. For instance, sea level rise threatens low-lying coastal Sierra Leone, especially the communities of Kroo Bay and Moa Wharf. There have been reports of increased coastal flood events, coastal erosion, and reduction in freshwater quality, population displacement, loss of property, reduction in groundwater resources, and reduced agricultural potential for coastal areas. Impacts of climate change on human health with an increase in the likelihood of certain diseases such as cholera, as well as the toll certain events take on agricultural production, infrastructure, tourism, public health and biodiversity, have also been documented (see for example, ref 1, ref2). Moreover, climate change is now recognized to have a significant impact on disaster risk reduction efforts and pose a considerable threat to efforts to meet the evolving needs of vulnerable communities

In these circumstances, it is imperative to reduce the impacts of climate change. Some priorities include improving health delivery services, improving supply of safe drinking water and sanitation, increasing funding to the health sector, development of an early warning systems, strengthening meteorological and hydrological institutions, providing coastal infrastructure, improving sanitation, among other actions. Key priorities will be drawn from the iNAP, which reflects goals set for adaptation in various plans and strategies. As such, the INAP provides a key resource for implementing the adaptation actions outlined in this NDC.

6.2 Adaptation planning

The goals, actions, and plan proposed for adaptation in this section provide a country-driven and comprehensive approach to planning and implementation across multiple sectors and at scale. The approach sets out the adaptation outcomes the country is aiming to achieve, as well as how they will be achieved through iterative planning, public engagement, GESI mainstreaming, and other processes required for effective adaptation. These actions will be reviewed as the knowledge of climate risks and vulnerabilities across sectors and communities increases, as well as when the needs and capacities of different stakeholders evolve. The following analysis shows the progress made with the implementation of adaptation measures since 2015 (see table 8).

Table 8: Climate adaptation progress since 2015

Strategy	Associated Priority Sector (s)	Progress made since 2015
Estimation, in a sustainable manner, of Sierra Leone's contribution to global warming and climate change.	All sectors	● Most of the actions in the NAPA were developed into a bankable project, and progress monitored and reported through the national communication.
Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation.	Agriculture and Food Security	● Not implemented
Integrated management of crops and Livestock management. Strategy	Agriculture and Food Security	● Not implemented
Restoration of degraded lands with high production potential	Environment	● Development of mined out area rehabilitation plan for four major mining companies (Sierra rutile, Koidu holdings, African Minerals, and London Mining) ● 1.2 million seedlings transplanted under the National Tree Planting Project out of a total of 5, million ● 100 ha of degraded mangrove sites restored and enhanced in 25 coastal wetland communities.
Management of coastal and fisheries resources through promotion of non-destructive fishing techniques to maintain resilience of marine ecosystems.	Environment	● Implementing the youth in fisheries project in seven coastal districts, targeting 7,000 youths. ● Implementing the West African regional Fisheries Programme
Promotion and facilitation of early warning and disaster preparedness system.	Environment	● Installed 8 weather stations across the country through the GEF funded Climate information and Early Warning System project. ● Installed 8 Agromet stations through the climate smart agriculture project.
Strengthen integration of climate change adaptation into the health Sector.	Environment	● No action taken
Strengthen the adaptive capacity of the most vulnerable groups and communities through social safety nets and insurance schemes.	Gender and Social protection Issues	● NaCSA rolling out the social safety net project **to 28,538 Households in 10 Districts** across the country.
Enhance the resilience of the tourism value chain.	Environment	● Developed the Ecotourism Policy and Action Plan in 2015. ● Coastal protection works through planting of assorted tree species by ecotourism communities, shift from mud or makeshift iron sheet dwellings to brick houses; ● Cleaning of coastal beaches and removal of Sargassum Seaweeds as an adaptation strategy. ● Ecotourism enhanced through the construction of Eco-lodges and environmentally friendly facilities in various island communities
Create enabling environment for the resilience of private sector investment, demonstrate an operational business case.	All Sector	● Not Implemented
Integrate climate change adaptation into the mining/extractive sector	Hard and soft infrastructure	● Not Implemented
Mainstream climate change adaptation in land reforms.	Environment	● National land policy developed, with provisions for climate change and environment

6.3 Adaptation strategy

Table 9 below presents strategies for climate adaptation across multiple sectors. The strategies are rooted in:

- Actions to identify and assess risks, and managing those risks to minimize impact
- An understanding that different communities, ecosystems, and sectors are affected differently by climate change and hence, require different plans, including soft, hard, and ecosystem-based
- A consideration of future climate change impacts, as well as those already being experienced
- A phased approach to build flexibility and resilience in planning
- Specific, measurable, achievable, results-oriented, and time-bound objectives that allow a continuous review of the effectiveness, efficiency, equity, and legitimacy of adaptation actions

Table 9: Action plan for implementing adaptation actions

Strategies	Goal/Objectives	Actions	Sectors 1- Agriculture and food security; 2- Water resources and energy; 3- Coastal zone management; 4-Environment; 5- Disaster management; 6- Gender and social inclusion; 7- Hard and soft infrastructures							Targeted Period		Indicative Cost
			1	2	3	4	5	6	7	By 2025	By 2030	
Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation.	**Goal: 1** Ensure effective animal husbandry and agricultural productivity **2** Enhance sustainable Land use practices for improved Agricultural productivity	Reduction of the burning of the grazing land to reduce land degradation										
		Construction of fire belts to reduce the burning of forest land										
		Introduce drought, temperature and flood resistant crops										
		Improve infrastructure and water management (irrigation and water harvesting)										
		Develop and regulate effective animal grassing system										
		Develop structures for conflict resolution in respect of Land use										30,000,000
Integrated management of crops and Livestock management. Strategy	Goal: Ensure integrated and sustainable crop and Livestock production	Introduce pest and disease resilient crops										
		Control free range animal grazing										25,000,000
		Embank on effective agricultural research										
Strengthen integration of climate change adaptation into the health Sector.	Build adaptive capacity and resilience of the health sector	Mainstream CC into the Health Sector										50,000,000
		Reduce taxation on private Sector										10,000,000

Create enabling environment for the resilience of private sector investment, demonstrate an operational business case.	Gaol: Leverage Public sector Investment	Build the capacity of the private sector on climate related actions										
		Improve monitoring and evaluation of corporate social responsibilities										
Integrate climate change adaptation into the mining/extractive sector	Ensure the mining sector becomes climate smart and resilient	Effective implementation of EIA										
		Promote Afforestation practices										
		Create alternative livelihoods of women in the mining sector through effective corporate social responsibilities										50,000,000
Promote climate-smart agriculture and climate-resilient food security practices	**Goal:** Ensure Climate e resilient agriculture **Objective** 1: Development of crop varieties adaptable to ensuring climate conditions Objective 2: Practicing alternative crop production on the same land	Adoption and application of climate-smart and conservation agriculture through best agricultural practices that enhance soil fertility and improve crop yield										
		Integrated management of crops and livestock management										
		Develop and maintain seed banks to provide a variety of seed types that preserve biological diversity and enable farmers to make informed choices										
		Promote innovative and adaptive approaches such as irrigation and water harvesting to protect farmers from variability in rainfall										
		Provide appropriate infrastructure, social services and effective mechanization of agriculture in the rural areas to slowdown massive movements of youths into urban areas										
		Mainstream Climate Change into Agricultural Development Strategies and ensure inclusion of women										250,000,000
Improve research and knowledge management	Scientific research conducted to ascertain	Support the establishment of adequate weather stations around the country in order to provide reliable and adequate weather data										100,000,000

capacities to Support Climate-Smart Agriculture and resilient land management	robust data on risk and vulnerability of mangrove	that will be useful to properly provide tailored climate services to farmers										
		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										
		Promote innovative and adaptive approaches such as irrigation and water harvesting, to protect farmers from variability in rainfall										
		Develop modelling approaches and tools to allow assessment of impacts of climate change on export and domestic crops and meat production										
		Develop regional links to fund and promote plant breeding programs for common crops										
		Review approaches to integrated pest management under climate change										
		Conduct a feasibility study to gather information on community perceptions of climate-smart agriculture techniques										
Improve institutional and functional capacities for integrated water management		Improve planning and coordination of the use of the river basin, which may provide solutions to problems of water quality and supply										
		Increase and maintain investment in hydrological monitoring and water use through a national database										
		Fund research into adopting a water resources and water supply planning method under climate change										
		Develop appropriate modelling tools to assist strategic planning of water resources										150,000,000
		Investigate shifting focus from groundwater to surface water storage for water supply to reduce the reliance on vulnerable coastal aquifers										10,,000,000

Enhance universal access to energy by promoting renewables and energy efficiency		Establish and operationalize a National Centre for Renewable Energy and Energy Efficiency (NaCREEE) to promote off-grid Stand-alone Solar (SAS) investments through technical advice and knowledge sharing in the areas of policy and regulation, technology development and transfer, and public education											
		Increase awareness of off-grid SAS and strengthen market knowledge by improving market intelligence											
		Strengthen local institutions and empower the private sector through capacity, network, and partnership building											
		Provide up-to-date market information through further studies and awareness raising campaigns											
		Align technology development and knowledge transfer goals with regional goals set for 2030											
		Technically support the Energy Planning Unit in creating a pipeline of off-grid SAS projects											
		Introduce solar technology management in school curricula and technical and vocational education at the tertiary level											
		Develop guidelines for the standardization of off-grid solar systems including technical equipment, design and assessment methods, operations and maintenance procedures, and environmental compliance											
		Mobilize financial institutions to create investment packages and counterpart funding											
Mainstream considerations of Gender Equality and Social Inclusion into	**Goal:** Ensure maximum gender dimension in addressing Climate challenges	Expand women's and youth employment opportunities and participation in the management of off-grid solar energy interventions											12,000,000

sectoral plans and strategies	**Objective1:** Include more women and Youths in addressing climate change challenges	Build women-led partnerships at the local level to facilitate knowledge exchange, resource mobilization, and sustained quality of services										
		Bridge the gap in the proportion of women to men employment as solar technicians, engineers, and project managers by promoting the entry of more women into jobs delivered within the sector through information, communication, education campaigns, scholarships, and job placements										
		Build the capacities of youth, women, PWDs, and other disadvantaged groups in using off-grid solar energy resources safely and productively (including for livelihood and business development or improvement)										
Improve climate change adaptation infrastructure across priority sectors	**Goal:** Provision of necessary in infrastructure in agriculture, Water Resources and Energy, Gender and coastal zone management **Objective 1:** To provide basic necessary climate change adaptation infrastructure for enhancing resilience **to the resulting climate change challenges**	Enhance waste management systems at all levels to reduce pollution and greenhouse gas emissions so as to improve health of both humans and animals and reduce climate change										
		Support the construction of appropriate roads particularly feeder roads in the rural areas as a climate resilience strategy										
		Diversify economic growth through a strengthened transport sector, particularly the infrastructure to contribute to the reduction of greenhouse gas emissions										250,000,000
Mainstream climate change adaptation considerations into sectoral plans and strategies	**Goal:** Climate change adaptation mainstreamed and implemented **Objective 1:** To mainstream Climate Change adaptation challenges in stakeholder sectorial plans.	Strengthen integration of climate change adaptation into the health sector										
		Monitor and control WASH activities in informal settlements										2,000,000
Develop local institutional capacity	**Goal:** The development of local institutional support to	Monitor academic and public news media to keep informed about changes in climate										10,000,000

to support coastal resources management	stakeholders for sustainable management of coastal resources. **Objective1:** To provide institutional capacity building for sustainable coastal resources management	change science and adaptation tools, technologies, and success stories											
		Operationalize a Coastal Chiefdoms Natural Resources Management Network (CCNRMN) and various co-management committees											
		Support the development, validation and enforcement of by-laws on mangrove wood harvesting, fishing and sand mining, at local and regional levels to promote mangrove conservation and adaptation to climate change											
		Collect physical and socioeconomic data to better understand vulnerabilities and impacts											
		Train relevant coastal institutions on climate change adaptation and mangrove conservation											
Management of coastal and fisheries resources	**Goal:** Sustainable utilization of coastal and fisheries recourses through legislative reforms and enforcement to enhance economic growth **Objective:** To provide necessary support for the sustainable management of the fisheries resources **Objective 2**: To provide support for the mainstreaming of fisheries issues into local government policies	Promotion of non-destructive fishing techniques to maintain resilience of marine ecosystems											
		Promotion of monitoring, control and surveillance of fishing grounds and fish stocks for sustainable exploitation											
		Promotion of climate change related education and awareness programs											
		Improve productivity and sustainable management of fisheries and the marine sector											
		Develop and operationalize an integrated coastal zone management plan											
		Adopt an adaptive management approach for the governance of coastal management institutions and interventions											
		Improve fisheries governance through awareness raising and law enforcement to regulate fishing practices											14,000,000

		Mainstream climate change adaptation into coastal development plans, thus using local development funds managed by councils to build resilience											
Increase human (social) development through technology transfer and livelihood support	**Goal** The achieve an increase in human development with support from technology **Objective:** To achieve livelihood support through technology transfer	Strengthen the adaptive capacity of the most vulnerable groups and communities through social safety nets and insurance schemes											
		Undertake research to assess local uptake potential of livelihood techniques and technologies											
		Promote agri-sylvicultural practices and sustainable rice cultivation in coastal landscapes											18,000,000
Provide information and improve knowledge on climate risks and vulnerabilities	**Goal:** To improve knowledge on climate risk and vulnerability Objective 1: To Reduce Health risk through sustainable health practices, improved infrastructure, and diversified economy	Delineate hazard (flood and erosion prone) areas along the coastline											
		Improve the quality of topographic data for the coastal zone											
		Establish robust and long-term mangrove ecosystem health surveillance, monitoring and analysis to develop insights into their current state and map future risks and vulnerabilities											10,000,000
Improve Natural Resources Management in critical biodiversity hotspots	Goal: To achieve restoration of degraded lands Objective 1: To achieve appreciable level of restoration of degraded land **Objective 2:** To restorat critical biodiversity hotspot	Manage rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation											
		Restore degraded lands with high production potential											
		Establish new forest reserves, national parks, and protected areas											15,000,000
Improve the resilience of environmental value chains across the sector (including forestry, mining, tourism, and land management).	Goal: To strengthen tourist destination for socioeconomic gains Objective 1: To restore degraded forest lands	Enhance the resilience of the tourism value chain											8,000,000

Mainstream climate change adaptation considerations into sectoral plans and strategies	Goal: To achieve mainstreaming of Climate change adaptation manures Objective: To mobilize sustain financial resoures for implementation of climate change adaptation measures	Integrate climate change adaptation into the mining/extractive sector										
		Mainstream climate change adaptation into land reforms (including establishment of a land commission and revision of the land policy)										5,000,000
Improve institutional and functional capacities for environmental governance	**Goal:** To build institutional capacity for improved environmental governance **Objective**: strengthen capacity of lead institutions to enhance governance	Review the current Draft Climate Policy into a comprehensive Climate Act										
		Establish the enabling legislative framework to implement the NCCS&AP actions										
		Establish and/or strengthen the high-level National Climate Change Council (NCCC), in the Office of the President										
		Establish a Sierra Leone Climate Fund to be a financing mechanism for priority climate change actions and interventions										
		Institutionalize 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										20,000,000
Establish early warning systems to improve local understanding of risks	**Goal:** Improved Early warning preparedness systems Objective: To provide early warning system to communities to reduce vulnerability to extreme event	Promotion and facilitation of early warning and disaster preparedness system										
		Strengthening the newly transformed National Meteorological Services of Sierra Leone for the NDC expected service delivery										
		Build capacity in observations and monitoring of climate systems, and in developing, packaging and communicating weather and climate information										
		Develop deeper insight into climate-related hazards, vulnerability and risks										10,000,000

		Promote climate related research, modelling and prediction of weather and climate events.											
Improve regulatory frameworks for disaster management	**Goal**: Improve Legislative frameworks, coordination and monitoring mechanisms Objective: To enhance implementation of regulation relating to disaster management	Adopt the current disaster risk reduction policy into a comprehensive Disaster Management and Emergency Response Policy											
		Establish the enabling legislative framework to implement the DMD policy and action plan											
		Establish and/or strengthen the high-level National DMD Council (NDMC), in the Office of the Vice President											
		Establish a National DM Agency as the primary national government agency for disaster management response											15,000,000

7. MEANS OF IMPLEMENTATION

The actions proposed in the preceding sections consider mitigation and adaptation complementary responses to climate change. The complementarity of actions is important because mitigation and adaptation responses interact with one another and reduce risks over different timescales. Through this approach, NDC implementation will contribute to nearly all the SDGs, as well as other local and international development indices (see section 7.5) . In general, the means of implementing the actions proposed above include sustainable financing, adequate and appropriate capacity, the adoption of new technologies, effective public and stakeholder engagement, GESI mainstreaming, policy influencing, and fit-for-purpose systems for governance. These factors are presented in the succeeding sections.

7.1 Financing

Finance is required for the implementation of the mitigation and adaptation actions proposed in this NDC. Various domestic and international vehicles will be explored for resource mobilisation, because international public financing sources like the Green Climate Fund (GCF) cannot provide all that is needed for a large-scale investment in addressing climate change. Accordingly, financing sources such as the private sector and domestic fiscal budgets will be explored, as described in Table 10 below.

Table 10: Potential vehicles and sources of climate financing

Vehicles	**Potential sources**	**Mobilisation strategy**
Domestic budget	Government of Sierra Leone	Annual allocations New tax levies
Private sector	Africa, Latin America and the Caribbean Fund (AFLAC) Africa Capitalization Fund, which invests in banks in Africa Green for Growth Fund (GGF) Climate Catalyst Fund Africa Climate Change Fund hosted by AfDB EU's Emissions Trading Scheme and World Bank's Community Development Carbon Fund (CDCF).	Partnership agreements Loan agreements Grant proposals
International climate finance	AFD French Development Agency Australia AID (AUSAID) Canadian International Development Agency (CIDA), CCCFL China Climate Change Framework Loan (of EIB) CCPL Climate Change Program Loan (of AFD and JICA) DANIDA DFID European Investment Bank (EIB), European Union Emission Trading Scheme European Commission Global Climate Change Alliance FGEF French Global Environment Facility (of AFD) GEEREF Global Energy Efficiency and Renewable Energy Fund (advised by EIB) German International Climate Initiative Green Climate Fund Adaptation Fund	Grant proposals Loan agreements Technical support frameworks

From these different sources, **USD 2,764,000,000** (Two Billion, Seven Hundred and Sixty Four Million US Dollars) could be mobilised to implement the actions proposed in this NDC. Compared to previous requests, this NDC requires enhanced international support in the form of finance, technology transfer, and technical assistance. As such, steps for improving access to public and private financing sources will be a high priority. For instance, a National Climate Financing Facility (NCFF) will be formed to set out an NDC Investment Plan (NIP), including a strategy for meeting the financing needs of the NDC. The CFF, housed within the National Climate Change Secretariat (NCCS) at the Environment Protection Agency (EPA) will build specific institutional capacities to address relevant technical barriers to resource mobilisation, and create an enabling environment for private sector engagement. Further information on the governance of structures for resource mobilisation is described in section 7.8.

Table 11: Categorisation of proposed adaptation and mitigation actions into conditional and unconditional targets

Strategies	Mitigation or Adaptation		Targeting	
	M	A	Conditional (in %)	Unconditional (in %)
Improve mechanisms for multilevel climate governance and coordination.	X		20	80
Increase Energy efficiency and access through the dissemination of clean energy technologies	X		90	10
Promote the mainstreaming of climate actions into processes within industries	X		20	80
Improve and maintain Sierra Leone's forests as a major carbon sink.	X		90	10
Enhance integrated waste management system in the country	X		80	20
Maintain the integrity of the marine and coastal environment	X		70	30
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.	X		85	15
Adoption and application of climate-smart and conservation agriculture through best agricultural practices that enhance soil fertility and improve crop yield	X		70	30
Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation.		X	90	10
Integrated management of crops and Livestock management. Strategy		X	60	40
Strengthen integration of climate change adaptation into the health Sector.		X	70	30
Create enabling environment for the resilience of private sector investment, demonstrate an operational business case		X	0	100
Integrate climate change adaptation into the mining/extractive sector		X	70	30
Promote climate-smart agriculture and climate-resilient food security practices		X	80	20
Improve research and knowledge management capacities to Support Climate-Smart Agriculture and resilient land management		X	30	70
Improve institutional and functional capacities for integrated water management		X	10	90
Enhance universal access to energy by promoting renewables and energy efficiency		X	95	5
Mainstream considerations of Gender Equality and Social Inclusion into sectoral plans and strategies		X	10	90
Develop local institutional capacity to support coastal resources management		X	70	30
Management of coastal and fisheries resources		X	80	20
Increase human (social) development through technology transfer and livelihood support		X	100	0
Provide information and improve knowledge on climate risks and vulnerabilities		X	70	30
Improve Natural Resources Management in critical biodiversity hotspots		X	35	65
Improve the resilience of environmental value chains across the sector (including forestry, mining, tourism, and land management).		X	80	20
Mainstream climate change adaptation considerations into sectoral plans and strategies		X	10	90

Improve institutional and functional capacities for environmental governance		**X**	30	70
Establish early warning systems to improve local understanding of risks		**X**	85	15
Improve regulatory frameworks for disaster management		**X**	10	90

7.2 Capacity building and technology transfer

Capacity building and technology transfer are vital conditions for the successful implementation of the NDC under the Paris Agreement. In Sierra Leone, capacity building and technology transfer are perceived in view of the shortfalls in past initiatives on capacity building under different bilateral and multilateral agencies, which can be largely attributed to their short-term, ad-hoc, supply-driven, and project-based nature. Overall, despite the progress made with capacity building related to climate action at the national level over the years, there are institutional, technical, and financial capacity gaps and needs with respect to the implementation of the adaptation and mitigation actions. Capacity gaps that have persisted include challenges to data generation, collection and analysis; governance and coordination; development of endogenous capacity; access to climate finance; monitoring and reporting; and gender-responsiveness. Potential capacity building and technology transfer actions in support of Adaptation (A) and Mitigation (M) efforts across the different sectors covered in this document are presented in Table 12.

Table 12: Actions for capacity building and technology transfer

Proposed action	**A**	**M**
Introducing irrigation technologies, including the development of micro-systems for drip irrigation and rainwater harvesting	X	
New approaches to combating soil erosion	X	
Processing and conserving agricultural products	X	
Researching and applying climate-ready crop varieties	X	
Beach nourishment as a response to sea level rise	X	
Education, training, and public awareness of climate risks	X	
Promoting the use of biogas as a substitute for wood	X	
Producing biofertilizer as a substitute for chemical fertilizers		X
Development and use of renewable energy technologies		X
Use of energy efficient appliances		X
Building the capacity of the private sector for energy efficiency initiatives		X
Strengthening disaster preparedness and early warning systems	X	
Developing climate-resilient energy systems	X	
Strengthening the capacity of health system institutions	X	
Developing technical capacity to manufacture energy-efficient cook stoves		X
Introducing standards for energy-efficient infrastructure		X
Expanding sustainable forest management and reforestation efforts		X
Reducing deforestation, including through building capacity for fire control		X
Strengthening degraded land rehabilitation		X
Climate-proofing infrastructure and housing	X	
Designing systems for increased and sustainable access to freshwater resources	X	
Enhancing knowledge on surface and groundwater management	X	
Designing a national REDD MRV mechanism		X
Developing a nationally appropriate mitigation action for the transport sector		X
Improving and expanding public transportation		X
Building capacity for waste collection, transportation, and treatment		X
Improving data generation, collection, and analysis	X	X

7.3 Public engagement

This NDC will build upon strategies in the National Climate Communications Strategy, which seeks to:

- Improve awareness and understanding of the Government of Sierra Leone's climate change adaptation initiatives and the NAP process through effective communication, education and training
- Promote an inclusive and participatory approach to adapting to climate change so that the Government of Sierra Leone can unite under a common vision and speak with one voice on the issue of addressing climate change impacts
- Generate support and political commitment among key decision-makers for the NAP process and for prioritizing, managing and resourcing efforts to address climate change adaptation issues
- Persuade the general public and the private sector of the need for a significant and timely investment in climate change adaptation from both public and private sources within and outside of Sierra Leone
- Encourage Sierra Leoneans to collectively embark on activities to strengthen the country's resilience to climate change

The strategy was developed as part of the NAP Global Network's second programme of support to Sierra Leone with the aim of providing short- and mid-term guidance on how the government can use communications strategically and effectively to support the NAP process. It identifies a need for vertical integration, including by building political momentum at the subnational level; as well as strategic communications, including by enhancing strategic communications around climate change adaptation at the national and local levels. The strategy seeks to further emphasize the following aspects (EPA 2020):

- What information needs to be disseminated and when
- The key audience that the Government of Sierra Leone needs to address
- The relevant changes in knowledge, opinions or behaviour that need to be implemented
- The most effective messages and channels of communication to be used
- The sharing of communications-related responsibilities by different government actors to foster better internal coordination.

The approach taken to public engagement is based on the following SWOT analyses:

- **Strengths**, including that the climate change adaptation and mitigation information are readily available to the public; the government has several channels of communication at its disposal; the public is willing to change attitudes and behaviours if they receive the appropriate climate change education and communication; there is technical personnel with the capacity to implement climate change communication initiatives; and there is evidence of political will to support climate change adaptation and communication.
- **Weaknesses**, including low public awareness about national climate change policies and legislation; inadequate access and usage of climate change data by decision makers; low budget allocation for climate change adaptation initiatives among MDAs; climate change issues are yet to form major parts of the government's plans and budgets.
- **Opportunities**, including that there are funding opportunities to support capacity-building initiatives on climate change communication in Sierra Leone; and development partners are committed to supporting climate change-associated initiatives in the country, and

- **Threats**, including that most of the general public is still in denial about climate change; some politicians, religious and cultural leaders still miscomprehend facts about climate change; there is an excessive use of scientific terminology and technical information in communicating climate change; and there is limited positive change in behaviours, attitudes, perceptions and practices.

A plan for public engagement is presented in table 13 below.

Table 13: Plan for public engagement (adapted from EPA 2020)

Target audience	Tools and approaches	Channels	Information source	Engagement frequency
Primary: Policymakers (MDAs) Political leaders	Policy briefs, press releases, flyers, banners, reports, posters, calendar, brochures, guides, handbooks, stickers, infographics, pictures, documentaries, stories, drama, animations, talk shows, announcements, adverts, notices	Television and radio, printed materials, outdoor displays, social media (WhatsApp, Facebook, etc.), community outreach and town hall meetings, mobile phone (call, SMS, apps), websites	MDAs, CSOs, development partners, research institutes, private sector, online databases, websites	Quarterly
Secondary: Media, CSOs, the private sector, development partners, academic and research institutions, youth, women, farmers, vulnerable groups	Policy briefs, press releases, flyers, banners, reports, posters, calendars, brochures, guides, handbooks, stickers, infographics, pictures, documentaries, stories, drama, animations, talk shows, announcements, adverts, notices	Television and radio, printed materials, outdoor displays, social media (WhatsApp, Facebook, etc.), community meetings, mobile phone (call, SMS, apps), websites	MDAs, universities, lead agencies (e.g., projects), research institutes, enforcement agencies, online databases, websites, mobile apps, policy and law	Monthly

7.4 GESI mainstreaming

The governance and coordination mechanism for the NDC will foster the empowerment of women and marginalised people by ensuring meaningful participation in NDC implementation activities. Activities that create an enabling environment for women, youth, children, and persons with disability have been proposed, which will help to institutionalize GESI-sensitive approaches delivered at the technical and operational levels. Overall, NDC actions will promote a supportive institutional and policy environment for mainstreaming gender equality and social inclusion; mainstream GESI dimensions into the thematic and cross-cutting components of the NDC; enhance the capacity of partners and stakeholders to give women and marginalised groups a voice in climate management decision-making; and secure rights by increasing access to climate services and other socio-economic opportunities. The strategy for GESI mainstreaming is aligned with the Gender Equality and Women's Empowerment Policy

(GoSL 2020) and contributes to the implementation of the country's vision for GESI in the Medium-Term National Development Plan (MTNDP).

7.5 Policy influencing

The NDC is aligned with several existing national and international policies, strategies, and plans, including the Medium-Term National Development Plan, AU Vision 2023, and the Sustainable Development Goals (see table 14). Therefore, it contributes to various country-level and regional actions to address climate change as part of global efforts to reduce vulnerabilities and mitigate emissions in countries. For instance, the governance and coordination mechanism for the NDC will support the delivery of SDGs, especially those on strong, accountable, and inclusive institutions (SDG16), strengthening means of implementation (SDG17), and creating more equitable governance systems (SDG4).

Table 14: NDC alignment with and the MTNDP, AU vision 2063 and SDGs,

Strategies	Alignment with the MTNDP	Alignment with AU Vision 2063	Alignment with the SDGs
Improve mechanisms for multilevel climate governance and coordination.	1,2,4	Vision 1& 6	Goal 13
Increase Energy efficiency and access through the dissemination of clean energy technologies	2,3,4,8	Vision1,3,6 &7	Goal 7
Promote the mainstreaming of climate actions into processes within industries	2,7,8	1,6,7	Goal 14
Improve and maintain Sierra Leone's forests as a major carbon sink.	7,8	1,5	Goal 15
Enhance integrated waste management system in the country	1,7.8	1,4,5,6,7	Goals 3 &6
Maintain the integrity of the marine and coastal environment	7	1.5.6	Goal 14
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.	2,3,4,8	1,3,4	9
Adoption and application of climate-smart and conservation agriculture through best agricultural practices that enhance soil fertility and improve crop yield	2,7	1,3,6	2
Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation.	2,7,8	1,5,6,7	2,13,15
Integrated management of crops and Livestock management. Strategy	2,8	1,5,6	2,13,15
Strengthen integration of climate change adaptation into the health Sector.	1,5,7	1,3,4,6	3,6,11
Create enabling environment for the resilience of private sector investment, demonstrate an operational business case	1,4,7,8	2,3,4	1,2,4,5,8,9, 16,17
Integrate climate change adaptation into the mining/extractive sector	2,3,4,7	1,2,3	8,9,15

Strategies	Alignment with the MTNDP	Alignment with AU Vision 2063	Alignment with the SDGs
Promote climate-smart agriculture and climate-resilient food security practices	2,3,4,5,6,7	1,3,4,5	1,2,12,13,14,16
Improve research and knowledge management capacities to Support Climate-Smart Agriculture and resilient land management	1,2,4,8	1,3	6,13,14,15
Improve institutional and functional capacities for integrated water management	1, 3,7,8	1,3	6,13
Enhance universal access to energy by promoting renewables and energy efficiency	2,3,4,8	1,2,3,4	6,7
Mainstream considerations of Gender Equality and Social Inclusion into sectoral plans and strategies	3,4,5,8	1,2,3,4,5,6,7	5
Develop local institutional capacity to support coastal resources management	1,2,3,4,8	1,2,3,4,5,6,7	6,14,
Management of coastal and fisheries resources	1,2,3,4,8	1	6,14
Increase human (social) development through technology transfer and livelihood support	1,4	2,3,6,7	1,2,9,16
Provide information and improve knowledge on climate risks and vulnerabilities	7	1,3,5,6	13,14,15
Improve Natural Resources Management in critical biodiversity hotspots	7	1,3,6,7	6,13,14,15
Improve the resilience of environmental value chains across the sector (including forestry, mining, tourism, and land management).	2,4,7	1,3,7	1,2,3,6,14,15
Mainstream climate change adaptation considerations into sectoral plans and strategies	2,8	1,3,7	1,2,3,6,14,15
Improve institutional and functional capacities for environmental governance	2,3	2,3,4,5,6,7	8,9,16,17
Establish early warning systems to improve local understanding of risks	7,8	1,6,7	4,16,17
Improve regulatory frameworks for disaster management	7,8	1,6,7	4,16,17

7.6 Monitoring, Reporting, and Verification (MRV)

NDC actions will be tracked to meet local and international reporting requirements, including reports to policy makers and the public to improve transparency and shape decisions to update climate actions. The MRV framework proposed here builds upon sector-based systems for climate monitoring and reporting, as well as national approaches to MRV, including outputs of the CBIT (Capacity Building Initiative for Transparency) project “Building and Strengthening Sierra Leone’s National Capacity to Implement the Transparency Elements of the Paris Agreement, 2020-2023”.

MRV actions will focus specifically on tracking mitigation (M), adaptation (A), and finance (F)- see table 15. For mitigation, the goal is to assess current and future progress in reducing GHGs by reviewing both the national inventory and national communications. This will involve regular M&E actions to track the implementation of the mitigation component of the NDC to ensure actions are contributing to meeting targets set and providing lessons for future decision-making. In the case of adaptation, the goal is to track implementation and assess the effectiveness of actions, and as provide insights for updating NAPs. In terms of financing, MRV efforts will track climate finance flows for NDC implementation to improve transparency and determine if resource needs are being met.

Table 15: MRV Indicators for proposed NDC actions

Strategies	**Mitigation or Adaptation**		**MRV Indicators**
	M	**A**	
Improve mechanisms for multilevel climate governance and coordination.	**X**		- Institutional and regulatory systems that improve incentives for low emission planning and development and their effective - # of policies, laws & technical documents based on climate datasets and modeling scenarios - # of technical staff from the relevant sector ministries with relevant capacities in GHG datasets or proportion of "relevant" sectors covered by analyses at national level - Proportion of government investment/program documents using results from climate mitigation actions as a priority-setting or screening tool. - # of climate information dissemination models by type of outlet (e.g. radio, newspaper, website), geographic coverage, level of disaggregation of - Tonnes of carbon dioxide equivalent (t CO2eq) reduced or avoided (including increased removals) by category - Proportion of low-emission power supply in a jurisdiction or market - % reduction in the annual fuel consumption for electricity power generation and transportation - Energy intensity/improved efficiency of buildings, cities, industries and appliances. - GHG emissions from industrial processes - # of technologies and innovative solutions transferred or licensed to support low-emission development. - % of forest cover in the country (Forest Investment Program anticipated indicator)
Increase Energy efficiency and access through the dissemination of clean energy technologies	**X**		
Promote the mainstreaming of climate actions into processes within industries	**X**		
Improve and maintain Sierra Leone's forests as a major carbon sink.	**X**		
Enhance integrated waste management system in the country	**X**		
Maintain the integrity of the marine and coastal environment	**X**		
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.	**X**		
Adoption and application of climate-smart and conservation agriculture through best agricultural practices that enhance soil fertility and improve crop yield	**X**		

Strategies	Mitigation or Adaptation		MRV Indicators
	M	A	
			- Tonnes of methane (CH4) reduced or avoided by category - # of people with diversified income - Tonnes of waste produce per year - Tonnes of methane converted into energy - # of incineration facilities provided - Tonnes N2O emissions reduced or avoided by category
Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management, and pasture rehabilitation.		**X**	- Conservation of forest genetic resources - # of inventories of climate change impacts on biodiversity - Area of land under landscape-scale conservation - Change in predictable losses of lives and economic assets due to the impact of extreme climate-related disasters in the geographic area - # of climate change vulnerability analysis and maps of coastal zone developed - Uptake of early warning systems (UV and air/water quality) - Uptake of measures to reduce air pollution - Uptake of soil conservation measures - %of climate-resilient trees/crops planted - Proportion of relevant sectors (water, forest, tourism, environment, disaster, gender, etc.) taking action on adaptation - Uptake of riparian tree planting - % of poor people in vulnerable communities with access to safe and reliable water disaggregated by gender - % of urban households with access to piped water - % of companies/industries assessing risks and opportunities from extreme weather and reduced water availability to their production and supply chains - % of agricultural land with improved irrigation - % of farming shifted to lowland (IVS farming) - % of treated wastewater - % of coastline under marine protection - # of women organised in agricultural cooperatives - % of farmers and fisher folk with access to financial services disaggregated by gender
Integrated management of crops and Livestock management. Strategy		**X**	
Strengthen integration of climate change adaptation into the health Sector.		**X**	
Create enabling environment for the resilience of private sector investment, demonstrate an operational business case		**X**	
Integrate climate change adaptation into the mining/extractive sector		**X**	
Promote climate-smart agriculture and climate-resilient food security practices		**X**	
Improve research and knowledge management capacities to Support Climate-Smart Agriculture and resilient land management		**X**	
Improve institutional and functional capacities for integrated water management		**X**	
Enhance universal access to energy by promoting renewables and energy efficiency		**X**	
Mainstream considerations of Gender Equality and Social Inclusion into sectoral plans and strategies		**X**	
Develop local institutional capacity to support coastal resources management		**X**	
Management of coastal and fisheries resources		**X**	
Increase human (social) development through technology transfer and livelihood support		**X**	

Strategies	Mitigation or Adaptation		MRV Indicators
	M	A	
Provide information and improve knowledge on climate risks and vulnerabilities		X	- % of climate resilient crops being used - % of climate resilient roads in the country - % of households at reduced risk of floods - % reduction of flood damage and disaster relief costs in cities due to increased standards for flood protection and improved flood emergency preparedness
Improve Natural Resources Management in critical biodiversity hotspots		X	
Improve the resilience of environmental value chains across the sector (including forestry, mining, tourism, and land management).		X	
Mainstream climate change adaptation considerations into sectoral plans and strategies		X	
Improve institutional and functional capacities for environmental governance		X	
Establish early warning systems to improve local understanding of risks		X	
Improve regulatory frameworks for disaster management		X	

Additional indicators relevant to resource mobilization:

- New projects approved
- Total annual domestic allocation
- Total financing mobilized from international public entities
- Total financing mobilized from the private sector
- Total financing mobilized from other sources

7.7 Governance and coordination

NDC implementation will be overseen by the Ministry of the Environment with technical support provided by the Environment Protection Agency (EPA) and the Sierra Leone Meteorological Agency (SLMet). The process will be supported by different Ministries, Departments, and Agencies (MDAs). The governance and coordination will involve driving progress, engaging stakeholders within and outside of government, maintaining political will at all levels, and coordinating planning and decision-making processes. The existing mechanisms for NDC implementation, such as institutional structures prescribed by the NAP, NFCS, MTNDP, NCCP, CCS, and other plans, policies, and strategies, will be maintained, to foster shared action and ensure inclusive stakeholder engagement across diverse actors-national, subnational, municipal, public, private, civil society, and community. Specific agencies (like the Sierra Leone Meteorological Agency) will be assigned specialised roles in the process, building on existing policies and processes, climate-related or otherwise.

As noted earlier, The Sierra Leone Climate Finance Fund (SLCFF) will be formed to mobilize and track the flow of finances. The architecture will include a Board of Directors or Steering Committee operated under the EPA with the EPA Executive Chairperson as the Board Chair; members taken from key stakeholder institutions, including select MDAs, private agencies, international donor organisations, and civil society. A Terms of Reference (ToR) and a strategic plan will be drawn to guide the establishment and running of the fund. On another hand, Sector Leads will be identified for rolling-out MRV actions and ensuring effective coordination. The Sector Leads will be part of a Sector Working Group (SWG) responsible for planning and delivery, as well as coordination with various District Working Groups (DWGs) at the subnational level. These structures will mainstream climate priorities and actions into subnational development plans, budgets, and other efforts.

Table 16: NDC governance and coordination matrix

Implementation strategy	**Lead institutions**	Supporting institutions
Resource mobilisation	EPA, SLMet	Ministry of Finance, Ministry of Foreign Affairs and International Cooperation, Public Private Partnerships Unit (Office of the Vice President), bilateral and multilateral organisations
Capacity building and technology transfer	EPA-SL	Directorate of Science, Technology, and Innovation
Public engagement		Ministry of Information and Communications
GESI mainstreaming		Ministry of Gender and Children's Affairs
Policy influencing	MoEnv	Ministry of Environment, Ministry of Planning and Economic Development, Ministry of Agriculture and Forestry, Ministry of Energy, Ministry of Water Resources, Ministry of Trade and Industry, Ministry of Fisheries and Marine Resources, Ministry of Mines and Mineral Resources, National Protected Area Authority, National Minerals Agency, Forestry Division
MRV (including data generation, analysis, and management)		Statistics Sierra Leone, National M&E Directorate
Governance and coordination		Ministry of Environment

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