TECHNICAL ASSISTANCE REPORT

SIERRA LEONE

Climate Policy Diagnostic

NOVEMBER 2024

Prepared By

Christine Richmond, Katja Funke, Henk Jan Reinders, Sunalika Singh, and Karlygash Zhunussova

Fiscal Affairs Department

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International Monetary Fund, IMF Publications
P.O. Box 92780, Washington, DC 20090, U.S.A.
T. +(1) 202.623.7430 • F. +(1) 202.623.7201
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Abbreviations and Acronyms

AFOLU	Agriculture, Forestry, Land Use, and Others Land Use
ASSS	Adaptive Social Safety Systems
BSL	Bank of Sierra Leone
BUR	Biennial Update Report
CBA	Cost-Benefit Analysis
CCS	Climate Change Secretariat
CSA	Climate Smart Agriculture
DMPRR	Disaster Management, Preparedness, Response, and Recovery Plans
DPL	Development Policy Loan
DRF	Disaster Risk Financing
DRM	Disaster Risk Management
EDSA	Electricity Distribution and Supply Authority
EGTC	Electricity Generation and Transmission Company
EPA-SL	Environment Protection Agency Sierra Leone
EWRC	Electricity and Water Regulatory Commission
GFSI	Global Food Security Index
GHG	Greenhouse Gas
GoSL	Government of Sierra Leone
GVWC	Guma Valley Water Company
iNAP	Initial National Adaptation Plan
IPCC	Intergovernmental Panel on Climate Change
IVS	Inland Valley Swamp
LULUCF	Land Use, Land-Use Change, and Forestry
MDA	Ministry, Department, and Agency
MELSS	Ministry of Employment, Labour, and Social Security
MIA	Ministry of Internal Affairs
MoAFS	Ministry of Agriculture and Food Security
MoECC	Ministry of Environment and Climate Change
MoHS	Ministry of Health and Sanitation
MoLHCP	Ministry of Land, Housing, and Country Planning
MoPED	Ministry of Planning and Economic Development
MoTA	Ministry of Transport and Aviation
MoFMR	Ministry of Fishery and Marine Resources

MRV	Monitoring, Reporting, and Verification
MoSW	Ministry of Social Welfare
MTI	Ministry of Trade and Industry
MTNDP	Medium-Term National Development Plan
MoWRS	Ministry of Water Resources and Sanitation
NARTGA	National Reforestation and Timber Governance Agency
NAMA	Nationally Appropriate Mitigation Actions
NAP	National Adaptation Plan
NaSCA	National Commission for Social Action
NCCP	National Climate Change Policy
NCCSAP	National Climate Change Strategy and Action Plan
NDC	Nationally Determined Contribution
NDMA	National Disaster Management Agency
NFI	National Forest Inventory
NGO	Non-Governmental Organization
NSPS	National Social Protection Strategy
NPAA	National Protected Area Authority
NPDRR	National Platform for Disaster Risk Reduction
NWRMA	National Water Resources Management Agency
ONS	Office of National Security
PA	Paris Agreement
PES	Payment for Ecosystem Services
PFM	Public Financial Management
PI-CREF	Presidential Initiative on Climate Change, Renewable Energy, and Food Security
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SALWACO	Sierra Leone Water Company
SDG	Sustainable Development Goals
SLCAA	Sierra Leone Civil Aviation Authority
SLEWRC	Sierra Leone Electricity and Water Regulatory Commission
SL-MET	Sierra Leone Meteorological Agency
SLR	Sea Level Rise
SLRA	Sierra Leone Roads Authority
SWG	Sector Working Group
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary Carbon Market
WASH	Water, Sanitation, and Hygiene

Preface

At the request of the Ministry of Finance of Sierra Leone, a team from the IMF's Fiscal Affairs Department (FAD) undertook an in-person mission from September 18 to October 1, 2024, in Freetown, for a comprehensive assessment of climate fiscal policies. The mission team was led by Ms. Christine Richmond and included Ms. Sunalika Singh, Ms. Karlygash Zhunussova (all FAD), Mr. Henk Jan Reinders (SPR), and Ms. Katja Funke (FAD short-term expert).

The mission benefitted from meetings with the teams under the purview of the Honorable Mr. Sheku Bangura (Ministry of Finance), Honorable Madam Kenyeh Barlay (Ministry of Planning and Economic Development (MoPED)), Honorable Mr. Jiwoh Abdulai (Ministry of Environment and Climate Change (MoECC)), Honorable Dr. Henry Musa Kpaka (Ministry of Agriculture and Food Security (MoAFS)), Honorable Dr. Eldred Tunde Taylor (Ministry of Energy), Dr. Kandeh K Yumkella (Presidential Initiative on Climate Change, Renewable Energy and Food Security), and Honorable Mrs. Princess Dugba (Ministry of Fisheries and Marine Resources), as well as representatives from Environment Protection Agency, Electricity Generation and Transmission Company (EGTC), Electricity Distribution and Supply Agency, Electricity and Water Regulatory Commission (EWRC), Sierra Leone Meteorological Agency (SL-MET), National Protected Area Authority (NPAA), National Disaster Management Agency (NDMA), Ministry of Internal Affairs (MIA), Office of National Security (ONS), Ministry of Lands and Housing, Freetown City Council, Ministry of Local Government and Community Affairs, Ministry of Employment, Labour, and Social Security (MELSS), Ministry of Social Welfare (MoSW), Sierra Leone Water Company (SALWACO), Ministry of Works and Public Assets, Ministry of Mines and Mineral Resources, Ministry of Transport and Aviation (MoTA), Ministry of Trade and Industry (MTI), Ministry of Foreign Affairs and International Cooperation, Ministry of Technical and Higher Education, Bank of Sierra Leone (BSL), Ministry of Information and Civic Education, Ministry of Water Resources, and National Commission for Social Action (NaSCA). The mission also met with representatives from the European Union, World Food Programme, United Nations Development Program, and World Bank.

The mission would like to particularly thank Mr. Sellu McCarthy (Ministry of Finance, Climate Finance Unit) and his staff for close collaboration, open exchanges, and support during the mission. In addition, the mission is grateful to the IMF Resident Representative, Wayne Mitchell, and his staff, Rashid Kargbo and Edison Juso, for their guidance, active participation, coordination, and administrative support provided before and during the mission.

Executive Summary

The Government of Sierra Leone (GoSL) aims to attain middle-income status by 2039 while addressing multiple development challenges. Key priorities include increasing access to electricity (currently less than 40 percent of the population has access), improving food security (one-third of households are severely food insecure), and expanding access to basic water and sanitation services (available to just over 60 percent and 31 percent of the population, respectively). These goals are complicated by a growing population, constrained fiscal space, high public debt, low domestic revenue, and limited private investment. Climate change will further strain efforts. Integrating climate action into the broader development agenda, supported by education and information sharing, will be essential for Sierra Leone's success.

Sierra Leone is experiencing significant climate change, including rising temperatures, more frequent extreme hot days, and more intense precipitation events. The impact is already being felt with climate-related natural disasters posing a threat to lives and livelihoods, human health, and food security; heavy rains in September 2024 resulted in severe flooding, displacement, crop loss, and contributed to collapsed buildings.

Expanding Energy Provision While Containing Emissions

Energy access is a major developmental and climate challenge for Sierra Leone. Currently, less than 40 percent of the population has access to electricity, with unreliable service and frequent outages reported. Most electricity generation comes from hydropower and imported fossil fuels, which is expensive and contributes to high operational costs for state-owned energy companies. In addition, the inefficiencies in the energy sector, including outdated infrastructure, high transmission losses, and low bill collection rates, have left the sector financially vulnerable. Addressing these issues will require a comprehensive energy sector reform that includes tariff adjustments, competitive tendering for Independent Power Producers (IPPs), and investments in renewable energy sources such as solar mini-grids. Rural electrification, which lags significantly behind urban areas, should be prioritized. Mini-grids powered by renewable energy could provide a viable solution, but they currently face high capital costs and affordability issues for end-users. Sierra Leone relies on fuel imports, with government’s direct and indirect subsidies intervening with efficient pricing. Restoring the GST for petrol and diesel and adjusting taxation to incorporate inflation and exchange rate fluctuations on a predictable schedule would support fuel efficiency and promote cleaner energy mix.

The agriculture and forestry sectors are both crucial to Sierra Leone’s economy and livelihood but are under pressure from deforestation and unsustainable agricultural practices. Agriculture accounts for 43 percent of GDP and is a significant source of employment, but its expansion, particularly through shifting small-scale traditional farming methods, is causing significant deforestation. The country has lost about 25 percent of its tree cover since 2000, primarily due to expanding agriculture, urbanization, and logging. Deforestation is not only a threat to biodiversity but also a major contributor to greenhouse gas (GHG) emissions, with the agriculture and land use, land-use change, and forestry (LULUCF) sectors combined accounting for 60 percent of Sierra Leone’s total emissions. The government has set ambitious targets for forest preservation and reforestation but needs to do more in order to realize them. Completing a forest

inventory and strengthening monitoring and enforcement mechanisms are important activities to be undertaken.

Climate Sensitive Management of Water Resources and Waste

Sierra Leone's water resources are under increasing strain from climate change and human activity. The country's water supply is critical for agriculture, hydropower, and basic consumption needs, yet it is becoming more vulnerable to extreme weather events such as floods and droughts. Deforestation and urban sprawl, particularly in and around Freetown, are exacerbating these challenges by reducing the ability of watersheds to replenish and store water. At the same time, waste management facilities are lacking. The government has made progress in establishing legal frameworks for water resource management, including the creation of the National Water Resources Management Agency (NWRMA), but enforcement remains weak due to capacity constraints. The introduction of water permits for water extraction is a positive step toward regulating use, but public awareness of this system is low, particularly among small-scale users. Improved data collection on water availability, stronger enforcement mechanisms, and the development of long-term climate scenarios to ensure that water resources are managed sustainably are needed. To incentivize waste reduction, the government could expand the advance disposal fee for plastic to cover all plastic materials and single-use recyclable beverage containers, while encouraging the use of biodegradable materials (such as cellulose). It could also in the medium-term implement a refund system to further encourage waste collection and recycling.

Resilience to Climate Change Implications

Increasing climate-related risks, particularly from extreme weather events such as flooding, landslides, and coastal erosion, pose a threat to lives and livelihoods. The government has made progress in disaster risk management (DRM) by establishing the National Disaster Management Agency and formulating a National Disaster Risk Management Policy. Disaster risks are exacerbated by human activities, including uncontrolled expansion of vulnerable urban settlements around large cities and in coastal areas. However, the current focus is on responding to disasters and not on risk prevention or mitigation efforts. Effective land-use planning and building controls are pivotal in reducing disaster risks. This will require completing the significant land management reforms that are currently underway and introducing an appropriate building code. At the same time, the public sector should ensure that infrastructure is designed and built to be disaster safe and climate-resilient. Several sectors operate basic early warning systems (EWS) catering only to parts of the population. Taking a systematic approach to develop a single EWS by successively rolling out a multi hazard system that aspires to serve the entire population would allow for specialization and create synergies, saving scarce resources while providing a reliable service.

Enabling Institutions to Enact Climate Change

Sierra Leone has some basic elements of a legal framework for climate change management. However, in many areas the legal framework is outdated, resulting in contradictory laws and insufficient coordination of legacy policies across sectoral laws. The Government of Sierra Leone is currently preparing a Climate Change Act, which is expected to define the institutional arrangement for climate change management and offers an opportunity to provide an institutional structure with well-defined roles and responsibilities of institutions and individuals. It will be imperative that the law is accompanied by the appropriate revision of sectoral laws to integrate climate change considerations with a long-term view and

ensure consistent and clear responsibilities. While most sectoral policies refer to climate change issues, they lack a long-term view and vary in the level of their adaptation and mitigation considerations. The planning horizons are often limited to the short-term, driven by immediate development targets. Decision-making is hampered by limited data availability and sharing. To address these constraints, data requirements for efficient climate change management should be prioritized (such as hazard vulnerability maps and GHG inventory), and systematic information sharing should be established.

Recommendations

		Timing: ST/MT/LT	Priority: H/M/L
Expanding Energy Provision While Containing Emissions			
2.1	Establish transparent and competitive tendering procedures in the electricity sector. (ESDA, EGTC, EWRC, PPPU)	ST/MT	H
2.2	Expand installation of AMI meters to address commercial losses. (EDSA)	ST/MT	H
2.3	Impose GST on petrol and diesel. (MoF and PRA)	MT	H
2.4	Align diesel taxation (excises and other fees) with petrol and adjust taxation to reflect the real values, under a transparent and predictable schedule. (MoF and PRA)	ST	H
2.5	Add conditionality to social programs in the agriculture sector based on good environmental practices, agroforestry and conservation agriculture. (MoAFS)	MT/LT	M
2.6	In alignment with donors, consider introduction of a Payment for Environmental Services (PES) scheme to slow down deforestation. (MoECC)	LT	M
2.7	Complete and publish National Forest Inventory (NFI). (MoECC)	MT	H
2.8	Establish a continuous monitoring / measurement system for forestry using satellite data and piloting its use in a selection of Protected Areas. (MoECC; NPAA)	MT/LT	H
2.9	Operationalize a Monitoring, Reporting, and Verification (MRV) system, to allow for proper emission accounting and provide data to evaluate the impacts of environmental and climate policies, including from reforestation. (MoECC)	MT/LT	M
Climate Sensitive Management of Water Resources and Waste			
3.1	Enable the NWRMA to effectively implement the water permit system.	MT/LT	H
3.2	Generate and provide the data and analysis to support informed decisions on access to water resources. (MoWRM)	ST/MT	M
3.3	Introduce a formal process to manage conflicting demands on water resources at the policy and project planning stage. (MoWRM)	MT/LT	M
3.4	Remunerate piped water services (urban running water) at cost reflective rates covering operations and capital investment.	MT/LT	H
3.5	Expand the advance disposal fee for plastic to cover all plastic materials and single-use recyclable beverage containers. (plastic, aluminum, glass) (NRA; MoF)	ST/MT	H
3.6	Implement a refund system for single-use recyclable beverage containers at designated collection locations with unclaimed rebates earmarked to finance additional waste management facilities. (MoECC)	MT/LT	H
Resilience to Climate Change Implications			
4.1	Ensure the availability of needed information and to introduce climate and risk vulnerability assessments for all policies and projects. (NDMA coordinate)	ST/MT	H
4.2	Finalize revisions of the land management framework to make it fully consistent and comprehensive. (MoLHCP)	ST	H

4.3	Roll out land-use planning and register land titles in line with the new legal framework. (MoLHCP)	MT/LT	H
4.4	Enact and implement a building code that takes into account the risks from natural disasters and climate change. (MoLHCP)	ST/MT	H
4.5	Design and implement a scalable multi hazard EWS that is rolled out in line with risk considerations. (NDMA, SL-Met)	MT/LT	M
Enabling Institutions to Enact Climate Change			
5.1	Adopt and implement a comprehensive Climate Change Act that addresses critical gaps, by establishing an institutional framework, and aligning with United Nations Framework Convention on Climate Change (UNFCCC) mitigation commitments. (MoECC)	ST	H
5.2	Implement the Local Government Act (2022) and Devolution Directive (2019) which call for a decentralization of powers and capacity to local governments. (Individual ministries, MoLGA, Local Councils).	MT	M
5.3	Amend the Local Government Act (2022) so as to continue undertaking certain analytical and administrative functions centrally as a service to Local Councils, where more feasible and efficient, without undermining their authority in policy design and decision taking. (MoLGA, Individual Ministries)	ST	M
5.4	Ensure consistency between the Local Governments Law (2022) and the forthcoming Town and Country Planning Act to improve land use planning. (MoLH and MoLGA)	ST	H
5.5	Publish an annual report on climate related activities, including information on the key parameters, progress, and funding of climate related projects to build stakeholder ownership. (MoF, with inputs from other MDAs and development partners)	ST/MT	L
5.6	Identify and prioritize data requirements for efficient climate change management for each MDA, starting with Big 5: disaster risk data, GHG inventory, forestry inventory, climate scenarios and hazard vulnerability maps, structural plans. (Individual ministries)	MT	H
5.7	Introduce a system for effective data management and sharing between MDAs and development partners through standing MoUs. (MoECC)	ST/MT	H
5.8	Collect information on all donor related financing activities, noting which are for climate-related activities. (MoF)	ST	M

Recommendations that are characterized as short-term (ST) may be undertaken quickly by the authorities (in a year) if agreed. Proposals that require longer time to implement are labeled medium (2-3 years, MT) or long-term (3+ years, LT). Recommendations are prioritized by high (H), medium (M), and low (L).

I. Context

1. The Government of Sierra Leone aims to achieve middle-income status by 2039, while tackling multiple, competing development objectives: increasing access to electricity, improving food security and health outcomes, as well as providing better livelihoods and work opportunities. The development indicators highlight the magnitude of these challenges, with (i) less than 30 percent of the population having access to electricity, of which around 50 percent is produced from hydro power (SDG 7: Affordable and Clean Energy), (ii) almost one in three households being severely food insecure (MTNDP: Feed Salone; SDG 2: Zero Hunger), and (iii) basic water and basic sanitation services available to just above 60 and 31 percent of population, respectively (SDG 6: Clean Water and Sanitation). A growing population adds to pressure for access to basic resources including water, food, and energy. This is occurring in the context of constrained fiscal space characterized by elevated public debt levels, insufficient domestic revenue mobilization, and low private investment. At the same time climate change, through changing rainfall patterns and rising temperatures, will exacerbate the challenges of meeting Sierra Leone's development needs. Imbedding climate action within the broader development agenda will be important for achieving success on both fronts.

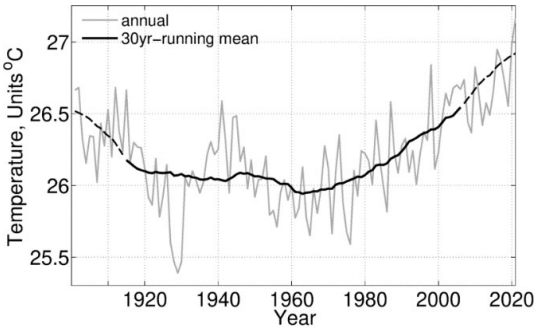
A. The Impact of Climate Change

Recent Trends

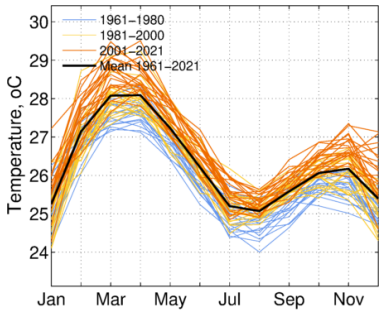
2. Temperature patterns in Sierra Leone have undergone a notable warming trend. Historically stable with minimal seasonal variation, temperatures in the country have risen sharply, particularly since the 1980s (Figure 1, panel A). Moreover, the number of extreme hot days in Sierra Leone has shown a significant upward trend in recent decades (Figure 2, panel A), suggesting that Sierra Leone is experiencing more frequent and intense heatwaves.

Figure 1. Sierra Leone Temperature (ºC) and Precipitation (mm/year) Timeseries

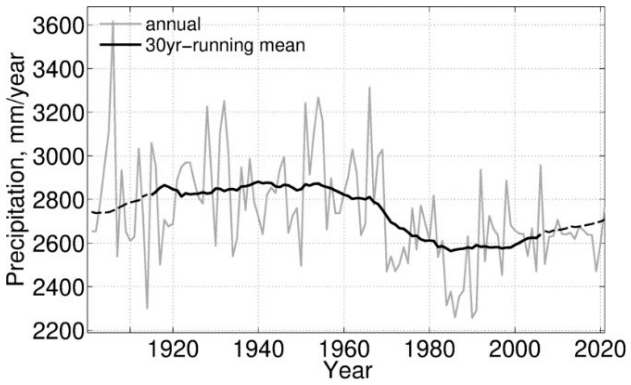
A. Country Wide Average Temperature



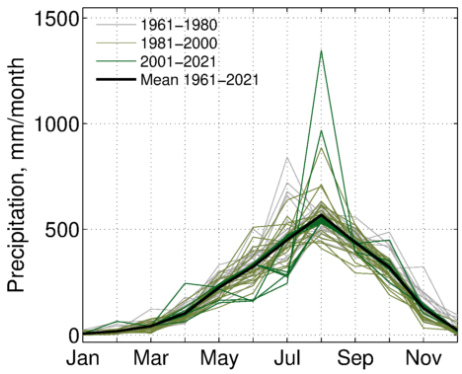
B. Seasonal Cycle



C. Country Wide Average Precipitation



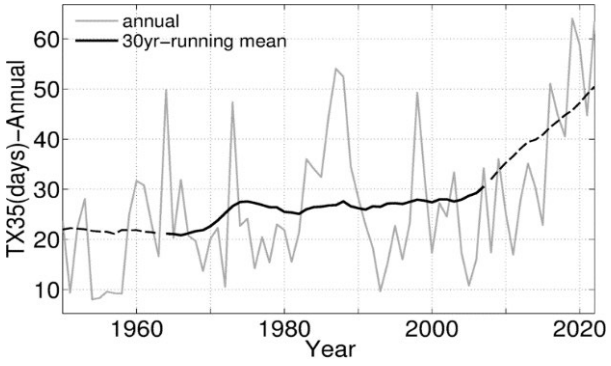
D. Seasonal Cycle



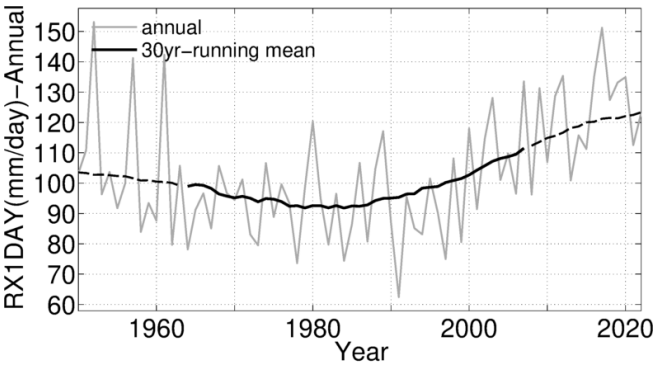
Source: FADCP Climate Dataset (Massetti and Tagklis, 2023) using CRU dataset (Haris et al. 2020).[1]
Notes: Annual timeseries: The solid line displays the 30-year average centered around each 30-year period. Edge effects near the beginning and end of the time series may affect the accuracy of the mean in those regions (dashed). Monthly timeseries: Each line represents data from a single year. The colors transition from grey to green (for total precipitation) and from blue to red (for mean temperature), illustrating the presence or absence of a trend. The bold black line shows the average across the 60-year periods.

Figure 2. Extreme Climate Indices: Average Conditions and Recent Changes

A. Annual Number of Hot Days (TX35)



B. Annual Max 1-Day Precipitation (RX1) (mm)



Source: FADCP Climate Dataset (Massetti and Tagklis, 2023) using ERA5 reanalysis dataset (Hersbach et al. 2023)[2].
Notes: In the timeseries the solid line displays the 30-year average centered around each 30-year period. Edge effects near the beginning and end of the time series may affect the accuracy of the mean in those regions (dashed).

3. Sierra Leone's tropical rainforest climate makes it one of the wettest regions in West Africa. Characterized by lush forests and abundant rainfall, the country experiences peak precipitation levels during the rainy season, often exceeding 400 mm monthly (Figure 1, panel B), displaying significant inter-annual variability (Figure 1, panel D). While there has been a decline in total annual rainfall, Sierra Leone

[1] Harris, I., Osborn, T.J., Jones, P. *et al.* Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. *Sci Data* 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3

[2] Hersbach, H., Bell, B., Berrisford, P., Biavati, G., Horányi, A., Muñoz Sabater, J., Nicolas, J., Peubey, C., Radu, R., Rozum, I., Schepers, D., Simmons, A., Soci, C., Dee, D., Thépaut, J-N. (2023): ERA5 hourly data on single levels from 1940 to present. Copernicus Climate Change Service (C3S) Climate Data Store (CDS), DOI: 10.24381/cds.adbb2d47

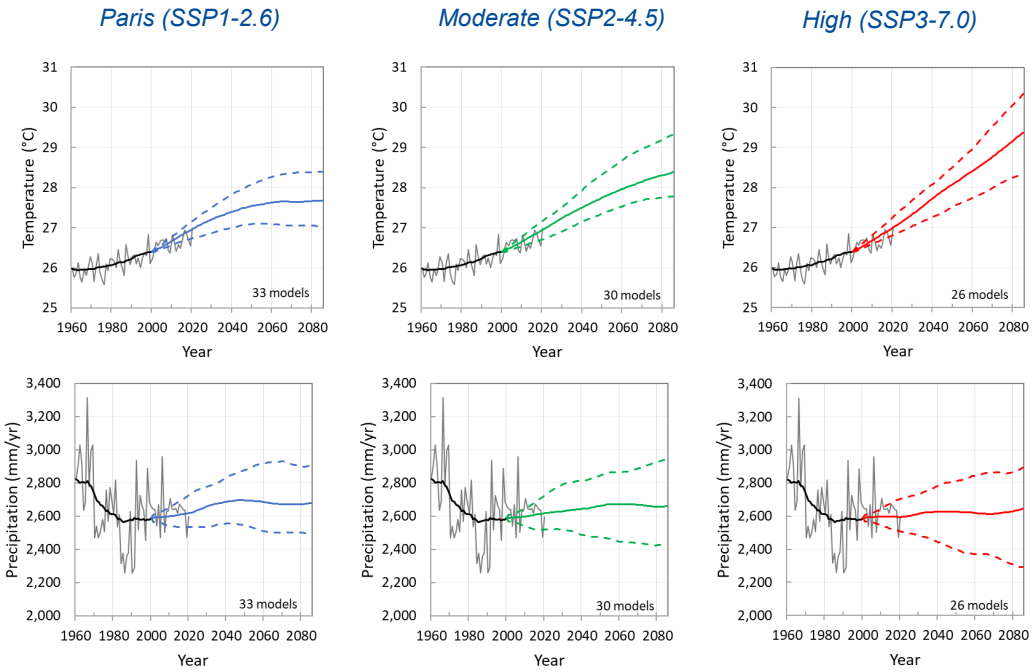
has seen an increase in the intensity of rainfall events, particularly evident in the rising trend of annual maximum 1-day precipitation (RX1DAY) (Figure1A2 Panel B).

4. The country's low-lying coastline is susceptible to coastal erosion, flooding, storm surges, and saltwater intrusion. The capital city, Freetown, is home to around 1.5 million residents or about 20 percent of the country's population and is located below 15 meters above sea level. Global average sea level rose by 0.2 meters between 1901 and 2018 and the pace of increase is accelerating (Intergovernmental Panel on Climate Change (IPCC) 2023).

Future Projections

5. Sierra Leone's temperatures are projected to rise significantly throughout the century, with increases depending on future emission scenarios (Figure 3). Median estimates of additional warming in Sierra Leone by the end of the century, relative to the 1985-2014 baseline, range between approximately 1.3°C and 3.0°C, reaching up to 3.9°C in the most extreme scenario. At the same time, the median projection across all model simulations suggests that average precipitation will remain relatively stable around current levels until the end of the century, but with large uncertainty ranges (dashed lines).

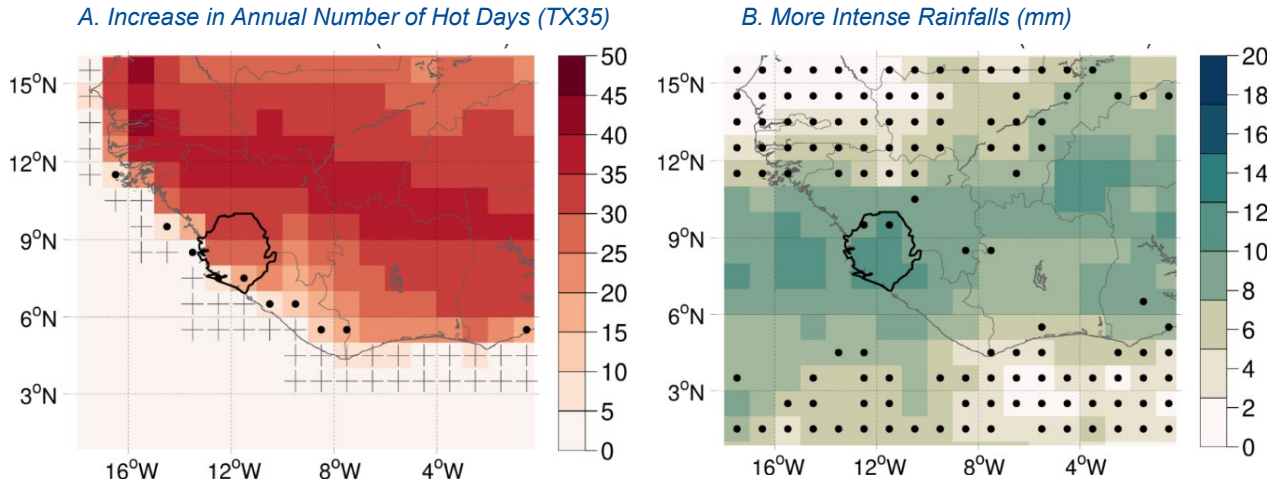
Figure 3. Time Series of Average Annual Temperature (ºC) and Total Annual Precipitation (mm/year)



Source: FADCP Climate Dataset (Massetti and Tagklis, 2023), using CRU data (Harris et al., 2020), and CMIP6 data (Copernicus Climate Change Service, Climate Data Store, (2021): CMIP6 climate projections).
Notes: The gray line describes historical mean annual temperature/precipitation based on observations (CRU). The black line describes the 30-year moving average of historical data centered around each 30-year period. Colored lines represent the median and the 80 percent range of temperature and precipitation anomalies (10^{th} and 90^{th} percentiles) added to the CRU value (thick black line in the year 2000). SSP1-2.6 is in line with the Paris goal to keep global mean temperature increase below 2 ºC with respect to pre-industrial times. SSP2-4.5 represents continuation of present trends. SSP3-7.0 is a high emission scenario.

6. There are growing risks of both extreme heat and intense rainfall in Sierra Leone. Figure 4 shows projected changes in Sierra Leone by 2050 under the SSP2-4.5 scenario (current trends). The left panel indicates a significant increase in the number of hot days (above 35°C), particularly in northern and western regions, where the rise could exceed 45 days per year (doubling from the current situation). The right panel projects a moderate increase in extreme rainfall single-day events, with central and eastern areas likely to see up to 8-12 mm more rainfall in a single day.

Figure 4. Projected Changes of Number of Hot Days and Extreme Precipitation by 2050 Under SSP2-4.5 (Current Trends)



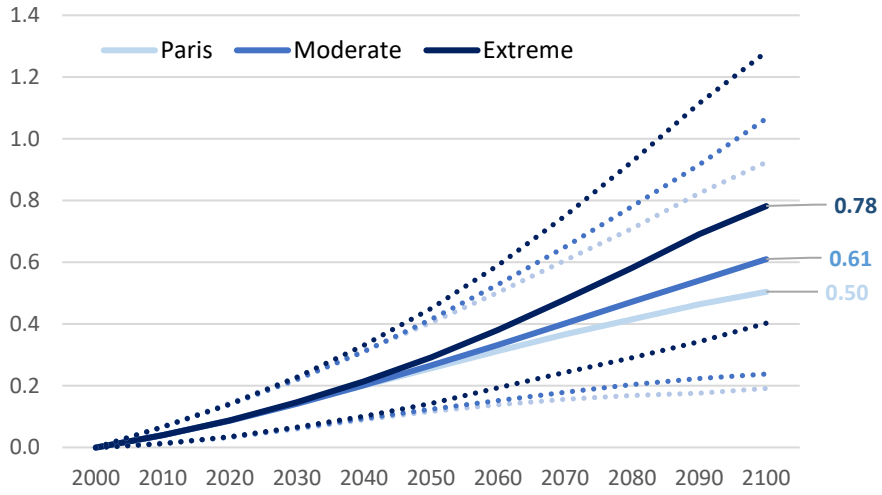
Source: FADCP Climate Dataset (Massetti and Tagklis, 2023), using data from The Copernicus Interactive Climate Atlas (C3S Atlas- https://atlas.climate.copernicus.eu/atlas).

Notes: The figure displays the projected changes relative to the 1991-2020 baseline under the SSP2-4.5 scenario for the Medium Term (2041-2060). The two panels represent annual metrics of (Left Panel) Days with Maximum Temperature Above 35°C and (Right Panel) Maximum of 1-Day Accumulated Precipitation. An advanced method for representing ensemble robustness is based on the approach proposed in AR6, categorized into three levels. Robust Signal: Indicates significant changes where at least 80% of the models agree on the sign of change. Conflicting Signals: Represented by crosses, indicating significant changes where less than 80% of the models agree on the sign of change. No Change or No Robust Signal: Represented by dots, representing areas of low change values and/or low significance, where less than 66% of the models exhibit emergent signals.

7. Sea-level is increasing and will continue to do so for centuries, a risk that can be managed, but not avoided. Median projections for Sierra Leone using a moderate emission scenario (RCP 4.5) indicate that by the end of the century sea-level will increase by 0.61 meters with respect to its level in 2000 (Figure 5). With an emission scenario in line with the Paris goal of keeping the global mean temperature increase below 2 °C (RCP 2.6), sea-level is projected to increase by 0.50 meters, while under a very high emission scenario (RCP 8.5), sea-level is projected to increase by 0.77 meters. This projected change of sea level is very similar to global average change.[3]

[3] See Annex 1 for more details on Sea Level Rise analysis.

Figure 5. Sea Level Rise Projections in Sierra Leone, Relative to 2000 (in meters)



Notes: Sea-level rise projections from Kopp et al. (2014) derived from the CIAM model database (Diaz, 2016). Probabilistic projections until 2100 under three emission scenarios (Paris - RCP 2.6; Moderate - RCP 4.5; Extreme - RCP 8.5). Solid lines depict median SLR, dotted lines depict the 5th and 95th percentiles of the distribution to account for uncertainty in the speed of sea-level rise and tipping points in Greenland and Antarctica Ice Sheets melting.

Implications for the Economy and Population

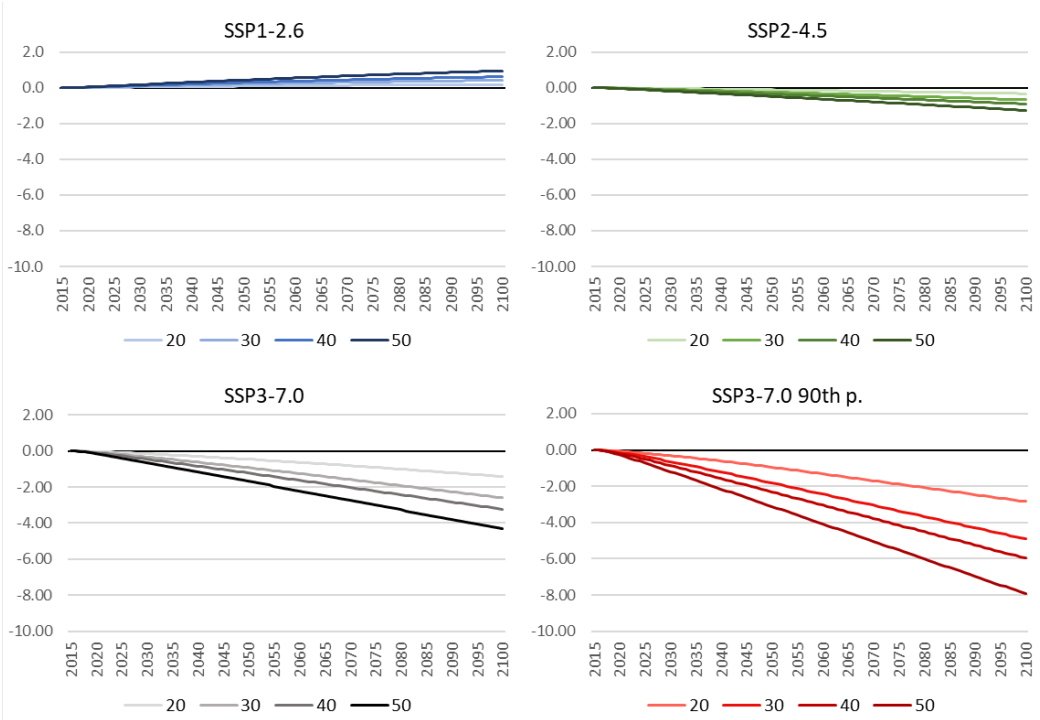
8. The significant warming trend and rise in extreme hot days is pushing Sierra Leone's climate beyond historical norms, raising concerns about the potential impacts on ecosystems, human health, and food security. At the same time, increasing rain complicates agricultural planning and water resource management. The shift towards more extreme rainfall poses heightened risks of flooding, which threatens infrastructure, agriculture, and vulnerable communities.

9. The warming trend predicted during the century could cause sizeable reductions in GDP per capita, especially with slow or no adaptation. In the fastest warming scenario considered for this analysis (SSP3-7.0 90th percentile: +3.9 °C compared to the year 2000), and assuming slow adaptation, GDP per capita is projected to decline by approximately 8 percent by 2100 with respect to what it would be if the present warming trend continues (Figure 6).[4] A scenario without adaptation at all causes damages approximately twice as large (Mohaddes and Raissi, 2024; not shown), but fast adaptation can reduce losses to approximately 3 percent of GDP per capita, for the same temperature change. These costs are relative to a world in which temperature increases along the observed trends and is already below its full potential. These estimates do not cover all potential impacts. For example, they do not include the effect of

[4] While the continuation of the historical temperature trend in the future does not reduce the growth rate of the economy, the loss of GDP per capita with respect to a hypothetical no-warming scenario (higher growth) grows over time. For example, if the long-run growth rate of the economy in year 2000 was equal to 3 percent per year and the observed temperature trend reduces growth by 0.2 percentage points per year, GDP per capita in 2024 would be 5 percent below its potential. Losses grow to 7 percent in 2040, and 18 percent in 2100.

extreme weather and sea-level rise, which needs specialized models. They also do not include the cost of adaptation, which underestimates costs estimated in the fast adaptation scenarios.

Figure 6. Sierra Leone Reduction of Real GDP per Capita with Respect to Continuation of Present Temperature Trends (Percent)



Source: FAD Staff estimates using Kahn et al. (2021), and CMIP6 data (Copernicus Climate Change Service, Climate Data Store, 2021) processed by Massetti and Tagklis (2024).

Notes: The impact of the warming trend for each scenario is estimated using Kahn et al. (2021) under the assumption that adaptation can offset the warming trend after 20, 30, 40, or 50 years. Impacts are measured as percentage deviations of real GDP per capita relative to a reference scenario in which the warming trend follows the historical pattern. Country specific warming trends are calculated for each scenario using the bias-adjusted ensemble median projections of temperature anomalies with respect to 1985-2014 over 30-year time periods centered around each year using CMIP6 data. The SSP1-2.6 scenario is in line with the Paris goal to keep global mean temperature increase below 2 ºC with respect to pre-industrial times. SSP2-4.5 represents continuation of present trends. SSP3-7.0 is a high emission scenario. SSP3-7. 90th p. uses the 90th percentile of the SSP3-7.0 ensemble instead of the median to provide a high-emission, fast-warming, pessimistic case.

10. IMF staff estimates the annual average cost of sea level rise (SLR) without adaptation is approximately equal to 0.3 percent of GDP from 2020 to 2099, using a moderate emission scenario (Figure 7).[5] Different emissions scenarios are not a major source of uncertainty as SLR responds to changes in emissions slowly, with costs ranging between 0.3-0.36 percent of GDP annually in a Paris-aligned and extreme emissions scenarios, respectively. In the worst-case scenario of extremely high emissions and very fast SLR, the cost increases to 0.45 percent of GDP annually. Most of the cost is attributed to loss of life and loss of capital during storm surges. These costs measure welfare losses, which include non-monetary costs like loss of life, ecosystem losses, and disutility from coastal

[5] Based on the state-of-the-art model of Sea Level Rise costs and adaptation CIAM (Diaz 2016). See Annex 1 for more information.

inundation.[6] While these are the appropriate metric to estimate the full economic impact of SLR, they do not necessarily imply a fiscal cost for the government.[7]

- Coastal protection can be very effective at reducing the cost of SLR in Sierra Leone, but it can be expensive. An investment of approximately 0.3 percent of GDP annually throughout the century reduces losses from storms and permanent inundation of the coastline virtually to zero, but the cost of protection summed to the monetized cost of disruptions to ecosystems in wetlands is almost as large as the cost of inaction. Furthermore, to be effective, investment in protection must be front-loaded at the cost of more than 1 percent of GDP until 2049.[8]

- Planned retreat from the coastline can substantially lower the cost of sea-level rise, but it needs careful planning, and its distributional consequences need to be estimated and assessed. Planned retreat relies on a pro-active move of the population and on a long-term strategy that avoids construction in areas that will be inundated. Assets exposed to future inundation are let depreciate over time. Eventually, the main cost for society comes from the permanent loss of land and from the disutility from moving away from inundated areas. Relocation to different neighborhoods within the same coastal city is usually sufficient to avoid inundated areas. This is the least-cost strategy along the entire coastline of Sierra Leone, and it can reduce the overall cost of SLR by more than 90 percent, to 0.015 percent of GDP under a moderate emission scenario and median SLR.[9]

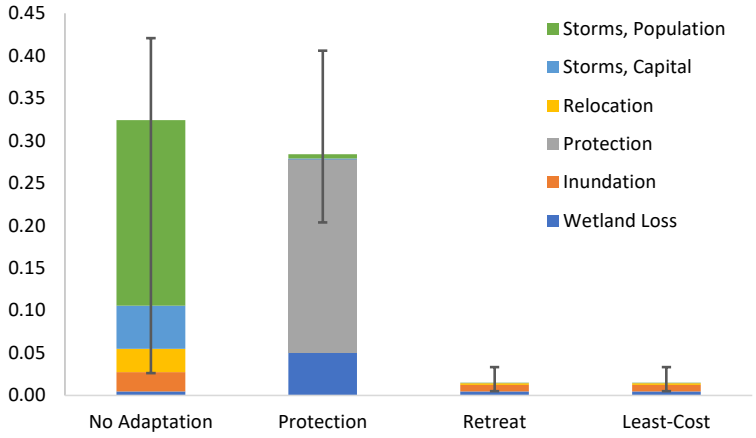
[6] The cost of SLR and all the adaptation strategies is calculated following best practices in cost-benefit analysis, which require including non-market impacts. The Value of Statistical Life is used to estimate the welfare loss from victims of storm surges. Willingness to pay for ecosystem services and willingness to accept for forced relocation are used for loss of wetland and relocation costs.

[7] For example, if the government does not need to compensate victims of storms, storms cause a loss for society, but not a fiscal cost. Loss of private capital may also not be a direct cost for the government. To estimate the fiscal cost of SLR additional assumptions are needed.

[8] Note that the model does not consider using mangroves or other nature-based solutions. There can be good reasons to avoid disrupting ecosystems along the coastline, but these come with opportunity costs.

[9] Avoiding development in areas at risk, while developing a comprehensive plan can be a sensible first step.

Figure 7. Annual Average (2020-99) Welfare Cost of Sea Level Rise in Sierra Leone (Percent of GDP)



Source: IMF Staff using the CIAM model (Diaz, 2016).
Notes: Average annual cost. Whiskers on top of each bar indicate the range of total cost using the 5th and 95th percentile of the probabilistic distribution of sea-level rise. Due to the highly non-linear nature of coastal impacts, adaptation costs, and effectiveness of adaptation measures, ranges are not always symmetric around total costs.

B. Sierra Leone's Climate Ambitions

Commitments

Mitigating Emissions

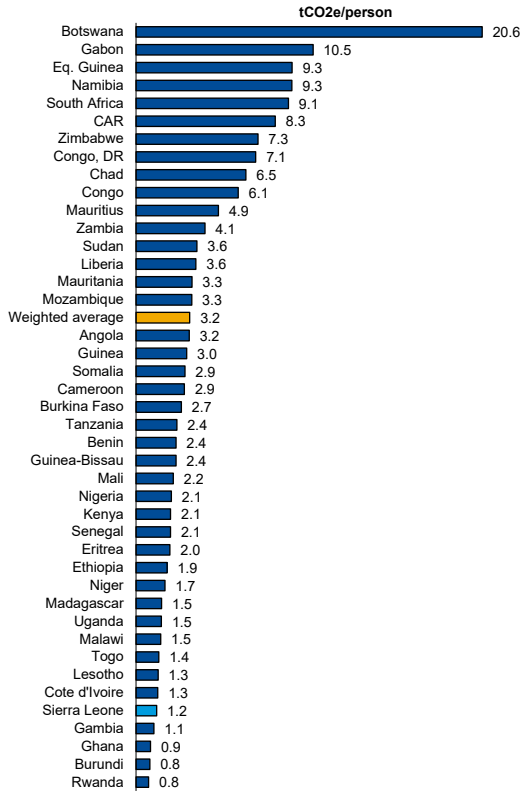
11. Estimates of Sierra Leone's emissions vary significantly. The First Biennial Update report (BUR, 2024) estimates 2020 emissions at 7.7 MtCO2e. In contrast, FAO datasets[10] report total GHG emissions nearly 50 percent higher, at 11.4 MtCO2e for the same year. Additionally, IMF estimates (used in this report) suggest emissions were around 10.2 MtCO2e in 2020, rising to 10.5 MtCO2e in 2022. The differences partially are driven by the lack of comprehensive official estimates.

12. While Sierra Leone's total and per capita emissions are low, its emission intensity of GDP is relatively higher. Sierra Leone accounts for approximately 0.02 percent of global GHG emissions. With 1.2 tCO2e emissions per capita, Sierra Leone is below the regional average of 3.2 tCO2e per capita (Figure 8, panel A) and significantly below the global average of 6.8 tCO2e per capita. However, the emission intensity of GDP of Sierra Leone is 1.47 tCO2e per 1000 USD GDP, which is almost three times the global average (0.5 tCO2e per 1000 USD GDP) but still 20 percent lower than the regional weighted average (Figure 8, panel B).

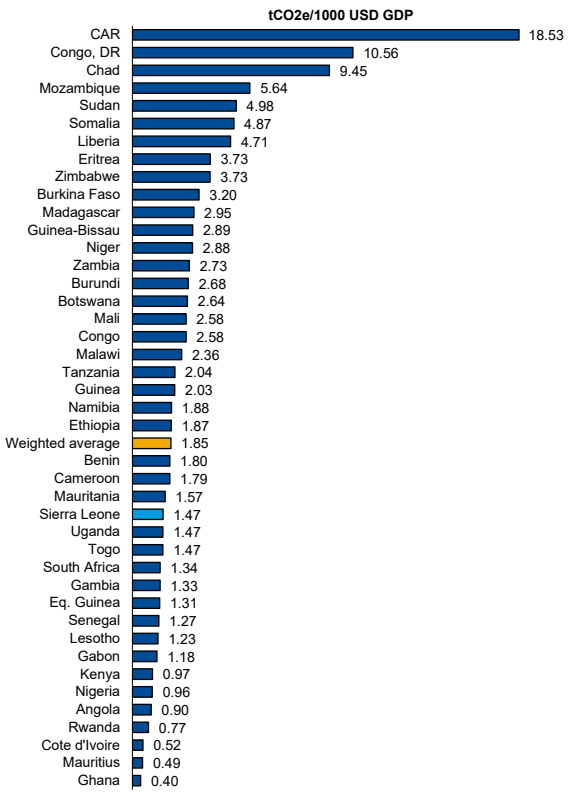
[10] https://www.fao.org/faostat/en/#data/GT

Figure 8. GHG Emissions Per Capita and GHG Intensity of GDP in Sub-Saharan Africa, 2022

A. GHG Emissions per Capita, 2022



B. Emissions Intensity of GDP, 2022



Source: IMF staff calculations.

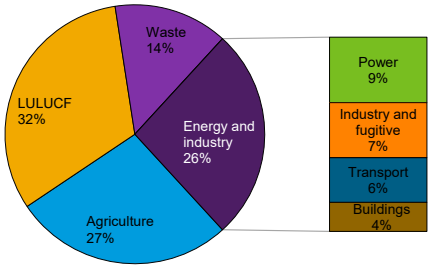
13. Most emissions in Sierra Leone come from forestry and agriculture. In 2022, 60 percent of Sierra Leone's 10.5 MtCO2e emissions originated from Agriculture, Forestry, Land Use, and Other Land Use ((AFOLU (of which 32 percent from LULUCF sector and 27 percent from agriculture with main contributors being deforestation, livestock farming, and rice cultivation (Updated BUR, 2024)), however, there is no comprehensive GHG inventory for the LULUCF and agriculture sectors. Approximately a quarter of emissions came from energy-related and industrial emissions (Figure 9, panel A).

14. Biomass and fossil fuels dominate primary energy consumption, adversely impacting health and productivity. Biomass (76 percent in 2022) and oil products (22 percent in 2022) historically dominate primary energy consumption (Figure 9, panel B). Fossil fuel consumption in transport and buildings sectors account for approximately 80 percent of energy-related emissions, with another 16 percent coming from combustion of fossil fuels in the power sector. Access to clean fuels and technology for cooking in Sierra Leone is limited, especially in rural areas (5 percent). The reliance on solid biomass

leads to harmful pollutant emissions (such as black carbon and methane), contributing to over nine thousand premature deaths from household air pollution[11] in 2021[12].

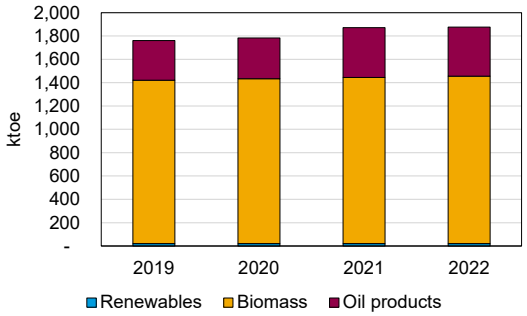
Figure 9. GHG Emissions and Primary Energy Consumption

A. GHG Emissions by Sector in 2022



Source: IMF staff calculations
Note: Industry and fugitive emissions include industrial processes and product use (IPPU) emissions. Buildings category includes negligible unclassified emissions.

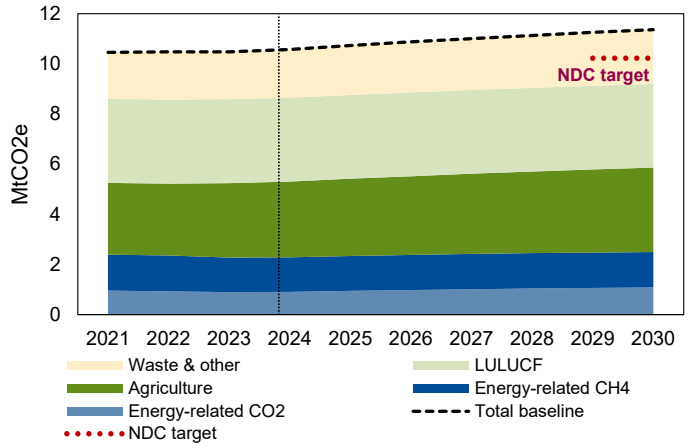
B. Primary Energy Consumption, 2019-2022



Source: Enerdata.

15. Sierra Leone has committed to mitigation actions in its updated Nationally Determined Contribution (NDC). Sierra Leone's updated NDC, submitted in 2021, aims to reduce GHG emissions by 5 percent by 2025 and by 10 percent by 2030 relative to a no-policy scenario. These targets, however, are not disaggregated by sector. According to IMF staff projections (Figure 10) using the IMF-WB Climate Policy Assessment Tool (CPAT, see Annex 2), Sierra Leone's total GHG emissions in 2030 could reach 10.7 $MtCO_2e$ under the baseline scenario[13], implying the NDC target of 10.2 MtCO2e.

Figure 10. IMF Estimates of Historical and Projected GHG Emissions, 2021-2030



Source: IMF staff using CPAT.

[11] Household air pollution is generated by the use of inefficient and polluting fuels in and around the home that contains a range of health-damaging pollutants. WHO, 2023.

[12] CPAT estimates based on Global Burden of Disease Study.

[13] For this report, baseline scenario assumptions are no changes in existing taxes and tariffs and no adding new taxes and levies in the energy sector.

16. A significant number of the targets in Sierra Leone's NDC are not yet quantified. Quantitative conditional goals in the energy sector include increase in electricity access (grid connection by 42 percent in 2025 and mini-grids and solar systems by 27 and 10 percent, respectively, by 2030). The quantitative unconditional goal in the AFOLU sector is to increase forest cover by planting 5 million trees over 5 years. Other goals are qualitative, including promoting renewable off-grid electricity, improving energy efficiency, increasing access to waste management infrastructure, and other actions. The targets mostly do not appear to be linked to existing policies or comprehensive implementation plans. Additionally, there are instances where targets do not fully align with existing documents and plans (e.g., electrification targets).

Adapting to Climate Change

17. Sierra Leone's overarching vision for adaptation is to reduce vulnerability to climate change by half by 2030, through increased risk awareness, better rule compliance, enhanced institutional capacity, and an integrated gender-responsive approach to adaptation. To this end, sector specific adaptation priorities focus on (i) enhancing climate resilience in agricultural practices and ensuring food security despite changing climate conditions, (ii) ensuring sustainable water management and increasing energy access through climate-smart initiatives, (iii) protecting coastal areas from sea-level rise and other climate-related hazards, including fisheries and mangrove ecosystems, (iv) safeguarding ecosystems, forestry, and biodiversity from climate change impacts, (v) improving disaster preparedness and response mechanisms to mitigate climate-induced hazards such as floods, landslides, and storms, and (vi) strengthening physical and social and institutional infrastructure to withstand climate impacts, all while promoting inclusivity, especially for women, youth, the elderly, and persons with disabilities.[14].

National Policies

18. Sierra Leone's framework for climate action consists of a series of laws, policies, and institutional arrangements. Several sectoral policies also contribute to the country's climate agenda. The Environmental Protection Agency Sierra Leone (EPA-SL) possesses the mandate to coordinate climate change, environmental protection, and management. Overarching climate change legislation integrating and coordinating sectoral efforts is yet to be enacted. The institutional framework is derived from multiple sources such as the Environment Protection Agency Act (2022), National Climate Change Policy (NCCP 2021), its revised Nationally Determined Contributions (NDC 2021), the initial National Adaptation Plan (iNAP 2021), the Medium-Term National Development Plan (MTNDP 2024-2030) and sectoral policies. Table 1 captures key laws, policies, and bodies defining this framework.

Table 1. Climate Policy, Legal, and Institutional Framework in Sierra Leone

	Legal Framework	Policy Framework	Institutional Framework
National Development Policy	Constitution of Sierra Leone (1991),	AU Vision 2063, Medium Term National Development Plan (2024-2030), Sustainable Development Goals (SDGs)	Ministry of Planning and Economic Development (MoPED), Presidential Initiative on Climate Change,

[14] While an objective measure of climate vulnerability has not been established, the objective presented in the NDC reflects Sierra Leone's concerns and its ambition to address it.

	Local Government Act (2022)		Renewable Energy, and Food Security (PI-CREF), line ministries
Environmental Policy	Environment Protection Agency Act (2022), The Sierra Leone Meteorological Agency Act (2017)	National Environment Policy National Environmental Action Plan (2002)	Ministry of Environment and Climate Change (MoECC) Environment Protection Agency National Protected Area Authority (NPAA) Sierra Leone Meteorological Agency (SL-MET)
Climate Policy		Updated Nationally Determined Contributions (NDC) 2021 Initial National Adaptation Plan (iNAP) 2021 National Climate Change Policy (NCCP) 2021 Nationally Appropriate Mitigation Actions (NAMA) 2020 National Climate Change Strategy and Action Plan (NCCSAP) 2015 Climate Change Communications Strategy NDC Implementation and Financing Plan Climate Change Mainstreaming Guidelines Freetown Climate Action Plan	Ministry of Environment and Climate Change (MoECC), Environmental Protection Agency (EPA), Sierra Leone Meteorological Agency (SL-MET), Presidential Initiative on Climate Change, Renewable Energy, and Food Security (PI-CREF), Ministry of Finance (MoF), other line ministries, Local Councils
Related Sectoral Policies			
Disaster Risk Management	The National Disaster Management Agency Act (2020), National Commission for Social Action (NaCSA) Acts (2001, 2019); Social Protection Strategy (2022), Public Financial Management (PFM) Act (2016)	Disaster Risk Financing (DRF) Strategy and Action Plan (2024-2029), Disaster Risk Management Policy (2020), Disaster Management, Preparedness, Response and Recovery Plans (DMPRR), Standard Operating Procedure (SOP) for the Sierra Leone incident management system, National Drought Management Plan (2018)	National Disaster Management Agency (NDMA), Office of National Security (ONS), Federal Emergency Management Agency, National Emergency Operations Center, National Platform for Disaster Risk Reduction (NPDRR), Ministry of Finance, National Commission for Social Action (NaCSA), Ministry of Environment and Climate Change (MoECC), Environment Protection Agency (EPA), Local Councils
Land Use Planning	Town and Country Planning Act (2024e) National Land Commission Act (2022) Customary Land Rights Act (2022), Land Act (2012)	Sierra Leone Land Administration Project (2024), National Land Policy (2015), Sierra Leone Land Governance Assessment Framework (2015)	Ministry of Lands and Housing (MoLH), Local Councils, Land Commissions (national and district), and Land Committees (chiefdom, district and village)
Energy	National Electricity Act (2011) Finance Act (2016) Mini Grid Regulation (2018)	National Energy Policy and Action Plan (2018, 2025e), Renewable Energy Policy (2016, 2025e), National Renewable Energy Action Plan, National Energy Efficiency Policy (2016, 2025e), Off Grid Solar Strategy, Mini Grid policy	Ministry of Energy Sierra Leone Electricity and Water Regulatory Commission (SLEWRC) Electricity Generation and Transmission Company (EGTC) Electricity Distribution and Supply Authority (EDSA)

Water & WASH	Groundwater Development and Protection Regulation (2022), Water Pollution (Control) Regulation, Water Use and Catchment Protection Regulation (2022), Public Health Act (2022), National Water Resources Management Agency Act (2017), GUMA Valley Water Company Act (2017), Sierra Leone Water Company Act (2017), Electricity and Water Resource Commission Act (2011)	NWRMA Strategic Development Plan (2019-2023) National Water and Sanitation Policy (2014) Sanitation and Hygiene Strategy (2020-2030) Water Safety Plant Strategy (2020-2030) Sanitation Policy Implementation Guideline	Ministry of Water Resources and Sanitation (MoWRS), National Water Resources Management Agency (NWRMA), Electricity and Water Regulatory Commission (SLEWRC), Sierra Leone Water Company (SALWACO) GUMA (national utility)
Agriculture	National Fertilizer Regulatory Agency Act 2017 Seed Certification Agency Act 2017	Feed Salone Strategy (2023), Guidance Note on Climate Smart Agriculture (CSA) (2021), National Agricultural Transformation (NAT) (2019–2023), National Adaptation Plan (NAP) for Agriculture (2019), National Sustainable Agriculture Development Program (NSADP) (2010–2030), Sierra Leone Agriculture Policy (2009)	Ministry of Agriculture and Food Security (MoAFS)
Fisheries	Fisheries Management and Development Act, 1994 (Amended 2007)	Coastal Climate Change Adaptation Plan, Action Plan for Coastal Protection Measures (2021-2023), National Biodiversity and Strategic Action, Plan (2017-2026), Integrated Coastal Zone Management Plan (2015)	Ministry of Fishery and Marine Resources (MoFMR)
Forestry	The National Protected Area Authority Act (2022), National Reforestation and Timber Governance Agency (NARTGA) Act (2021), National Protected Area Authority and Conservation Trust Fund Act (2012) Forestry Regulations (1989), Forestry Act (1988), Wildlife Conservation Act (1988)	National Forestry Policy (2010), Forest Management and Conservation Policy, National Biodiversity Strategy and Action Plan (NBSAP) (2017), Community Forestry Policy, National Forestry and Timber Governance Policy	Ministry of Environment and Climate Change (MoECC), National Protected Areas Authority, National Commission for Wildlife and Forest Conservation
Waste Management	Public Health Ordinance (1960), Public Health Act (2022)	Integrated National Waste Management Strategy (2012)	Ministry of Health and Sanitation (MoHS, previously, now Ministry of Water Resources and Sanitation), Local Councils

Works	Public Financial Management Act (2016), Land Act (2012)	Works and Public Assets Management Policy	Ministry of Works and Public Assets (MoWPA), Sierra Leone Roads Authority (SLRA), National Commission for Social Action (NaCSA), Local Councils
Transport	Civil Aviation Act (2010), Roads Traffic Act (2007), Ports Authority Act (1990),	Transport Sector Policy, National Transport Policy (2015), Public Transport Regulations	Ministry of Transport and Aviation (MoTA), Sierra Leone Roads Authority (SLRA), Sierra Leone Ports Authority, Sierra Leone Civil Aviation Authority (SLCAA), Local Councils
Mines	Mining Act (2009), National Minerals Agency Act (2012)	Mineral Policy (2009), Artisanal Mining Policy	Ministry of Mines and Mineral Resources (MoMMR), National Minerals Agency (NMA), Minerals Advisory Board, Local Councils, Geological Survey Department

Source: Government of Sierra Leone (GoSL).

II. Expanding Energy Provision While Containing Emissions

A. Access to Affordable and Reliable Electricity

Current State and Challenges

19. More than half the population lacks access to electricity. SEforALL estimates that only 36 percent of population has access to electricity, with just 5 percent in rural areas[15]. The government aims to enhance access through various programs. The Electricity Sector Reform Roadmap (2017-2030) seeks to achieve universal access to electricity in 2030. At the same time, the National Renewable Energy Action Plan (2015-2030) targets 92 percent access to electricity services in 2030, including 27 percent through mini-grids and 10 percent via standalone systems. In the NDC, the conditional mitigation target is to achieve 42 percent grid connectivity by 2030, with the same mini-grid and standalone systems targets but with a shorter timeline (2025).

20. Hydro and diesel dominate electricity generation in Sierra Leone, with plans to expand into LNG. Electricity in Sierra Leone is supplied through the main grid, isolated grids, and mini-grids, each offering varying service quality, depending on fuel availability and season (hydro). While the official data on electricity generation and capacity is lacking, based on available data from third parties[16], hydro, diesel and heavy fuel oil are the largest sources of electricity generation, each accounting for roughly a half of electricity supply, with solar and biomass providing less than one percent each. The heavy reliance on expensive imported fossil fuels increases generation costs. In the long term, Sierra Leone plans to introduce LNG in the generation mix: a 20-year PPA with EDSA for 83.5 MW project, funded by the U.S. International Development Finance Corporation (US$292 million for infrastructure and US$120 million in political risk insurance). On net, introduction of LNG in the power mix might reduce emissions if it replaces private diesel generation[17]. Political risk insurance would also support private investment.

21. State-owned companies in the electricity sector face significant operational losses. The sector is mainly operated by two state-owned companies: the Electricity Generation and Transmission Company (EGTC) is responsible for power generation and transmission at high-voltage levels, and the Electricity Distribution and Supply Authority (EDSA) is responsible for the distribution network (single buyer model) and customer sales. EDSA and EGTC face significant operational losses. Technical and commercial losses of 38 percent are among the highest in Africa[18]. The losses stem from outdated infrastructure, high levels of electricity theft, and low levels of bills collections. Historically, tariff structures did not fully cover operational costs, which exacerbated financial losses. To address collection losses, the authorities have installed 1,250 of advance metering infrastructure (AMI) and committed to install

[15] https://www.seforall.org/news/first-universal-energy-facility-funded-mini-grid-in-sierra-leone-begins-powering-1300-people-0
[16] Enerdata, EIA, and Climatescope by BNEF.
[17] More than half of the diesel in Sierra Leone is consumed in the residential sector.
[18] World Bank, 2024. Sierra Leone: Energy Access Diagnostic Report Based on the Multi-Tier Framework

additional 3,000 meters. Given EDSA's role as a single buyer, its operational and financial ineffectiveness decreases attractiveness of the sector to potential investors.

22. Electricity tariff regulations were revised to be at cost-recovery levels, but subsidies from the government are still required to clear arrears. Electricity and Water Regulatory Commission (EWRC) Tariff Rules (2019) establish a cost-recovery methodology for tariff setting, with periodic reviews. Regulations for mini-grids were developed in collaboration with UNOPS and were approved by Parliament in 2019, although most of mini-grids tariffs have not been adjusted yet. Operational losses and costly agreements with IPPs led to a significant accumulation of EDSA's arrears, up to US$68 million in the first quarter of 2024. IMF staff estimates that net fiscal transfers will have to remain large to clear arrears: 0.8, 0.5, and 0.4 percent of GDP in 2024, 2025, and 2026, respectively, further limiting available fiscal space.

23. Low access to clean cooking and unreliable electricity supply hinder economic opportunities. The majority of Sierra Leone's population uses three-stone open-fire stoves (72 percent), inefficient and pollution-inducing cooking solutions. Using charcoal and wood, which is the least cost solution to the households, contributes to indoor air pollution and is associated with adverse health effects and lower productivity. Moreover, 82.6 percent of rural households have to collect wood for cooking, and 85 percent spend more than 7 hours per week to acquire cooking fuels, leading to significant opportunity costs, as well as adding pressure on national forests. Additionally, according to the WB study[19], electricity access in the country is unreliable: 35 percent report having more than 14 outages per week; 62 percent report between 3 and 14 outages per week. The World Bank estimates an average revenue loss of 11.2 percent for private firms due to unreliable electricity.

Key Policy Gaps and Opportunities

24. Electricity affordability remains a challenge to expand grid connectivity, especially in rural areas. Main grid tariffs, regulated by EWRC, are around US$0.2/kWh for residential customers and US$0.24-0.26 for commercial and industrial customers, with additional monthly service charges, varying from US$0.7 to US$3 per month. Despite MoE's efforts to ensure affordability of electricity in rural areas through social tariffs and subsidies, it is still a significant issue, as the costs of 1kWh consumption per day is greater than 5 percent of household expenditures for almost 64 percent of households nationwide (80 percent in rural areas).

25. Mini-grids development is impaired by limited demand and higher upward costs, leading to increased tariffs. Initial sites for Work Package 1 (WP-1) had low demand[20] and high capital and project development costs, leading to tariffs between $0.82/kWh and $0.87/kWh. In WP-2, co-investment under a 'split-asset' model and subsidies for capital costs slightly lowered tariffs to US$0.74/kWh and US$0.82/kWh. Additionally, consumers face connection fees (between US$15-US$17) and monthly service charges (between US$0.8 and US$2). Affordability was the main reason cited by 80 percent of households for not connecting to mini-grids after WP-1[21].

[19] World Bank, 2024. Sierra Leone: Energy Access Diagnostic Report Based on the Multi-Tier Framework
[20] Low demand implies low load factor. World Bank ESMAP estimates that LCOE of mini-grids with load factor of 22 percent is US$0.55/kWh, compared to US$0.35/kWh for 80 percent load factor.
[21] SE4All, 2021. Increasing energy access in Sierra Leone. Mini-grid survey analysis on tariffs, subsidies, and productive use.

26. A cross-subsidization scheme would enhance clean energy access and make electricity more affordable in rural areas. The government could consider a cross-subsidization scheme, which allows the main grid customers to subsidize the costs of the solar mini-grids, once the inefficiencies in the sector are addressed. This approach would support rural electrification initiatives, helping to bridge the gap in electricity access between urban and rural areas. By redistributing costs, the scheme would promote social equity and incentivize renewable energy adoption. Additionally, it could stabilize revenue for mini-grids operators, ensuring their operational viability while expanding electricity access.

27. Successful cross-subsidization would require careful designing, including transparent tariff setting, consumption metering, and addressing sector inefficiencies. A transparent compensation mechanism should include clear participation criteria to promote cost efficiency (including estimating the impact of adding new mini-grids on tariffs), cost recovery calculations for participating mini-grids, studies on the impact of increased main grid tariffs on customers, and periodic tariff reviews. Effective metering of electricity consumption, including using advance metering infrastructure (AMI) meters, would be essential. Long-term planning of the sector, including mini-grids sites, will help to leverage economies of scale to lower the costs. Finally, addressing operational losses and clearing EDSA arrears is crucial to ensure transparency and effectiveness of the scheme.

28. Significant transparency issues in the electricity sector persist. The lack of transparency, for example, led to EDSA's costly 'take or pay' contracts that further exacerbate commercial losses. In the absence of a regulatory framework for IPP procurement, many of the approved IPPs in the past were initiated as unsolicited bids to the MoE, which hinders long-term planning in the sector and negatively affects cost-effectiveness. For example, the contract with Karpowership, which uses expensive imported heavy fuel oil, started as a temporary measure in 2016 and has been extended until 2025. The Rural Renewable Energy Project (RREP) was the first time mini-grids licensing and competitive procurement were implemented in Sierra Leone.

29. EDSA and EGTC need to establish transparent and competitive tendering procedures in the electricity sector. By clearly outlining requirements and evaluation criteria, the companies would foster trust among stakeholders and potential investors. Competitive bidding processes based on criteria such as levelized costs of electricity (LCOE)[22] and proposed tariffs for main grid, mini-grids, and off-grid systems would drive down costs for consumers, favor cleaner energy, and encourage quality improvements.

Recommendations

- Establish transparent and competitive tendering procedures in the electricity sector (ESDA, EGTC, EWRC, PPPU):
  - Adopt regulatory framework for IPP procurement.
  - Clearly outline requirements and evaluation criteria (such as LCOE).
- Implement a cross-subsidization scheme between the main grid and (solar) mini-grids (ESDA, EWRC, MoF, MoE):

[22] LCOE of diesel generation are about US$0.75/kWh, while LCOE for solar with storage, when used at 22 percent capacity factor, are around US$0.5/kWh)

- Ensure that participation criteria promote cost efficiency.
- Apply transparent methodology to calculate cost recovery tariffs and clearly present required subsidies.
- Assess the impact of subsidies on main grid and mini-grid customers.
- Ensure that tariffs are reviewed periodically.

- Expand installation of AMI meters to address commercial losses (EDSA).

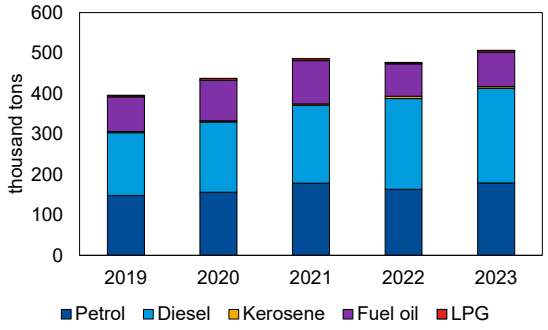
B. Cross-Cutting Energy Issues (Fuel Pricing)

Current State and Challenges

30. Sierra Leone primarily relies on fuel imports for supply (about 20 percent of total imports), which negatively affects the trade balance and results in significant fiscal costs. In 2023, Sierra Leone imported over 500,000 tons of petroleum products, with over 80 percent being petrol and diesel (for transport and power generation). Fuel imports have increased by 28 percent since 2019, with diesel rising by 50 percent (Figure 11, panel A). This dependence on external fuels has led to government spending on subsidies totaling nearly US$120 million from 2019 to 2023 (Figure 11, panel B).

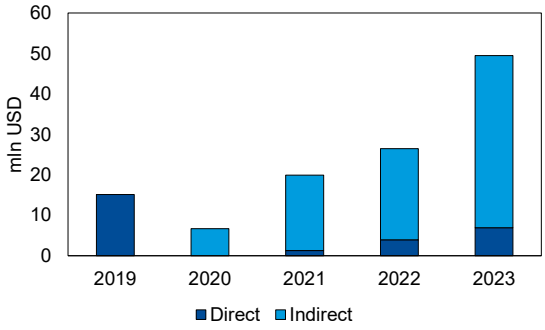
Figure 11. Fuel Imports and Government Subsidies for Fuel, 2019-2023

A. Fuel Imports, by Product



Source: PRA Annual report (2018-2030).

B. Government Subsidies



Source: PRA report (2018-2030).

31. Prices for fossil fuels were historically directly and indirectly subsidized by the Government of Sierra Leone. In 2022, fuel oil was exempt from Petroleum Fund payments, while other charges (stabilization fund, excise duty, and road user charge) were adjusted to keep prices for different fuels fixed at the same level. Due to fluctuations in international prices and exchange rates, the Petroleum Regulatory Authority (PRA) revised fuel prices 15 times in that year alone.

32. Sierra Leone introduced a new pricing regime to enhance fuel pricing transparency and stabilize the domestic market. Launched in July 2024 in collaboration with the World Bank, this regime replaces a 30-year-old formula and aims to align local prices with international markets, thereby reducing subsidy burdens and establishing a more predictable pricing structure for consumers. The new regime has improved the pass-through of international prices, but some subsidies and uncertainty persist. For example, the latest price formula, effective September 2024 (Table 2), includes a negative debt recovery charge for petrol and a lower diesel excise, resulting in equal retail prices (28 Le/liter) despite diesel's 16

percent higher landing cost compared to petrol[23]. Additionally, there is no schedule for future price revisions by the PRA and it is unclear if any charges will change.

Table 2. PRA Pricing Formula as of September 2024, for Petrol and Diesel

Components	Petrol	Diesel
Average Platts Prices, USD per metric ton	750.89	688.67
Freight, USD per metric ton	86.50	148.00
C&F (Freetown), USD per metric ton	837.39	836.67
Import Duty, 5% C&F	41.87	41.83
Storage, USD per metric ton	4.70	4.70
Port Charges, USD per metric ton	3.00	3.00
Petrojetty Charges, USD per metric ton	20.00	20.00
Freight Levy, USD per metric ton	2.00	2.00
Other Charges, USD per metric ton	7.30	7.30
Landed Cost, USD per metric ton	920.03	919.27
Conversion, liter per metric ton	1,362.00	1,162.24
Landed Cost, USD per liter	0.68	0.79
Exchange Rate Adjustment, Le per USD	23.38	23.38
Landed Cost, Le/liter	15.79	18.49
Distribution Cost, Le/liter	5.22	5.02
Debt Recovery, Le/liter	-0.35	0.29
Petroleum Fund, Le/liter	0.25	0.25
Excise Duty, Le/liter	2.80	2.01
Road User Charge, Le/liter	0.70	0.50
Uniform Price Adjustment Factor, Le/liter	0.07	0.07
Pump price, Le/liter	**28.00**	**28.00**

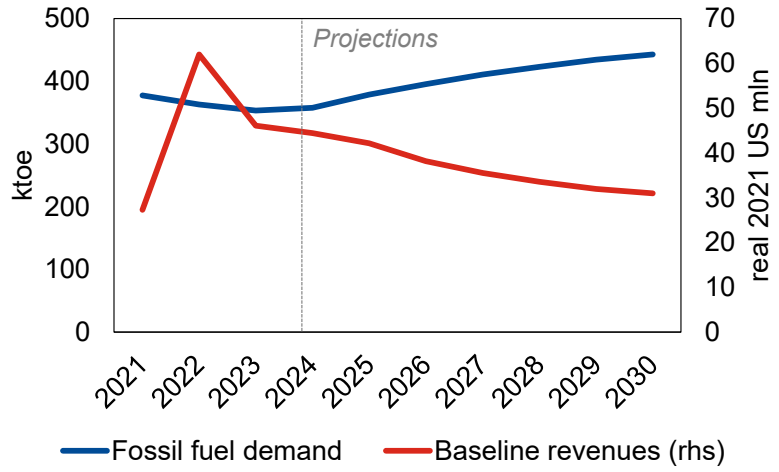
Source: PRA.

33. Real values of excises and other taxes on fossil fuels have eroded over time. Average fees and taxes[24] collected from one liter of petrol fell from an average US$0.20 in 2022 to US$0.12 in 2024. Kerosene charges dropped from US$0.14 to US$0.04, and fuel oil from US$0.41 to US$0.15 during the same period (all in real 2021 US$). Without corrections for exchange rate depreciation and inflation, revenues will decline despite rising fuel demand (Figure 12). Moreover, fossil fuels are exempt from GST, leading to further revenue losses.

[23] Landing costs are 0.68 USD/liter for petrol and 0.79 USD/liter for diesel. Conversion at a 23.38 exchange rate results in costs of 15.898 Le/liter for petrol and 18.47 Le/liter for diesel, which is different from the published costs of 15.79 Le/liter for petrol and 18.49 Le/liter for diesel.

[24] Charged after landing and distribution costs, include, where applicable: Stabilization Fund, Petroleum Fund, Excise Duty, Road User Charge, Uniform Price Adjustment Factor, and Infrastructure Development Fund Provisions for 2022, and Debt Recovery, Petroleum Fund, Excise Duty, Road User Charge, and Uniform Price Adjustment Factor for 2024.

Figure 12. Estimates and Projections of Fossil Fuel Demand and Revenue, 2021-2030



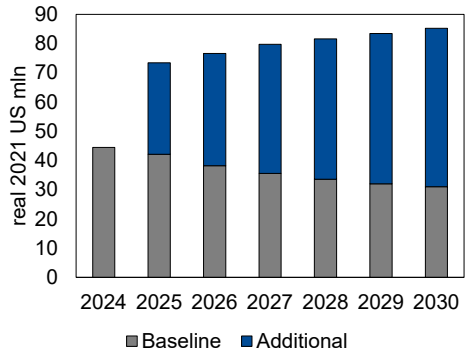
Source: IMF staff using CPAT.
Note: fossil fuel demand and revenues calculations include petrol, diesel, LPG, and kerosene.

Key Policy Gaps and Opportunities

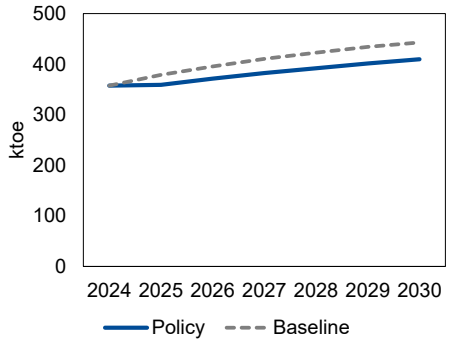
34. Imposing GST and adjusting excises to reflect their real values would mitigate revenue losses and promote more efficient fuel use. CPAT simulations indicate that imposing GST for petrol and diesel—responsible for 80 percent of emissions—along with adjusting petrol excises to real values (exchange rate and inflation adjustments) and aligning diesel taxes with petrol, could increase fiscal revenues by over $250 million from 2025 to 2030 (Figure 13, panel A) while saving 7 percent in fuel use compared to the baseline (Figure 13, panel B). Having a predictable schedule of price reviews (for example, four times a year) and announcing excise and fee increases would improve transparency of the process and promote stability on the domestic market.

Figure 13. Impact on Fiscal Revenues and Fuel Demand

A. Revenues, Million US$



B. Fuel Consumption



Source: IMF staff using CPAT.
Note: fossil fuel demand and revenues calculations include petrol, diesel, LPG, and kerosene.

35. This reform will put upward pressure on energy prices. Considering that international fuel prices are projected to decline, prices in 2030 are expected to be lower than current prices despite the implementation of the proposed reforms. Under the reforms, prices for petrol and diesel in 2030 would be

comparable to those in 2023 (Table 3). Additional measures will be required to address distributional impacts of the reform, particularly concerning the effects of increased diesel prices on public transportation.[25]

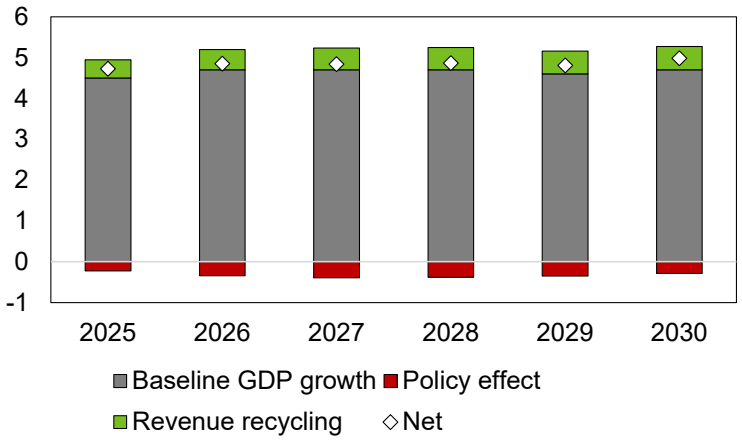
Table 3. Impact on Fuel Prices

Fuel	Unit	2023	Baseline 2030	Policy 2030
Petrol	real 2021 $/liter	0.94	0.78	0.96
Diesel	real 2021 $/liter	0.95	0.80	0.86

Source: IMF staff using CPAT.

36. Without revenue recycling, rising energy prices could hinder economic growth, but use of a portion of the additional tax revenues can alleviate this impact. The reform may reduce GDP growth in 2025-2030 by 0.2-0.4 percentage points, but this effect can be offset by raising productive public investment and current spending, resulting in a net positive impact of 0.1-0.3 percentage points on GDP growth compared to the baseline (Figure 14).

Figure 14. Impact on GDP Growth, 2025-2030



Source: IMF staff using CPAT.
Note: revenue recycling assumptions: 50 percent of additional revenues are used for public investment, and 50 percent to increase current spendings.

37. Since most emissions in Sierra Leone are from non-energy sectors, total GHG emissions are only reduced to a limited extent. The reform's impact on emissions is relatively small but significant, resulting in approximately 1 percent reduction in total GHG emissions, or up to 500 kton CO2e cumulatively over five years.

Recommendations

- Align fuel taxation to support energy efficiency and promote a cleaner and cheaper energy mix.
  - Impose GST for petrol and diesel (MoF and PRA).

[25] Based on discussions with the Ministry of Transportation, if diesel prices remain below SLE35/liter, bus ticket prices will not need to be adjusted. This reform implies a diesel price of SLE33/liter in 2025, increasing to SLE49/liter in 2030.

- Align diesel taxation (excises and other fees) with petrol and adjust taxation to reflect the real values, under a transparent and predictable schedule (MoF and PRA).

C. Forest Management and Climate Sensitive Agriculture

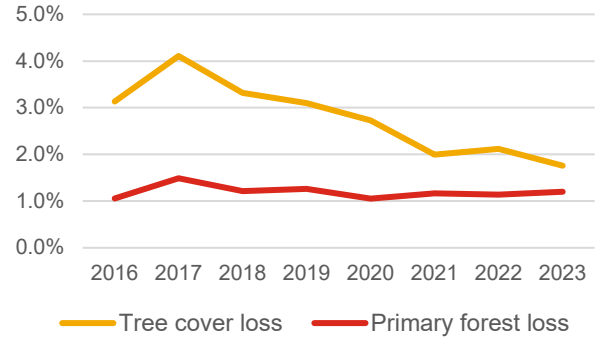
Current State and Challenges

38. Forests make up an important part of Sierra Leone's land cover, while agriculture is a main pillar of its economy. Total forest and woodland cover (including mangroves) in the country is estimated at 38 percent of land area, with the majority (86 percent) being owned and managed by local communities. The remainder (14 percent) are publicly administered forests with about half being managed for conservation and half being used for timber production (Updated BUR, 2024). Agriculture accounts for 43 percent of nominal GDP. The principal agricultural activity is rice cultivation, which accounts for over half of the total volume of agricultural production. Current agricultural activity is mostly at a subsistence level, suggesting that with agricultural development GHG emissions in the sector will increase.

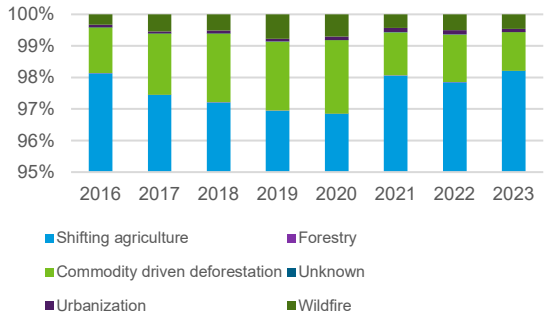
39. Sierra Leone is experiencing rapid deforestation, which is largely driven by expanding small scale, traditional agriculture. Since 2000, the country has lost about 25 percent of its tree cover (Malan et al., 2024). Average tree cover loss has been 2.8 percent per year since 2016 with a decelerating trend in recent years, yet primary forest loss (mostly in Protected Areas) continues to be high around 1.2 percent per year (Figure 15, panel A). The main cause of tree cover loss is shifting small scale traditional agriculture in upland areas, as part of which land is cleared and burned ("slash and burn") for short-term cultivation of crops. Other factors also play a role, including commodity driven deforestation (mining), urbanization, forestry (lumbering), and wildfires (Figure 15, panel B). In coastal areas, mangroves are under pressure due to urbanization, conversion to rice paddies, and unsustainable exploitation for fuelwood and fish smoking (USAID, 2020).

Figure 15. Deforestation in Sierra Leone

A. Deforestation Rates (Sierra Leone)



B. Tree Cover Loss by Main Cause



Note: deforestation rates based on the percentage of the total area covered in the baseline year (2000).

Source: IMF Staff based on Global Forest Watch.

40. Although forestry management and wetland conservation are priorities in Sierra Leone, both legislation and enforcement are weak. Forestry management and wetland conservation is

identified as an enabler for climate resilience and environmental action in Sierra Leone's MTNDP 2024-2030. The Wildlife Conservation Act of 1972 is the principal legislation guiding the management and regulation of wildlife and protected areas, however, it does not fully prohibit activities in protected areas and has limited fines and penalties for offenses.[26] Enforcement is carried out by the National Protected Area Authority (NPAA), which was established in 2012 by an Act of Parliament and tasked with the sustainable use of biodiversity and forest resources. The NPAA carries out a few dozen armed patrols each month but lacks sufficient operational capacity to fully carry out its duties. More recently, the NPAA has started to tear down buildings that were constructed in the Western Area Peninsula National Park, near Freetown.

41. Agriculture is a key sector within the government's flagship program "Feed Salone" to achieve food self-sufficiency. Sectoral targets are development related and in general not focused on reducing emissions. These include an increase in rice yields to 4.0 MT by 2028 (from 1.9 MT in 2023), an overall improvement in the Global Food Security Index (GFSI) from to 50.0 by 2030 (from 40.5 in 2022), and the reduction of the import value of key staple food, to at most US$67 million in 2030 (from US$500 million in 2023). Achieving these will require mechanization, better irrigation, better seed and input systems, and agricultural finance (MTNDP, 2024). Part of the government's current strategy is to encourage farmers to move to the more fertile lowlands, such as the Inland Valley Swamps (IVS), although these come with their own challenges including flooding, higher up-front costs of development, and potential health issues (e.g., malaria). The government intends to develop 73,000 hectares of IVS and other low-land rice ecologies by 2028 (Feed Salone Strategy, 2023). The updated NDC furthermore sets out actions to promote climate-smart agriculture and climate-resilient food security practices (updated NDC, 2021).

Key Policy Gaps and Opportunities

42. To support development while limiting local pollution and GHG emissions, the authorities could incentivize more efficient agricultural practices outside of forested areas. Given the high priority for agricultural development, broad fiscal climate mitigation policies (such as pricing mechanisms) are undesirable as these would disproportionally affect farmers' livelihoods. Instead, the government could increase the use of more targeted policies and incentives to steer agricultural development towards a high productivity and low deforestation equilibrium. This could, among others, be done by increasing existing efforts to develop IVS and other low-land rice ecologies as well as incentivizing Climate Smart Agriculture, for example by using targeted agricultural subsidies and encouraging agroforestry (CSA Guidance Note, 2021). As part of these efforts, over the longer term the government could consider Payment for Ecosystem Services (PES) schemes that are conditioned on sustainable practices in terms of land use and forest resource management. Payments might be based on performance and targeted to the most vulnerable areas at first, for example by estimating reduced GHG emissions per hectare of forest valued by its social cost, or on the opportunity cost of using the forest (see example in Annex 3). For such schemes to work, well defined property rights are an important prerequisite. As these schemes have spending implications, the government would need to explore opportunities for donor support. In the

[26] Related legislation includes the National Land Commission Act of 2022 and the Environmental Protection Agency Act of 2022 which provide limited additional grounds for fines and penalties.

short-term, the authorities could introduce elements of PES schemes by adding good environmental practices as conditionality in existing social programs.

43. To guide policymaking and enforcement efforts, there is a need to improve data availability and work towards a full Monitoring, Reporting, and Verification (MRV) system. While the government has qualitative views on the drivers of deforestation, there is insufficient data and no periodic monitoring of land use related to agriculture and forestry. The authorities are currently conducting a forestry inventory, to map forested areas and associated GHG emissions within its territory. This is expected to be completed by 2026. Building on such an inventory, the government could work towards a full MRV system. In the context of deforestation, MRV usually entails a process to monitor changes in forest cover over time (using satellites) and can be used to determine the impact forest conservation and reforestation policies (Box 1). Such monitoring can also inform the NPAA and the Forestry Department at the MoECC to target their enforcement efforts. Furthermore, MRV systems can potentially be used to issue carbon credits in the Voluntary Carbon Market (VCM) or validate outcomes for results-based climate finance arrangements and also inform the EPA when issuing Environmental Impact Assessment licenses.

44. The government could also step-up reforestation efforts while assuring that spending is effective and efficient. The MTNDP sets a target for reforestation of an additional 10 million trees by 2030. Several reforestation efforts are currently ongoing, such as “Freetown the Treetown” by the Freetown City Council, a tree planting intervention in the Western Area Peninsula National Park by the Ministry of Environment and Climate Change (MoECC), and a pilot project implemented by UK-based Crown Agents and UAVaid in the Northern part of the country. There are also reforestation projects from private parties that are connected to carbon crediting programs, such Verra. It would be important to set up adequate oversight of reforestation projects, to assure that efforts are effective (making sure that planted trees are verified and monitored, including survival rates) and efficient (reforestation at low costs per tree, especially if financed from the budget). This could include a central registry to monitor overall progress, avoid double counting, and identify best practices.

Box 1. GHG Related MRV Systems for Forestry

Monitoring, Reporting, and Verification (MRV) refers to the multi-step process to measure the amount of GHG emissions reduced by a specific mitigation activity, such as reducing emissions from deforestation and forest degradation, over a period of time, and report these findings to an accredited third party. The third party then verifies the report so that the results can be certified (World Bank, 2022).

MRV includes the following steps and procedures (WRI, 2016):

▪ **Measure or monitor (M)** data and information on emissions, mitigation actions, and support. This may entail direct physical measurement of GHG emissions, estimating emissions or emissions reductions utilizing activity data and emission factors, calculating changes relevant to sustainable development, and collecting information about support for climate change mitigation.

▪ **Report (R)** by compiling this information in inventories and other standardized formats to make it accessible to a range of users and facilitate public disclosure of information.

▪ **Verify (V)** by periodically subjecting the reported information to some form of review or analysis or independent assessment to establish completeness and reliability. Verification helps to ensure accuracy and conformance with any established procedures and can provide meaningful feedback for future improvement.

Setting up an MRV system requires obtaining several types of data. This includes the periodic collection of data on forest area and forest area changes (referred to as activity data or AD). A common way to collect this data is by employing a Satellite Land Monitoring System (SLMS). A second prerequisite is the determination of coefficients that quantify the emissions or removals per unit of activity (referred to as emission factors or EF). This includes measurements on the ground to determine the quality of the forest, the size and type of trees concerned, and the carbon stored. By combining both types of data (AD and EF), a GHG inventory can be compiled. The IPCC (2006, 2019) provides guidelines for national GHG inventories with specific guidance on agriculture, forestry, and other land use.

Recommendations

- Reduce agriculture emissions and agriculture related deforestation.
  - Add conditionality to social programs in the agriculture sector based on good environmental practices, agroforestry, and conservation agriculture. (MoAFS)
  - In alignment with donors, consider introduction of the Payment for Environmental Services (PES) in the forestry sector to slow down deforestation. (MoECC)

- Improve monitoring and measurement of forest cover and quality.
  - Complete and publish National Forest Inventory (NFI). (MoECC)
  - Establish a continuous monitoring / measurement system for forestry using satellite data and pilot its use in a selection of protected areas. (MoECC; NPAA)
  - Operationalize a Monitoring, Reporting, and Verification (MRV) system, to allow for proper emission accounting and provide data to evaluate the impacts of environmental and climate policies. (MoECC and its agencies responsible for climate reporting)

- Increase reforestation efforts by establishing a mechanism to verify the results of reforestation efforts (including a central registry to avoid double counting). (MoECC)

III. Climate Sensitive Management of Water Resources and Waste

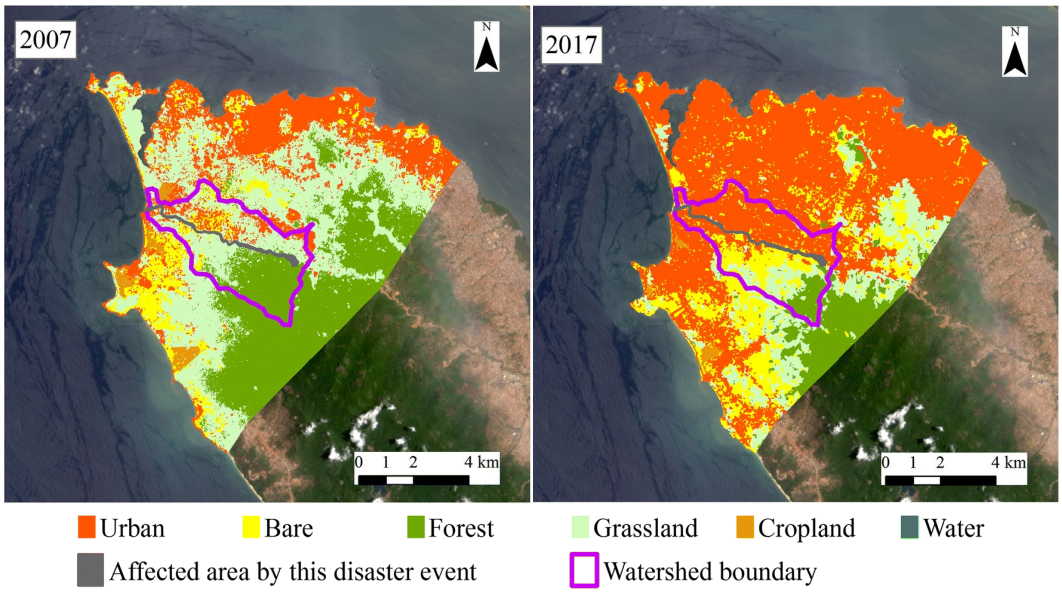
A. Water Management

Current State and Challenges

45. Various activities that are key to Sierra Leone's development are placing competing demands on the country's water resources. To this end, hydro power generation, the main source of power, relies on the availability of surface water, and the government is working to expand agriculture production and fisheries under the Feed Salone initiative also by making more use of technologies, including irrigation and the expansion of access to Water, Sanitation, and Hygiene (WASH) services for a growing population requiring access to more drinking water.

46. Changing rainfall patterns due to climate change and human activity are causing growing water scarcity. As Chapter I describes, rainfall is expected to become less predictable and subject to more pronounced seasonality, which will increase the risk of weather-related disasters, including flooding and droughts; while saltwater intrusion caused by sea level rise threatens the water quality in coastal areas. Human activities are adversely impacting the quantity and quality of available water resources with deforestation leads to the degradation of ground water by increasing run off and evaporation, the lack of wastewater treatment as well as artisanal mining and sand mining polluting water sources. Expansion of urban developments in conflict with important watersheds reduces the capability for replenishing water reservoirs. Freetown, which was originally designed for about 400,000 inhabitants, today has an estimated population of over 1.2 million and expanded into the Western Area Peninsula National Park (WAPNP), endangering the local watersheds, which covers about 90 percent of Freetown's water supply (Figure 16). The retreat and pollution of ground and surface water exacerbate vulnerabilities for the rural population which relies heavily on directly extracting from these sources for water consumption, and complicates the provision of portable water, making it more expensive for the utilities.

Figure 16. Changes in Land Use in Freetown, Sierra Leone, 2007–2017



Source: Cui, Y., Cheng, D., Choi, C.E. et al., 2019, The cost of rapid and haphazard urbanization: lessons learned from the Freetown landslide disaster. Published under Creative Commons Attribution 4.0 International License. Figure cropped.

47. The government's recognition of the economic value of water is reflected in the legal framework and policy framework for water resource management and in the creation of protective measures. The Ministry of Water Resources (MWR), which was established in January 2013 is responsible for water sector policies. The National Water Resources Management Agency (NWRMA) Act (2017) established the NWRMA and tasked it to regulate, utilize, protect, develop, conserve, control, and generally manage water resources throughout Sierra Leone. For this purpose, the functions of the NWRMA include (i) to propose comprehensive plans and strategies for the utilization, conservation, development and improvement of water resources and (ii) initiate, control and coordinate activities concerned with the development and utilization of water resources including the supervision and regulation. The NWRMA 2019-2023 Strategic Development Plan recognizes water as an economic good that needs to be managed efficiently.[27] To secure water supply for Freetown and surrounding areas, the Western Area Peninsula Water Fund (WAPWF) was created in 2022 with the objective to protect and restore the watersheds within the Western Area Peninsula National Park (WAPNP) so that they can supply the quantity and quality of water needed for all users in the Greater Freetown Area while improving the livelihoods of the people in the watershed and reducing risks from climate changing.

48. The government recently introduced water permits to regulate the use of water. The NWRMA Act 2017 and the Water Use and Catchment Regulations 2022 require that both natural and legal persons who engage in mechanical water extraction need to apply for a water permit. Permits are to be provided taking into account the available water resources and competing uses. Applicants need to provide information on the intended use, the volume to be used, the location and the type and name of water body affected, i.e., river, lake, groundwater etc., including an environmental impact assessment if requested. Permits are to be granted for one year and renewals need to be requested before their

[27] A more current policy is not available.

expiration. Small scale use for domestic purposes abstracted through mechanical means and for subsistence agricultural on land areas not exceeding 5 hectares as well as water resources for the purposes of firefighting are exempted from permits but need to register.

Key Policy Gaps and Opportunities

49. Capacity constraints prevent the effective application of the permit system. NWRMA has limited human and financial resources for running the registration process and the register. In addition, there are challenges with the enforcement with many water users operating without permits, partly also due to a lack of public awareness about the water permits system, particularly in rural areas and among small-scale users. Thus, the coverage of the permit system is limited and as a consequence, the information not representative for actual water extraction.

50. The available information does not allow an assessment of the amount of water that can be extracted on a sustainable basis as the assessment of available water resources is geographically limited and the implications of climate change are not considered. While the NWRMA, undertook a surveys of the condition of water resources in and around Freetown in the context of the Greater Freetown Water Supply and Sanitation Master Plan (2022), there is no nationwide assessment of surface water sources nor ground water table fluctuations. An assessment of the implication of climate change on water resources is not available and would require the provision of climate change scenarios for different time horizons downscaled to provide sufficiently detailed predictions of future climate conditions.

51. An additional complication for a reliable prediction of water resource availability lies in the impact of manmade actions on water resources. Key areas in this regard are urbanization and deforestation, which are outside the authority and control of the MoWRS. Decisions on and the enforcement of land-use planning, which is under the Ministry of Land and Housing (MoLH) and implemented by local governments and forest management, which is under the MoECC and implemented by the Forest Management Agency have significant impact on the quantity and quality of available water resources. While the framework for land-use planning is outdated and currently being revised (see Chapter IV.B) an effective application of forest management to slow down deforestation faces serious implementation challenges (See Chapter II.C).

Recommendations

- Enable the NWRMA to effectively implement the water permit system.
    - Secure adequate financial resources and build human capital enabling the agency to implement and maintain a robust water permit system. (NWRMA)
    - Design and undertake public awareness campaigns targeting especially rural areas and small-scale users. (NWRMA)
    - Make key information from the permit register publicly available to create transparency and encouraging compliance. (NWRMA)
    - Consider using satellite imaging to monitor larger scale compliance and violations in water extraction. (NWRMA in coordination with MoECC)

- Generate and provide the data and analysis to support informed decisions on access to water resources (NWRMA/MoWRS)
    - Assess the availability of water resources and determine amount of water that can be extracted without endangering the sustainability of the resource.
    - Assess the consistency of demand on water resources with the water quantities that can be extracted under sustainability water resource management.
    - Develop scenarios for the availability of water in 10, 20, and 50 years taking into account climate change scenarios, including for different assumptions about supporting actions (e.g., in land-use management and deforestation).
    - Based on an improved water permit system, compile the various demands on water resources.

- Introduce a formal process to manage conflicting demands on water resources at the policy and project planning stage (NWRMA/MoWRS)
    - Require major water resource users, including hydro power, agriculture, and WASH, to provide estimates for their future water needs for various policy scenarios and time horizons (10, 20, and 30 years).
    - Require the MoWRM to provide an annual report on the sustainable availability of water resources and submitted future demands on water resources, highlighting any areas of conflict for various time horizons.
    - Establish a mechanism to resolve any inconsistency between the availability of water resources and planned policies and projects.
    - Monitor the implementation of policies and measure that require water resources and take corrective action as needed.

B. Water Service Provision

Current State and Challenges

52. Water services are provided by two government companies and are mostly focused on water supply with very limited capacity for wastewater collection and treatment. According to the Guma Valley Water Company (GVWC) Act (2017), the company is responsible for water supply in the western area, including Greater Freetown. There is no legal mandate or requirement related to wastewater collection or treatment. According to the Sierra Leone Water Company (SALWACO) Act (2017), the company is responsible for providing water supply services in smaller towns and rural areas. The Act provides that SALWACO should develop and operate water supply services at reasonable cost and on a self-supporting basis in areas defined in the Act as well as to facilitate the provision of safe water and related sanitation services in rural communities and small towns. The Local Government Act (2004) gives local councils the power over organizing water services, which they do by getting involved in the planning and management of water supply services in their area. Wastewater management in rural areas is not regulated and there is no significant infrastructure for wastewater treatment.

53. Limited access to safe water resources is a key health concern, which will be exacerbated by the implications of climate change. Only part of the population has access to safe water sources. In

the urban area served by GVWC about 90 percent of the population have access to drinking water. But rapid and unregulated urbanization and population growth are overstretching the capacity of the system, while outdated infrastructure and lack of maintenance leave infrastructure dilapidated and lead to significant loss in water and risk of contamination. Areas of unregulated settlements do not have infrastructure and are not serviced by GVWC. In rural areas covered by SALWACO, only about half of the population has access to treated water. The other half of the population relies on sources like rivers, lakes, and unprotected wells. In rural areas SALWACO often provides boreholes and hand pumps, which are then handed over to, operated, and maintained by the community. With climate change induced changes in rainfall patterns, floods are becoming more frequent and intense, causing pollution and contamination of water bodies, making the expansion of access to safe water a key priority.

Key Policy Gaps and Opportunities

54. Expansion of water services and even the maintenance of existing services is a challenge as the sector is economically not viable and lacks financial resources for appropriate maintenance and investment. Providing water extraction or purification equipment or expanding the water distribution system requires substantial investment, the cost for which neither GVWC nor SALWACO can cover from their revenues. According to the water companies, their operation depends on government support as current water tariffs are not covering operation cost – with challenges in the tariff setting mechanism and tariff policies similar to those in the electricity sector (see Chapter 2.A.). Capital investments are financed by the government and related loans to the water companies are regularly not repaid. The economic situation of the water companies is additionally undermined by high technical losses caused by degraded water infrastructure, and by substantial commercial losses mainly caused by the non-collection of bills from MDAs, including hospitals and other government services.

55. While private investment could accelerate the development of water services, the sector will struggle to offer viable investment opportunities. Without a financially viable off taker and credible tariff setting policies and mechanism (potentially including subsidies) that would provide remuneration at full cost recovery, water purchase agreements (e.g., as Build-Operate-Transfer arrangements) will not be feasible. In addition, if implemented as foreseen under the regulation, the duration of water permits would be limited to one year with no guarantee of extension, creating substantial uncertainty for any long-term investment in the sector, including for investments into green energy solutions in water provision. Though private investment operating on a fully commercial basis without donor or government support might not be feasible in the short to medium term, removing structural obstacles for private investment might encourage the support from donors and open the way for public-private cooperations.

Recommendations

- Take administrative measures to encourage efficient use of water resources and limit commercial losses.
    - Assess and report on the relative efficiency of water use across similar MDAs to encourage adherence of obligations. (SALWACO and GVWC)
    - Install and operate prepaid meters for MDAs to avoid consumption of water without payment. (SALWACO and GVWC)

- Remunerate piped water services (urban running water) at cost reflective rates covering operations and capital investment.
    - Determine the operation and capital cost of service provision and the full cost of the service. (NWRMA)
    - Cost the difference between the full cost of the service and the applicable tariff. (NWRMA)
    - Assess options for raising tariffs and providing targeted compensation for vulnerable (conduct a distributional impact assessment). (NWRMA in coordination with MOF)
    - Make provisions in the budget to cover the difference between the full cost and the prevailing tariff. (MOF)

- Remove key obstacles for private investment in the sector.
    - Ensure that tariffs provide a fully cost reflective remuneration to make private investments in the context of potential water purchase agreements financially viable.
    - Adjust the terms of water permits to synchronize the duration of licenses with the horizon of project related investment.

C. Waste Management

Current State and Challenges

56. The waste sector in Sierra Leone is underdeveloped with rapid urbanization leading to increasing waste generation, especially in Freetown. Population growth in the nation's capital has been high, averaging 4.5 percent annually and leading to its current population reaching about 1.2 million compared to approximately 130,000 in the 1960s.[28] The rapid population growth has contributed to poor waste management practices for all waste categories, including solid waste, wastewater, and healthcare waste. In urban areas, most households dispose of their waste by dumping on roadsides or in drainage ditches. Solid waste management suffers from a range of problems, including low waste collection coverage, irregular waste collection services, and burning of waste without considering air pollution control (INWMS, 2012).

57. The legal framework is outdated, and the construction of adequate waste management facilities is progressing only slowly. The legal framework for waste management, encompassed in the Public Health Ordinance, stems from the 1960s and has not been reviewed since 1978. In Freetown, the current organization of waste collection stems from 2006, when waste management responsibilities were handed over to the Freetown City Council (FCC). Waste management is handled by a private company MASADA. In other Local Councils, Sierra Leone established environment and social units in 2012. These units work with the District Health Superintendent (DHS) at that time in the Ministry of Health and Sanitation (MoHS) to promote proper and effective waste collection and management (Updated BUR, 2024). The FCC identified several barriers to improving waste management, including financing (upfront financing need for facilities, and limited downstream revenue collection) and land use planning (such as for landfills). A first wastewater treatment facility in Freetown was completed in 2021. However, to fulfill

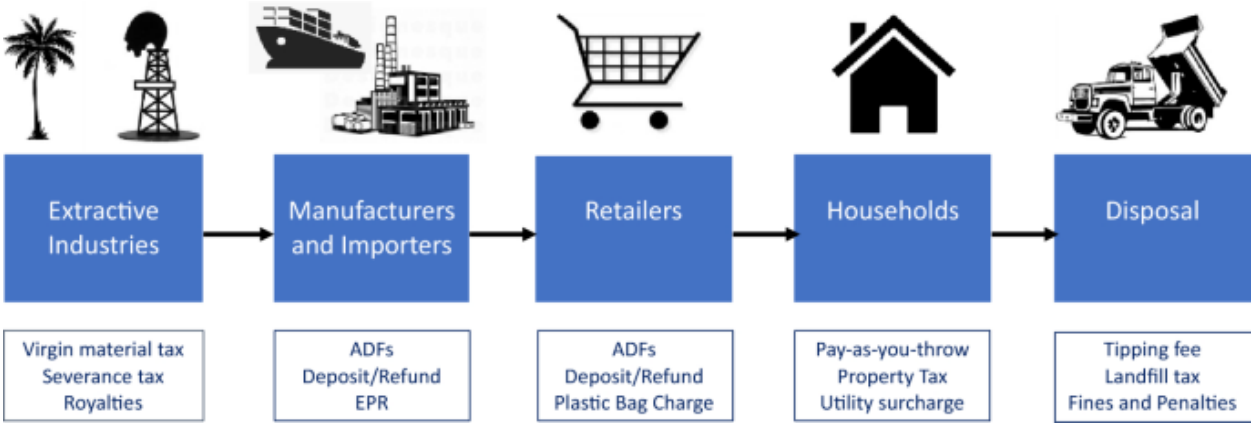
[28] As a share of the total population, Freetown has tripled in size during the last 60 years.

demand, the FCC indicated that water treatment capacity would need to double or triple. Based on the Environmental Protection Agency Act of 2022, the EPA is responsible for the disposal of toxic and hazardous waste and has general powers to control and prevent the discharge of waste into the environment.

Key Policy Gaps and Opportunities

58. The authorities could implement fiscal instruments to incentivize less polluting behavior as well as collect revenues to finance additional waste management facilities. Upstream and downstream fiscal instruments could internalize the negative externalities in the waste sector, while helping to finance waste management (Figure 17). Since Sierra Leone imports most goods that contribute to environmental pollution, instruments that are most relevant would target importers, retailers, or households. Disposal fees may not be appropriate, due to the prevalence of illegal waste dumping. Common instruments at the import stage include advance disposal fees (ADFs) and advance recycling fees (ARFs), which could be imposed to prepay the cost of disposal or recycling (Matheson, 2022). At the retailer stage, plastic bag charges or deposit/refund systems could be considered. Combinations are also possible, such as levying an ADF at import while refunding upon returning the waste to a collection point. A rebate could help stimulate urban scavengers to collect and return waste, such as single-use containers (made of plastic, glass, and aluminum) that constitute a predominant type of non-degradable waste in Freetown. Unclaimed rebates may contribute to government revenue. At the household level, property taxes and utility surcharges could be considered but are less targeted. An upside would be that it is easier to exempt the poorest and most vulnerable populations from such a tax, making it more progressive. Finally, the government could encourage the use of biodegradable materials (such as cellulose) or consider regulatory restrictions on the use of plastics.

Figure 17. Upstream and Downstream Fiscal Instruments for the Waste Lifecycle



Source: Matheson (2022).
Notes: Advance Disposal Fees (ADFs); Extended Producer Responsibility (EPR).

59. Specifically, the authorities could consider expanding upstream taxes on single-use containers and plastic bags. Legislation to do so is already in place through the Excise Act of 1982, which was amended in 2024 to include a tariff on polythene (plastic) bags and plastic bottles (packed with beverage, excluding water) of Le 6.0 per kilogram. This import tariff could be expanded to cover all

plastics and products that are made primarily of plastic materials, as well as other single-use recyclable beverage containers (such as those made from glass and aluminum).[29] For domestic manufacturers, an ADF equivalent to the tariff can be levied, to create a level playing field. The government could also consider a differentiated rate on biodegradable versus non-biodegradable plastics, to incentivize the use of the former. Implementation would need to define, for example, which bag providers are in scope (supermarkets, smaller traders), the type of bags, how the excise will be remitted to the NRA, and how NRA will ensure compliance (e.g., ensuring it is applied and not embedded into overall retail prices).[30] The authorities could furthermore consider implementing a refund system for single-use recyclable beverage containers that are returned for disposal or recycling, in particular plastic bottles. This is expected to have a distributional impact that is progressive, since lower income households will benefit proportionally more from it (and have lower opportunity costs associated with returning their containers). The additional revenues (fees minus refunds) could be used to finance wastewater treatment and solid waste disposal or recycling facilities. As an alternative to using tariffs, the government could consider implementing a traditional deposit-refund system (DRS) with fees on the sale of single-use recyclable beverage containers and plastic bags. Tariffs may however be easier to administer, due to the limited number of import locations in Sierra Leone (compared to taxing at the retailer level).

60. In line with broader recommendations on land use planning, the authorities should ensure that there are designated locations for new waste treatment facilities and landfills. This is a key prerequisite for better waste management and requires improved coordination by Ministry of Land, Housing, and Country Planning (MoLHCP) with inputs from the relevant MDAs.

Recommendations

- Expand the fiscal regime for plastics and single-use recyclable beverage containers.
  - Expand the advance disposal fee for plastic imports to cover all plastic materials and single-use recyclable beverage containers (plastic, aluminum, glass) (NRA; MoF)
  - For domestic manufacturers, an ADF equivalent to the tariff can be levied, to ensure a level playing field.
  - As an alternative to using advance disposal fees, the government could consider implementing a traditional deposit-refund system (DRS) with fees on the sale of single-use packaging and plastic bags.
- Implement a refund system for single-use recyclable beverage containers at designated collection locations with unclaimed refunds earmarked to financing additional waste management facilities (MoECC; FCC)

[29] This would be in line with the 2023 National Plastics and Plastic Waste Management Policy.

[30] It will be important to ensure that the tariff be collected by the NRA. Also see IMF 2022 “Sierra Leone—Medium-Term Revenue Strategy: Tax Policy Options for Inclusion”.

IV. Resilience to Climate Change Implications

A. Disaster Risk Management

Current State and Challenges

61. Climate related natural disasters pose a threat to lives and livelihoods and are undermining Sierra Leone's development efforts. While reliable data on disaster events are not available, anecdotal reports on floods, droughts, and landslides suggest they are frequent and the impact on lives, property, and economic development are estimated to be considerable.[31] The 2017 Freetown landslide was a stark reminder of the risk and the impact that climate related natural disasters have on the country (Box 2), and heavy rain fall in September 2024 led to the overflow of a dam causing severe flooding in communities downstream, with 747 people displaced and loss of food supplies and livelihoods (livestock, farmlands, and crops). In other areas, flood incidences submerged the farmlands of over 1,500 farmers with crops either destroyed or severely damaged.[32]

Box 2. The Impact and Causes of the 2017 Freetown Landslide

The land slide was triggered by heavy rainfall and affected resulted an estimated 6,000 people, with over 1,100 reported dead or missing. More than 3,000 people lost their homes and almost every sector of the urban economy was impacted.

The hazard and the vulnerability of the population was amplified by rapid and haphazard urbanization. Uncontrolled expansion of the city as well as poor urban planning practices with inadequate consideration of risk led to housing construction in dangerous areas; clearance of hillside vegetation increased erosion potential. With no building controls in place, low cost buildings used frail construction material and methods lacking resilience.

A Rapid Damage and Loss Assessment estimated the total economic value of the effects of the landslide and floods at about USD 31.65 million (SLL 237 billion) and the preliminary cost of resilient recovery needs at about USD 82.41 million (SLL 618 billion).

Source: Sierra Leone- Rapid Damage and Loss Assessment of August 14th, 2017 – Landslides and Floods in the Western Area and The cost of rapid and haphazard urbanization: lessons learned from the Freetown landslide disaster.

62. The need for effective disaster risk management (DRM) is widely acknowledged within government and among development partners. DRM is one of seven priorities under the NAP (2021) and features prominently in the NDC (2021) and in the MTNDP (2024). Various assessments call for efforts to be put into effective DRM, stressing, among others, the need for disaster prevention and mitigation as well as preparedness.[33]

63. The DRM policy and legal basis for disaster management is in line with good international practices. In line with the objectives set in the 2006 Sierra Leone Disaster Management Policy, the

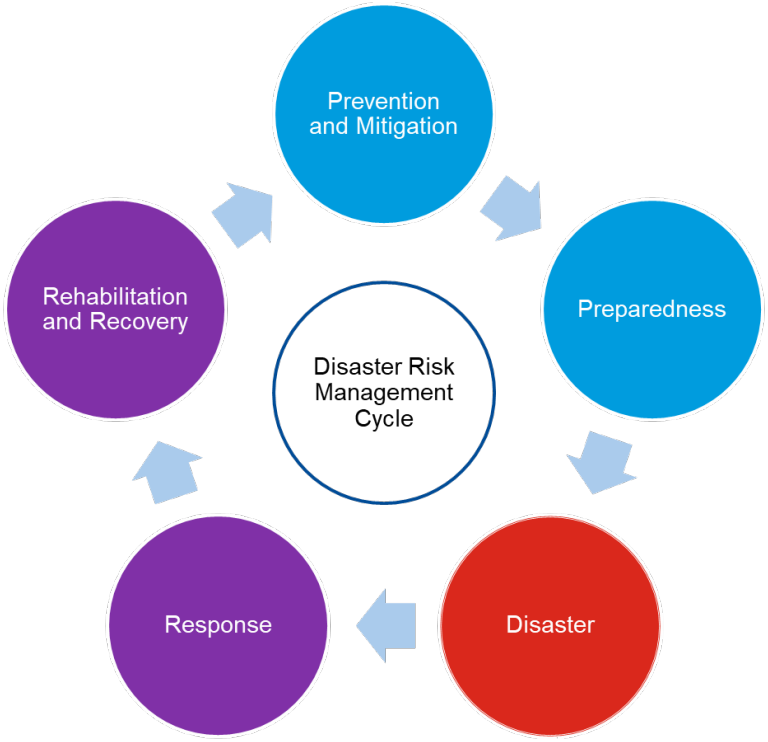
[31] See for example World Bank, 2021, Disaster Risk Management Diagnostic Note.

[32] As reported by the Red Cross Red Crescent

[33] See for example, World Bank, 2021, Disaster Risk Management Diagnostic Note.

government developed and approved the National Disaster Management Agency (NDMA) Act (2020), which provides the legal basis for DRM. The Act established the NDMA and provides for the formation of national, regional, district, and chiefdom level Disaster Management Committees. The Act also provides for the development of a comprehensive disaster management framework as per the UN Sendai Framework for Disaster Risk Reduction including disaster risk reduction and prevention in addition to emergency preparedness, disaster response, and post-disaster recovery (Figure 18). Finally, the Act covers the establishment of a National Disaster Fund for disaster relief and management.

Figure 18. Disaster Risk Management Cycle



Source: Adapted from UN.

Key Policy Gaps and Opportunities

64. The NDMA Act is not fully implemented with institutional capacity posing significant challenges. In line with the Act, the NDMA has been established and the National Platform for Disaster Risk Reduction (NPDRR) is summoned as needed to manage national level disasters. Structures at the subnational level are less developed and lack capacity for filling their role in planning and undertaking preparing disaster management. The National Disaster Fund has not been implemented.

65. While institutional arrangements at the national level provide a basis for disaster response, progress in the areas of disaster prevention and mitigation are limited. Given the lack of financial resources and limited administrative capacity, MDAs are mostly operating reactively in response to acute pressures in their respective area of responsibility. If a disaster occurs, MDAs react swiftly within their capacity. When it comes to policy design and planning they pay limited attention to long term effects or cross sectoral implications of their actions or the lack thereof. While the NDMA Act tasks the agency to

implement the Government policy on disaster prevention and disaster risk reduction, as well as climate risk management, key policy areas relevant to this end, including land-use planning, construction control, public infrastructure, forest management, management of marine activities and coastal areas are under the responsibility of other MDAs. Thus, NDMA cannot on its own design and implement preventive policies but requires the cooperation of relevant MDAs. Sections IV.B-E discuss the challenges and reform options in policy areas key to strengthening the country's resilience to natural disasters and climate change implications.

66. The current approach towards disaster risk management does not allow Sierra Leone to use its scarce resources efficiently in addressing competing development priorities. Disaster prevention can preserve lives and reduce damage, making it generally more cost-effective than responding to disasters as they occur. However, if financial constraints and capacity limitations leave no room for additional projects and spending initiatives, ensuring a disaster smart design for policies and projects that are being implemented is a key step towards reducing the risk and cost of disasters. This can be achieved by conducting a climate vulnerability assessment as part of the feasibility study for policies and projects before they are fully developed and implemented. To this end, as much as EPA-SL is in charge of ensuring that policy decisions and project selection take the environmental (and soon also the climate impact) into account, the NDMA would be key in ensuring that policies and projects are designed in a resilient manner with respect to their exposure to, and impact on, natural disaster and climate risks. For this to happen, key information is needed for designing climate and disaster resilient policies and projects and for undertaking a vulnerability assessment, which is currently not available. In addition, there is no formal process through which NDMA could ensure that it can exercise its responsibility in this area.

67. The government's efforts in developing a disaster risk financing strategy to mitigate uncertainties in disaster response and recovery, is undermined by data limitations. With the support of a World Bank (2022) diagnostic, the government has developed its first disaster management financing strategy. This attempt towards identifying the most efficient financing instruments and determining the level of financing that should be catered for requires an assessment of the nature, frequency, and costs of natural disasters in Sierra Leone. However, reliable data on past disasters has not been compiled and an assessment of the implications of changing conditions, including from climate change, on expected disasters has not been undertaken. Under these circumstances the financing strategy is defined in very general terms, with limited applicability and use for the country. The disaster risk financing strategy should take into account how the financing of disaster management has been managed in the past and what the key sources of financing have been. Exploring whether these sources can be managed more proactive and efficiently would be an important option to consider at least in the short term while fully moving to more sophisticated options might not yet be economically feasible.

Recommendations

- Ensure the availability of needed information and to introduce climate and risk vulnerability assessments for all policies and projects to promote disaster prevention and mitigation within prevailing resource constraints. (NDMA coordinate)
    - Assess the risks for various types of natural disasters and provide projections for how the risk of these disasters would evolve under various climate change scenarios (NDMA / EPA-SL)

- Make the information easily accessible for all MDAs and potentially also the general public (for example in the form of hazard maps) as a key input for climate and disaster resilient project design and for vulnerability assessments (EPA-SL)
- Develop a methodology for climate and risk vulnerability assessments, using for example climate/disaster vulnerability maps. (NDMA/EPA-SL)
- Make climate and risk vulnerability assessments a requirement for all climate sensitive policy areas and projects as is done for environmental impact assessments (MOPED)
- Make NDMA responsible for confirming the climate and disaster smart design of policies and projects based on the climate and risk vulnerability assessments (MOPED)

- Develop the disaster risk financing strategy working towards data-driven, country-specific solutions that are feasible in the short term.
  - Generate reliable data on the location, frequency, and cost of various natural disasters, also by drawing on the records of various development partners (NDMA)
  - Assess the impact of expected changes in climate conditions on disaster occurrences (NDMA)
  - Project the cost of response and recovery, and financing needs and options based on the above assessment (MOF)
  - Consider managing financing sources available in the past, including donors, proactively and more efficiently by planning ahead and keeping financiers closely informed about the government's plans and about how the various players would fit into the response and recovery activities (MOF)

B. Land-Use Planning

Current State and Challenges

68. Effective land-use planning and its enforcement are key for disaster risk and climate change management. By taking into account prevailing conditions and risks in the allocation of areas for specific activities and uses, land-use planning can reduce the risks of, and the vulnerability to, natural hazards. In the context of climate change management, land-use planning has the dual role of (i) supporting the implementation of mitigation policies by allocating the country's land in line with policy commitments, e.g., identifying and designating forest (including mangroves) or water catchment areas, and (ii) protecting the population from the impact of climate by anticipating evolving climate related natural hazards and reflecting these in the land use planning to avoid the exposure to natural disasters in the medium to long term. Similarly, the management and protection of coastal zones plays a key role in protecting the population from the consequences of settlements in areas at risk from natural disasters along the coast, sea level rise, and in protecting mangroves, which can play an important role in climate change mitigation.

69. Stable and legally secure well-defined land rights impact how land is used, managed, and conserved thereby impacting the implementation of climate sensitive practices in land use. In areas where land tenure is unclear, land degradation and deforestation often occur at higher rates, as individuals and companies may exploit land for short-term gains. Clear land ownership creates accountability and strengthens the interest in the land and encourages long-term investments in

sustainable land management practices, such as agroforestry, reforestation, and soil conservation. It also empowers communities and their members, which can make community-based natural resource management (CBNRM) more effective.

70. The framework for management in Sierra Leone is undergoing substantial revisions. Legal and institutional reforms are undertaken to implement the 2015 National Land Use Policy, including by clarifying the land tenure system, reforming land administration, and promoting sustainable land management practices. The objective and progress of ongoing reforms are summarized in Table 4.

Table 4. Land Management Reforms in Sierra Leone

	Issue and Objective of Reform	Actions
Land Tenure	Land tenure under both the statutory and the customary land tenure not properly recorded, causing conflicts ▪ Creating tenure security for all landholders under both statutory and customary land tenure systems ▪ Clarifying land tenure system, formalizing, customary land tenure systems and updating the statutory tenure system	New Customary Land Rights Act 2022 Pending replacement of the Protectorate Land Act 1927
Land Administration	Lack of transparency, conflicts due to fraudulent land transactions ▪ Streamline and decentralize land administration to make it more efficient, transparent, and accountable ▪ Introducing a Land Information System (LIMS) to improve the registration of land and prevent disputes ▪ Modernizing land records through cadastral mapping providing official information on legal zoning and land use details, as well as the boundaries and ownership of land parcels	New National Land Commission Act 2022
Land-Use Planning	Growing urbanization and spread of informal settlements, particularly in Freetown and other urban centers ▪ Introducing sound land use planning and regulation ▪ Reflecting the decentralization reforms in land-use planning, giving more authority to local governments ▪ Strengthening environmental management principles, ensuring that development is sustainable and aligned with long-term goals for environmental conservation	Local Government Act 2004 and amendments Pending replacement of the Town and Country Planning Act 1946

Source: IMF Staff.

71. While the legal framework is being clarified and updated, land use planning is only undertaken for parts of the country. While the Ministry of Lands, Housing, and Country Planning (MoLHCP) used to be responsible for land-use planning the task has now been allocated to the subnational level (Local Government Act 2004) under the oversight of the National Land Commission (National Land Commission Act 2022). There is no national level land-use master plan and, with the exception of Freetown, local councils, which are responsible for preparing land-use plans for their respective areas don't have the capacity to undertake the task. A plan prepared and submitted by the Freetown Council to the MoLHCP was not considered for approval. As part of a project supported by development partners, the MoLHCP is currently preparing a structural plan, providing zoning for Western Area plus six additional secondary cities. The plans are being developed in cooperation between the MoLHCP and the respective city councils.

72. The implementation of formal land management practices as provided for under the revised legal framework will depend on financial resources and capacity building. Land tenure reforms introduce legal land titles and the National Land Commission Law foresees the introduction of a land inventory and a land title registration system. The Act introduces District Land Commissions to manage land administration, including the land register at the district level.[34] At the local level, Chiefdom Land Committees and Town or Village Area Land Committees are created to manage communal land. Since the implementation of the Customary Land Rights Act 2022 and the National Land Commission Act 2022, Land committees have been introduced for five out of 16 districts and less than 300 out of over 7000 villages. The five pilot districts are setting up registers for land titles. The demarcation and registration of existing land titles for the five districts is expected to take at least three years. This does not include the issuance of titles for plots under customary land, which will take much longer. Land rights and their demarcation seem to be less disputed down to the chiefdom level but remain to be clarified at the village and household level.

Key Policy Gaps and Opportunities

73. Without consistent land-use planning and strict enforcement of land-use plans and land rights, informal expansion of human activities creates risks for live and prevents the sustainable management of key natural resources. Expansion of informal settlements in cities as a consequence of rural-urban migration create and exacerbate vulnerabilities: they lead to the construction of housing in areas at risk from natural disasters putting their inhabitants at risk; the uncontrolled construction of buildings can obstruct water flows increasing the risk of floods; the clearing of vegetation on slopes can destabilize the ground, increasing the risk for landslides; and buildings constructed in coastal areas might undermine coastal protection.

74. Without land-use plans, inconsistency in the intended use of natural resources under major government policies are not revealed. During discussions with various MDAs, it prevailed that there are inconsistencies in the evolution of land allocation for various key activities and purposes. While some entities understood that key policies would require the use of forest wood for energy and trading, and the clearing of forest land to expand agriculture production, other entities expected the forest area to

[34] Sierra Leone is divided into six regions, which are further subdivided into 16 districts, with 190 chiefdoms across the country, which are further divided into villages (Electoral Commission for Sierra Leone). While chiefdoms and villages play an important role in the management of local affairs, the exact number of entities may change from time to time.

remain protected and be eventually expanded through afforestation measures. A land-use plan that lays down the intended use of land would uncover such inconsistencies and allow for a transparent arbitration and settlement of prevailing land-use conflicts. It would also provide clear and accessible information on protected areas that can be used as a basis for enforcement.

75. Without a fully developed physical land-use plans, development control cannot be enforced. Notwithstanding the limited resources currently available for controlling development, controls and enforcement need to be undertaken against an approved baseline, that is, land-use plan and city development plans that are aligned to and coordinated through the land-use plan.

76. To use the scarce resources available for land-use planning most efficiently, land-use plans could be rolled out on a risk basis. The six plans that are currently being developed cover about 40 percent of the population and focus on the most densely populated areas, which are also at the highest risk from natural disasters. In the gradual expansion of the planning process other risk factors could be consider, for example to cover areas with key natural resources including water and forests.

77. The parallel rollout of land titles, driving the registration in those areas that are covered by land-use plans, can create important synergies. If property rights are registered and information on property rights is transparently available for areas that are subject to land-use planning, land owners can be responsible for using their land for activities outside the scope foreseen under land-use planning. To expedite the process, it could be considered to register land allocations first at the level where there are less disputes, that is, at the Chiefdom level. This could create accountability at a level that can take responsibility for supervising and coordinating the management of local land without holding the process back until land disputes at the land plot level are resolved.

Recommendations

- Finalize revisions of the land management framework to make it fully consistent and comprehensive (MoLHCP).
    - Replace the Protectorate Land Act with a law that clarifies land tenure under statutory land rights and is consistent with the Customary Lands Act and the National Land Commission Act.
    - Replace the Town and Country Planning Act with a law that is consistent with the National Land Commission Act and Local Government Act.
- Roll out land-use planning and register land titles in line with the new legal framework. (MoLHCP)
    - Consider taking a risk-based approach in successively rolling out land use planning, starting with areas that are more at risk from natural disaster, highly populated, and important for the management of the country's natural resources.
    - Develop capacity for planning, administrating, controlling, and enforcing land-use plans in line with expanding planning activities.
    - Use plans to assess consistency of land use with national policies, reveal and address contradictions in national policies, e.g., between agriculture, forestry, energy, water, etc.
    - Roll out the land title register in parallel with land-use planning to encourage compliance with land-use plans. As an interim step, consider registering land allocation at the Chiefdom level.

C. Disaster Resilient Construction

Construction Codes

78. Building codes play a key role in making buildings resilient to natural disasters, mitigating the risk for and impact on lives and properties. They establish standards and regulations that ensure buildings are designed, constructed, and maintained to withstand natural hazards such as floods, storms, and fires. For example, in flood-prone areas, building codes often require elevating structures or incorporating flood-resistant materials, ensuring that buildings are less likely to be damaged by flooding. Codes may also include setback requirements from water bodies to minimize the risk of inundation. Buildings constructed according to modern, hazard-resistant codes are less likely to suffer severe damage in the event of a disaster, thereby reducing the need for costly repairs or reconstruction. In the context of climate change, building codes increasingly incorporate standards to address more frequent and intense extreme weather events, rising temperatures, and sea-level rise.

79. In Sierra Leone building collapses occur regularly across the country. Collapses are often attributed to the use of unqualified contractors and substandard building materials. The risk of such collapses is exacerbated by natural disaster as weak structures cannot withstand the impact of water intrusion, flooding, or land movements.

80. The country does not have a construction code and does not exercise quality control over engineering services or construction materials. Two draft building codes were prepared in 2016 and 2021 but were not finalized and enacted. The MoLHCP, in cooperation the with the Sierra Leone Professional Engineering Regulatory Council and the Sierra Leone Institution of Engineers, is preparing a new draft code.

81. Finalizing and enacting the building code would be an important first step in establishing a framework for safer construction, however, the full application will require additional measures. To this end, (i) construction designers and workers need to be trained to be apple to comply with the code, (ii) the institutional settings for processing, approving, and maintaining a register of building permits, and (iii) building control and enforcement capacity would need to be developed.

Recommendations

- Enact and implement a building code that takes into account the risks from natural disasters and climate change. (MoLHCP)
    - Finalize and enact the draft code.
    - Implement an information and training campaign to create awareness of the substance of the code and capacity for its application.
    - Build the administrative capacity for processing and approving building permits.
    - Implement and maintain a register of building permits.
    - Build capacity for building controls and enforcement.

Public Works

82. Building design and construction standards should take into account the potential implication of natural disasters and climate change to ensure the most cost-effective use of public resources and to reduces the risk from disasters for the population and the cost to the economy. Standards for the construction of key infrastructure sectors, including transport and energy go beyond what is covered by civil building codes. These sector specific standards play a crucial role in ensuring that public infrastructure withstands the impact of natural disasters and climate change.

83. Sierra Leone has not developed or introduced its own building standards. The Ministry of Public Works applies international codes and standards which might not be adapted to local conditions. However, relying on international standards, if consistently applied, allows for achieving good building standards without the cost of developing and maintaining own standards.

84. A lack of relevant information prevents taking disaster risks and climate hazards into account when designing and implementation public infrastructure. While international standards would allow decisions on the design and implementation of resilient infrastructure, consistent information on hazard risks would be needed for assessing the risks in certain locations and under predicted hazard and climate conditions. The introduction of climate vulnerability assessments and the application of international standards to specific local hazard and climate conditions in the design and implementation of projects requires capacity building.

Recommendations

- Apply international standards relevant for Sierra Leone's climate conditions and hazard profile and which provide for designing projects that are resilient to natural hazards and climate change implications.
    - Identify relevant standards for key sectors.
    - Build capacity for the application of international standards.
    - Ensure the availability of relevant information on natural disasters and climate hazards, e.g., in the form of vulnerability maps, that can be used as inputs for assessment and design purposes.

D. Effective Response to Natural Disasters

Early Warning Systems

85. Effective early warning systems (EWS) are crucial to protect lives and minimize the adverse impact of disasters on livelihoods. They are a critical tool in disaster management helping to reduce the impact of disasters by providing timely information and alerts to communities.

86. EWS should be tailored to local circumstances. Efficient EWS begins with understanding and identifying the specific hazards that communities are exposed to, which requires information on the frequency, intensity, and historical occurrence of these events. Analyzing the vulnerability of populations and infrastructure helps identify which areas or groups are most at risk.

87. EWS consist of have multiple key elements. These include:

- **Detecting potential hazards**. Monitoring and forecasting conditions that can lead to hazardous events is critical for being able to issue timely alerts based on reliable data. The real-time monitoring of potential hazards may, for example, involve technologies like satellites, weather stations, and hydrological sensors. Predictive models and simulations are used to forecast the potential impact, scale, and timing of hazards.
- **Communicating warnings**. Warning messages should be communicated through multiple channels to ensure they reach all segments of the population, include direct alerts through local authorities, radio, television, SMS, social media, and sirens. Communications channels should be designed to reach all, including vulnerable groups such as people with disabilities, elderly populations. Warning messages should be easy to understand and providing clear instructions on what actions to take.
- **Preemptive actions**. Community-based EWS that engage local populations in preparedness activities, ensuring they understand the risks and how to respond are most effective. Education campaigns help ensure that communities know how to react when a warning is issued. EWS should operate based on standard operating procedures which prescribe how to activate emergency services, implement evacuations, and provide immediate relief efforts.

88. In Sierra Leone, several sectors provide early warnings on potential hazards to the population, however, efforts lack a systematic and coordinated approach. Various MDAs, including NDMA, MoAFS, and MoFMR, are operating some basic EWS targeted to their specific clientele. The systems are mostly not formalized and rely on the ad hoc identification of hazards, which are disseminated thorough a range of non-formalized communication channels.

89. A unified EWS covering all hazards and serving the needs of all parts of the population would be an important step for Sierra Leone towards managing growing risks from natural disasters effectively and within limited resources. Key steps in this regard would be to take a comprehensive approach in identifying the hazard risks, the population affected, the sources of information needed for monitoring, the communication channels providing access to the relevant parts of the population, the messages to be communicated in the event a hazard is expected, and actions to be taken in response to the warning. The government would need a workplan for developing the EWS by engaging all relevant stakeholders and for creating awareness in the population.

90. The EWS could be built and rolled out gradually as resources become available, which should not hold back taking a collective effort towards a unified system. The steps to be taken to develop and implement an EWS are the same across various types of hazards and for all parts of the population. Developing a single system with the contribution of various stakeholders will ensure that scarce resources can be used most efficiently and that all hazards are covered with a warning system of the best quality achievable under the prevailing circumstances. A rollout can be paced according to available financial, human, and information resources, driven by risk considerations. The expansion can progress regarding geographical coverage and in terms of employed technologies. The availability of information on past events as well as the capacity for real-time monitoring of potential hazards will set the limits for a systematic information driven approach to EWS. On the latter, the capacity and geographical coverage of SL-Met's systems will be an important parameter. Options for circumventing these constraints through alternative data sources, including satellites and crowd sourcing could be explored.

Recommendations

- Design and implement a scalable multi-hazard EWS that is rolled out in line with risk considerations.
    - Collect information on past hazards and maintain an updated spreadsheet with the information and make it accessible to all relevant stakeholders. (NDMA)
    - Assess and update hazard risks based on the data. (NDMA)
    - Engage stakeholder to identify all EWS needs across sectors and levels of government. (NDMA to coordinate)
    - Define and agree among stakeholders on the coverage of the EWS, including a plan for a risk based gradual rollout. (NDMA to coordinate)
    - Design and implement the EWS system, including processes and methodologies for hazard monitoring and communication. (NDMA to coordinate with important inputs from SL-Met)
    - Design and implement a communication and education program for the population. (NDMA to coordinate)

Social Safety Nets

91. Adaptive Social Safety Systems (ASSS) are a key tool for protecting the poor from shocks and stresses, preventing households from falling into poverty, and promoting climate-resilient livelihoods. ASSS are designed to respond quickly and effectively in the event of a disaster, providing critical support to vulnerable populations. They can quickly scale up benefits to provide additional support to existing beneficiaries if affected by a disaster and also to reach additional households affected by the disaster, even if they were not previously part of the safety net system. While disaster related benefits are provided on a non-permanent basis, the identification of beneficiaries and the distribution of benefits needs to rely on permanent administrative infrastructure, including a register of current and potential beneficiaries. To allow for the implementation of benefits in the case of a disaster, the legal framework needs to provide for mechanisms to conditional resource allocation and spending execution, and institutional arrangements need to be in place for their execution.

92. The Government is working to formalize for the first time a comprehensive national protection system as outlined in the National Social Protection Strategy (NSPS) 2022-2026. The current social safety system consists mainly of a number of donor financed programs reaching out to extremely poor households with cash transfers. In addition, the National Commission for Social Action undertaking various community works programs. However, the system has no formally defined structures and benefits. Initiatives for building a social safety net were launched over the past decade did not lead to the implementation of a comprehensive system. After establishing the National Commission for Social Action in 2011, the rollout of a social safety net program started in 2014 but was not completed due to the need to react to acute disaster events. Government made building social resilience is a key objective under the MTNDP and formalize the social safety net is expected to contribute to this. To this end, the NSPS aims to introduce a formal system of social programs under a life-course framework, addressing social protection needs at different stages of life, from infancy to old age. Accordingly, the Government is preparing a National Social Protection Bill, which is expected to establish the institutional framework for administering and the legal backing for introducing a comprehensive social safety net. While the bill is expected to be enacted by end 2024, it will not provide for specific benefit programs but serve as an umbrella for introducing such programs through regulations.

93. The administrative infrastructure of Sierra Leone's social safety system would need to be strengthened and data gaps addressed. Efforts have been undertaken to register the poorest 20 percent of households as part of existing support programs. The formalization and digitalization of the database is expected to be undertaken based on the forthcoming National Social Protection Bill. To reach vulnerable groups that are not covered by social benefits otherwise but that are at risk for sliding into poverty when hit by a disaster, the register would have to be expanded to cover this part of the population. The systematic identification the parts of the population that should be included in the register due to being vulnerable to disaster risks, information on the nature and location of disaster risks and on the location and situation of the population would be needed. NaCSA started collecting data on households residing in disaster prone areas covering geographical locations based on the at-risk areas identified by NDMA and the Councils in a 2016 mapping exercise. However, updated information for systematically identifying vulnerable areas under evolving climate condition is currently no available.

94. A well-designed and transparent benefit allocation, distribution, and monitoring system could be used to consolidate and coordinate the support from different actors, including donors. This could be a key contribution to making efficient use of resources in the context of resource constraints and dependance on temporary external financing. Given limited resources from the budget, disaster response has been relying on donor support. With donors providing most of their support directly to the population, creating challenges for coordination and leaving the government with limited information on comprehensive response efforts. Channeling the response through an efficient unified response system would allow for better coordination, avoiding overlaps and gaps in the provision of support and allowing the government to retain a comprehensive overview on the response. Monitoring and reporting on the allocation of resources and implementation of benefits would provide important information for analyzing and planning disaster response efforts and would give financiers the control they need when providing resources. The monitoring systems would best be set up in coordination with relevant donors to ensure that their needs are catered for.

Recommendations

- Ensure that the social protection system is shock adaptive and that benefits can be rolled out in response to shocks, including from natural disasters.
- Under forthcoming Social Protection Bill, provide for a benefit distribution system that can deliver targeted temporary support following a natural disaster. (MELSS)
- Design and implement the mechanism for a reliable and timely disbursement of benefits. (MELSS)
- Identify vulnerable parts of the population, including their location and the type of vulnerability they are facing based on an up to date vulnerability assessment. (MELSS)
- Include in the social register information on location and work towards covering population in areas vulnerable to disasters. (MELSS)Design and implement procedures for monitoring and reporting on program execution, also to encourage donors to provide relieve support through the unified system. (MELSS)

V. Enabling Institutions to Support Climate Action

A. Assessment of Legal Framework

95. Sierra Leone has some basic elements of a legal framework for climate change management. The 1991 Constitution of Sierra Leone allows the State to harness all natural resources to fulfil economic objectives while also emphasizing the right to a healthy environment and sustainable development, acknowledging the duty of the State to preserve the environment for current and future generations. The Government of Sierra Leone refers to this as a basis for engaging in environmental protection policies. According to the National Environment Protection Agency (EPA-SL) Act No.15 (2022), the EPA-SL, an agency under the Ministry of Environment and Climate Change (MoECC), is mandated to coordinate and ensure the consistency of climate change related policies and law and their implementation. The Act also mandates the EPA-SL to serve as a National Climate Change Secretariat (CCS) and focal point for all climate actions in Sierra Leone.

96. However, in many areas, the legal framework is outdated, resulting in contradictory laws and insufficient coordination of legacy policies across sectoral laws. For example, the Local Government Act (2022) decentralizes the preparation of land use plans. However, the primary legislation that governs urban planning and development management is the Town and Country Planning Act (1946) which maintains this power with the MoLHCP. It will be replaced by a new Town and Country Planning Act by the end of 2024. While the forthcoming Town and Country Planning Act incorporates the decentralization of power, the Local Government Act (2022) has not been fully enforced across districts. As such, local governments presently lack both a clear mandate and capacity. Further, the Forestry Act (1988) aims to regulate the use of forest resources and promote conservation. However, the Land Tenure Act (1976) allows for the conversion of forested land into agricultural land, creating a policy conflict between conservation efforts and agricultural expansion.

97. There is some legal guidance to coordinate aspects of climate change management across levels of government, but this is not fully enforced. The Local Government Act (2022) provides for the continued devolution of several powers and responsibilities to local councils, including forest conservation and environmental management and protection. The resources and capacity of local governments are, however, limited, hindering implementation. Towards this, the legislation states that where the local council does not have the capacity to improve its performance, the relevant ministry shall undertake the functions on the council's behalf and take immediate steps to develop the necessary capacity of the council. Given their constraints however, it may be inefficient and infeasible to decentralize and develop certain analytical and administrative capacities of individual local councils.

98. The creation of specialized MDAs and transfer of divisions to different ministries has been done without adequate guidance on navigating split jurisdiction. Initially, the Ministry of Agriculture, Forestry, and Food Security was responsible for a broad range of agricultural and environment issues. In 2018, it was divided into specialized ministries to support more focused management of sectors, namely agriculture, environment and land use. Established in 2019, the MoECC now oversees the EPA-SL

(established in 2008), SL-MET, the Forestry Division, and the National Protected Areas Authority (NPAA). The governance frameworks of some of these bodies thus naturally include other MDAs. Moreover, the EPA-SL is better capacitated than the ministry itself. These dynamics often cause tension between MDAs relating to the distribution of power and responsibilities.

99. The GoSL is currently preparing a Climate Change Act, which is expected to define the institutional arrangement for climate change management. In line with the National Climate Change Strategy and Action Plan (NCCSAP) (2021) the Climate Change Act is expected to provide for an institutional structure with well-defined roles and responsibilities of institutions and individuals. The government is also considering inclusion of provisions for governing a carbon market in the law. It is expected that the law would be enacted by 2025. The preparation of the law seems to be at a relatively early stage as consultations on the content of the law among MDAs are still to be held and the concept note for the law was not shared with the mission. Some countries have already adopted such legislation, the key components of which are summarized in Table 5. Given the fiscal, technical, and institutional limitations of Sierra Leone, conditions are premature to include some of these aspects in the forthcoming legislation. The provisions should instead focus on aspects that will facilitate the efficient coordination of climate change matters and which can have an immediate impact, and can subsequently be adapted as conditions see fit:

- Appointing the MoECC/EPA-SL to ensure that Sierra Leone's international climate commitments are being respected.
- Defining a cohesive institutional arrangement for climate change management which clarifies the roles and responsibilities of MDAs and Local Councils, filling gaps, and avoiding overlaps and contradictions.
- Directing the MoECC/EPA-SL to supervise the design and implementation of climate vulnerability and impact assessments, to be undertaken for all relevant projects in specific sectors and exceeding a specific size and scale.

It will be imperative that the law is accompanied by the appropriate revision of sectoral laws to integrate climate change considerations with a long-term view and ensure consistent and clear responsibilities.

Table 5. Key Components of Climate Change Laws in Different Countries

Key Features	Examples
Long Term Emission Reduction Targets	The European Climate Law (2021) commits to achieving climate neutrality by 2050 and reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. Laws in developing countries are less binding in this regard, and instead include provisions for the development of mitigation strategies in accordance with their respective UNFCCC commitments.
Climate Governance Structures	Nigeria's Climate Change Act (2021) establishes the National Council on Climate Change to oversee the implementation and coordination of climate policies.
Carbon Pricing and Market Mechanisms	Kenya's Climate Change Act (2016) was amended in 2023 to provide a legal framework for the regulation of carbon projects and markets. The amendment identifies key principles for the implementation of carbon markets, and provides for the establishment of a carbon registry for all carbon projects. Further, carbon projects may be entitled to fiscal and non-fiscal incentives.

Monitoring, Reporting and Verification (MRV) Mechanisms	South Africa's Climate Change Bill (2022) requires detailed tracking of emissions by sector and regular updates on adaptation and mitigation strategies.
Sector Specific Regulations and Energy Transition	Norway's Climate Change Act (2017) includes detailed policies for transitioning its energy sector, with goals to electrify transportation and reduce reliance on fossil fuels in industrial sectors.
Adaptation and Resilience Measures	Benin's Climate Change Act (2018) emphasizes adaptation to climate change impacts, especially for vulnerable communities and ecosystems. It mandates the development of adaptation strategies, with a focus on agriculture, water resources, health, and infrastructure.

Source: IMF staff.

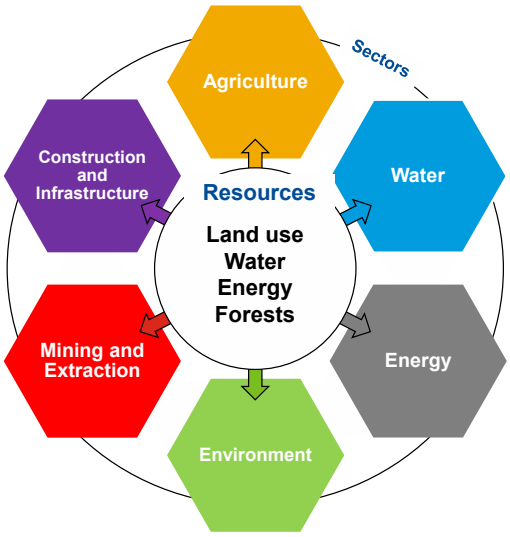
B. Assessment of Policy Framework

100. While most sectoral policies refer to climate change issues, they lack a long-term view and vary in the level of their adaptation and mitigation considerations. The planning horizons are often limited to the short-term, driven by immediate development targets. The programs and policies of the National Water Resource Management Agency are limited to a planning period of 5-7 years. Additionally, some sectoral policies such as those guiding mining activities exclude climate change altogether. Major agricultural initiatives like the Sierra Leone Agriculture Policy (2009) and the National Sustainable Agriculture Development Plan (NSADP) (2010–2030) are outdated. They lack climate change awareness and planning beyond urgent food security needs. The National Adaptation Plan (NAP) for Agriculture (2019), the National Agricultural Transformation Programme (NAT 2023–2027) and the Guidance Note on Climate Smart Agriculture (2021) are more recent. While they promote climate smart practices, development of resilient agriculture systems, sustainable water and land management, and disaster risk reduction, they do not adequately stipulate roles for climate change management and implementation mechanisms. With multiple policies and plans currently being revised under centralized guidelines from the EPA-SL however, this is expected to improve.

101. Limited cross-sectoral coordination results in partially conflicting policies, suggesting that sectors are not aware of sectoral interdependencies. This is even the case for flagship development initiatives of the government. Specifically, the Feed Salone program sets out to achieve food sufficiency by 2030. It comprises (i) the acceleration of productivity, commercialization and green transformation of agriculture, (ii) increased productivity and sustainable management of fisheries and the marine sector, and (iii) improved availability and access to safe and nutritious foods. Meanwhile, the primary components of the Infrastructure, Technology and Innovation program include (i) implementation of the national transport infrastructural system to improve nationwide connection, and (ii) improvement and expansion of existing energy supply infrastructure. These programs lay competing claims on limited natural resources of the country including land, forests, water, and energy. Clearing more forest area for agriculture and infrastructure development also undermines ongoing afforestation efforts. Figure 19 depicts more broadly the resource requirements of sectors. A unified, cross-sectoral blueprint to identify needs, prioritize projects, and allocate resources accordingly is yet to be formulated. This should be integrated in the budget process.

102. The development of collective climate change considerations is largely determined by the integration of sectoral policies with the MTNDP (2024-2030), which fails to ensure consistency among these policies, and is not fully aligned with international commitments (iNAP and NDC). The plan lists sectoral policies without providing adequate guidance on how the inconsistencies between them (as outlined above) can be remedied. The strategic targets and financial investment estimates stated in the plan also are not fully reconciled with the NDC and iNAP. While the document notably identifies the advancement of climate resilience and environmental action as an enabler for its overarching national objectives, operationalizing these strategies remains a challenge. This is a result of weak capacity, lack of resources and an unclear implementation plan backed by well-defined institutional arrangements. Finally, its 7-year planning horizon is also insufficient to compensate for the absence of a long-term climate sensitive development strategy which is clearly aligned with the forthcoming NDC (2025) and iNAP (2021).

Figure 19. Competing Resource Requirements of Sectors



Source: IMF Staff.

C. Assessment of Institutional Framework

103. Specific institutional arrangements are created for the implementation of various climate change policies and strategies, leading to a multitude of overlapping and mostly not operationalized structures. They derive from multiple sources including the revised Nationally Determined Contributions (NDC 2021), the initial National Adaptation Plan (iNAP 2021), and the National Climate Change Policy (NCCP 2021). Under the United Nations Framework Convention on Climate Change (UNFCCC) framework, the government committed to creating a comprehensive institutional framework. Towards this, the iNAP (2021) calls for the establishment of four upper-level bodies:

1. Parliamentary Committee (PC): This committee shall provide legislative support and oversight, monitoring and evaluation, policy advocacy and outreach;

2. Interministerial Committee (IC): Together with the PC, the IC shall strive to secure political and legislative support for NAP implementation;

3. National Steering Committee (NSC): The PC and IC bodies shall oversee the NSC, responsible for overall coordination, policy and strategy making and coherence, resource mobilization, and adaptation planning;

4. Scientific and Technical Advisory Task Force: This Taskforce shall provide technical assistance and advisory to the NSC and other consultative committees including; Local Council, Communities, and Civil Society Consultative Group; and the Development Partner Consultative Group.

However, consistency was not ensured in the following: leadership, membership, distinct functions, and coordination mechanisms. Moreover, there is little evidence to suggest that these committees are in effect, with listed members of the bodies not being aware of their operations. Furthermore, the NDC upholds this framework and additionally calls for the creation of Sector Working Groups (SWGs) and District Working Groups (DWG) to integrate climate priorities and actions into development plans, budgets, and other processes. Authorities indicated that these are not permanent entities, but rather project or program specific.

104. At the national level, the National Climate Change Policy (2021) appoints the SL-MET within the MoECC as the UNFCCC Focal Point, responsible for ensuring that the GoSL fulfils its international obligations. The SL-MET is to lead multilateral engagement and dialogue on behalf of the GoSL, facilitate partnerships, and help unlock access to technical and financial support for Sierra Leone's climate change objectives. It simultaneously also appoints the EPA-SL as the Focal Point for UNFCCC finance mechanisms including the Green Climate Fund (GCF) and Global Environment Fund (GEF) without adequately clarifying the distinction between the two roles.

105. The lack of clear institutional responsibilities for climate change management results in overlapping efforts in some areas while leaving important gaps in others. To this end, various MDAs create structures and functions that work in the area of climate change. Driven by the desire to address resource constraints, several MDAs are undertaking fragmented climate related resource mobilization efforts. In addition to the EPA-SL and SL-MET as described above, these include; MoECC, PI-CREF, MoPED, as well as the FCC at the subnational level. At the same time, the MOF has also created a designated Climate Finance Unit. At the same time, there is no effort underway to organize the generation and dissemination of comprehensive and up-to-date information on the current and expected implications of climate change.

106. Limited coordination across sectors and levels of government exacerbates frictions caused by unclear institutional arrangements. Though several collaborative platforms for MDAs and working groups are foreseen, they are sparsely formalized, that is, they lack formal workplans, meeting agendas, minutes/session recordings, and formal outcomes. Unclear and constantly changing institutional arrangements (ministries being split and responsibilities being shifted between ministries) have also skewed incentives for regular information sharing and joint initiatives between MDAs and across levels of government. For instance, climate data generation and vulnerability assessments are initiated by multiple authorities such as EPA-SL, SL-MET, NaCSA, and some line ministries. There is no framework to

incentivize and regulate data-sharing. As such, MDAs and donors are often unaware of what information is collectively available for use.

107. There is a lack of mainstreaming climate change into government processes. At present, the GoSL does not mainstream climate change considerations into the public investment management (PIM) and budget processes. In this regard, the EPA has released Guidelines for Mainstreaming Climate Change Adaptation and Mitigation into Development Planning, providing a standardized approach for the preparation of climate-aware public strategies at all levels of government. The guidelines are focused on preparing strategies and plans and do not provide guidance on the preparation and costing of individual climate-sensitive public investments at the project level. Nevertheless, they provide a starting point for expanding centralized guidance and assistance on climate-sensitive public investment management (IMF C-PIMA 2024).

108. The authorities recognize the need for strengthened coordination and foresees to address some challenges in the process for updating the NDC, which should be submitted in March 2025. Towards this, the EPA-SL is initiating a series of consultations with MDAs, development partners and other stakeholders to foster collaboration and information sharing. The GoSL expects that the forthcoming NDC will remedy institutional inconsistencies described in this chapter, set more realistic targets premised on reliable data, and better integrate national development and sectoral plans with its climate change ambitions.

D. Information for Climate Sensitive Policy Design

109. Data plays a crucial role in decision-making by providing objective insights that can help GoSL and MDAs make more informed choices. It enables decision-makers to identify trends, assess risks, and evaluate outcomes based on factual evidence rather than intuition or anecdotes. Accurate and timely data helps reduce uncertainty, allowing for better projections, and more strategic planning. It can also lead to improved efficiency, resource allocation, and innovation. This is not limited to climate-related data.

110. A lack of technical capacity and resources significantly limits climate-related data collection, analyses, dissemination. This challenge is exacerbated by the need for very long-run forecasting and projections, whereas traditionally MDAs have taken a short-to-medium-run view: the SL-MET provides seasonal weather forecasts for the government and civil society up to 6-month horizons; the MoF's resource envelop is determined through the Medium Term Expenditure Framework (MTEF) which typically covers a three year period; and the MTNDP only covers a 6-year horizon. There have been a few instances of successfully using long-term projections: temperature and rainfall patterns under RCP 4.5 and 8.5 were assessed until 2080 in the NDC (2021), and SL-MET has also modelled sea level rise until 2060 under the same scenarios. Given the uncertainty around climate projections, defining methodologies and building capacity for making decisions under uncertainty (Box 3) will be an important task for policy design and policy assessment.

111. With limited resources, the GoSL will need to determine its main data priorities and ensure better data sharing. The mission learned that there are pockets of data that exist across the GoSL, some of which overlaps with other data related work, however they are not widely being shared within or

between MDAs and in some instances the data resides in hands of the Development Partner that originally supported the activity. The mission identified various instances where data was produced once, and then not updated or maintained for future use. To address this, the government needs to introduce a system for effective data management and sharing between MDAs and development partners through standing MoUs. MDAs should be surveyed to understand their main data needs and to take stock of existing data they hold (and vintage). Several data priorities are discussed throughout this report, with the big 5 data needs appearing to: disaster risk data, GHG inventory, forestry inventory, climate scenarios and hazard vulnerability maps, and structural plans.

Box 3. Investment Decisions Under Increasing Uncertainty

When designing climate-sensitive policies informing important investments, it is usual to use historical weather and climate data. Engineers use it in the design of infrastructure and buildings, the insurance industry to calculate premiums and capital needs, and farmers depend on it to choose crops and scheduling. Even national governments base their assessments of energy security requirements on such data. With the projected changes in climate, however, historical data is no longer as useful for planning.

Ideally, there would be well-behaved climate models that allow to produce climate statistics for the future. Unfortunately, two problems make it impossible to provide the equivalent of historical climate data for future climates:

First, there is a scale misfit between what can be provided by climate models (resolution of ~50 km for physical downscaling and ~ 10 km for statistical downscaling) and what is needed by decision-makers.

Second, and most importantly, climate change uncertainty is significant, due to both the inherent uncertainty of the earth's climate system and the limited understanding of that system as represented in climate model projections.

However, many policy decisions come with a long-term commitment and can be very climate sensitive. Examples of such decisions include urbanization plans, risk management strategies, infrastructure development for water management or transportation, and building design and norms. These decisions have consequences over periods of 50 to 200 years (see table). Urbanization plans influence city structures over even longer timescales. And infrastructure and urban plans influence the spatial distribution of activities even beyond their lifetime.

Box 3 Table 1. Illustrative List of Sectors with High Inertia and High Exposure to Climate Conditions

Sector	Time scale	Exposure
Water infrastructures (e.g., dams, reservoirs)	30–200 yr	+ + +
Land-use planning (e.g., in flood plain or coastal areas)	>100 yr	+ + +
Coastline and flood defenses (e.g., dikes, sea walls)	>50 yr	+ + +
Building and housing (e.g., insulation, windows)	30–150 yr	+ +
Transportation infrastructure (e.g., port, bridges)	30–200 yr	+
Urbanism (e.g., urban density, parks)	>100 yr	+
Energy production (e.g., nuclear plant cooling system)	20–70 yr	+

Source: World Bank

Forecasting long-term climate conditions

Climate models cannot predict with certainty climate projections and their implications. It is therefore essential not to over-interpret the results of these models over the short-term, and not to use their output as forecasts, without considering natural variability. However, using expert judgement and macro-regional trends, it is possible to have sufficiently good indications on the nature and magnitude of expected changes.

Reflecting uncertainty in project selection

Accepting uncertainty mandates a focus on robustness. A robust decision process implies the selection of a project or plan which meets its intended objectives – e.g., increase access to safe water, reduce floods, upgrade slums, or many others– across a variety of plausible futures. As such, an initial step is to identify the vulnerabilities of a plan (or set of possible plans) to a field of possible variables. Then a set of plausible futures should be identified, incorporating sets of the variables examined, and evaluate the performance of each plan under each future. Finally, those plans that are robust to the more likely futures or otherwise important to be considered are identified and project design and selection can then be based on cost benefit considerations.

Source: IMF staff.

E. Climate Finance

112. Sierra Leone is in the early stages regarding climate financing and related institutional arrangements. Two new units have been recently set up in the MoF and the BSL, but their responsibilities and work programs still have to take shape. The MoF established a Climate Finance Unit in 2023 to strengthen coordination and support the mobilization of climate finance. The BSL established an Emerging Risks Unit in its prudential supervision directorate in 2024, which will, among others, address climate-related risks. Furthermore, the authorities are developing a Climate Finance Strategy and have recently completed a Disaster Risk Financing (DRF) strategy. Key components that are being considered as part of the DRF strategy include Development Policy Loans (DPLs) with a Catastrophe Deferred Drawdown Option (Cat DDO), creating a disaster emergency fund, and employing insurance instruments such as accessing the African Risk Capacity. At present, disaster risk insurance penetration is extremely low.

113. Given the country's underdeveloped capital markets and formal private sector, the focus of climate financing should be on grant or concessional resources and coordination of donor activities. At present, it is not likely that the country is able to attract substantial amounts of climate-related private financing, given that it has limited access to international capital markets and the private sector in the country is underdeveloped. Sierra Leone started a carbon credit project in 2013 in the Gola rainforest, based on the framework for reducing emissions from deforestation and forest degradation (REDD+). However, the country would need to substantially strengthen its institutional capacity related to forest preservation and MRV before allowing it to access carbon markets at a larger scale. Given tightening international standards for carbon credits that may be used for offsetting purposes, it is questionable whether the Voluntary Carbon Market (VCM) can provide substantial sources of revenue in the short or medium run. Instead, the country could focus on increasing the amount of grants and concessional resources available from international donors, including financing for PES schemes and results-based financing for forest preservation. Among others, this could be done by improving the management of donors and better coordination of donor activities across MDAs. To begin, information on all donor related financing activities should be collected by the MoF.

Recommendations

- Adopt and implement a comprehensive Climate Change Act that addresses critical gaps, by establishing an institutional framework, and aligning with UNFCCC mitigation commitments (MoECC).
- Fully implement the Local Government Act (2022) and Devolution Directive (2019) which call for a decentralization of powers and capacity to local governments (Individual ministries, MoLGA, Local Councils).
- Amend the Local Government Act (2022) so as to continue undertaking certain analytical and administrative functions centrally as a service to Local Councils, where more feasible and efficient, without undermining their authority in policy design and decision taking.
- Resolve conflict in the legal framework to improve credibility and enable enforcement.

    - Ensure consistency between the Local Governments Law (2022) and the forthcoming Town and Country Planning Act to improve land use planning (MoLHCP and MoLGA).

- Mainstream climate change management related procedures into other relevant acts, starting with the PFM Act (under revision) and Environmental Protection Agency Act (2022) (MoF, MoECC).
- Publish an annual report on climate related activities, including information on the key parameters, progress, and funding of climate related projects to build stakeholder ownership (MoF, with inputs from other MDAs and development partners).
- Identify and prioritize data requirements for efficient climate change management for each MDA, starting with Big 5: disaster risk data, GHG inventory, forestry inventory, climate scenarios and hazard vulnerability maps, structural plans (Individual ministries).
- Introduce a system for effective data management and sharing between MDAs and development partners through standing MoUs (MoECC).
- Include in a comprehensive project repository, information on climate vulnerability and climate impact (MoECC).
- Collect information on all donor related financing activities, noting which are for climate-related activities (MoF).

Annex I. Sea Level Rise and Costs

Sea-Level Rise: Drivers and Projections

The primary sources of global mean sea-level rise (SLR) are thermal expansion directly caused by global warming and melting of land-based ice mass, most of which is in Greenland and Antarctica (Kopp et al., 2014). A slow but persistent response of ice masses to higher temperature will cause sea-level to increase for decades, and possibly centuries, after global mean temperature stabilizes. As a result, there is no doubt that sea-level will continue to increase during this century, but uncertainty remains on its extent. Thermal expansion and melting of the Greenland Ice sheet are projected to be the main sources of SLR this century with high confidence. The contribution to SLR of Antarctic Ice Sheet melting is instead very uncertain, going from slightly negative (due to increased snow accumulation) to very large (due to fast melting of Western Antarctica) (Kopp et al., 2014). Projections of global mean-sea level are useful to monitor global trends but are not accurate to predict local impacts and support adaptation decisions (Kopp et al., 2014; Diaz, 2016). Local SLR can differ from global mean SLR due to multiple factors, including local vertical land movement (for example, due to tectonics) (Kopp et al., 2014). The analysis of the cost of sea-level rise in this Annex relies on probabilistic local SLR projections, which account for regional SLR, local vertical land movements, and uncertainty in the range of SLR (Kopp et al., 2014; Diaz, 2016).

More recent projections of SLR (Fox-Kemper et al., 2021) are slightly lower than those in Kopp et al. (2014) in Sierra Leone, except for a new low-confidence extreme emissions and extremely fast Antarctica Ice Sheet melting projection (data at latitude 6° north and longitude 2°, from Garner et al., 2021). In Fox-Kemper et al. (2021), the SSP2-4.5 scenario is comparable to the RCP4.5 scenario in Kopp et al. (2014) and projects 0.60 m of SLR in 2100 in Sierra Leone, instead of 0.71 m. The SSP5-8.5 scenario is comparable to the RCP 8.5 scenario and projects 0.83 m of SLR in 2100, while Kopp et al. (2014) project 0.90 m. The 95th percentiles of the SSP2-4.5 and SSP5-8.5 scenarios are within few centimeters from those in Kopp et al. (2014). The new projections also consider a low confidence (limited empirical evidence) scenario of extremely fast SLR in the possible but poorly understood quick deterioration of Antarctica.

Estimating the Cost of Sea-Level Rise and Adaptation

The analysis of sea-level rise impacts, and adaptation options is done using complex models that rely on necessary simplifications but provide important insights. While there is uncertainty on the exact extent and cost of damages from SLR and on the cost of protection measures, there is consensus in this literature that long-term planning of adaptation can be highly effective at containing physical impacts and costs of SLR. For example, the large EU-funded research project PESETA IV finds that coastal protection can reduce SLR damages in the EU by approximately 90 percent (Vousdoukas et al. 2020, Table 6). Model simulations fully agree that adaptation can be highly effective but may differ on the optimal mix of adaptation measures – e.g., hard protection, nature-based solutions, planned retreat – because they use different data, use different climate scenarios, or work under different normative criteria. There is also

consensus that the transformations needed to adapt to SLR, while technologically feasible and economically sound, are complex and require strong governance (Hinkel et al., 2018).

IMF staff uses the state-of-the-art Coastal Impact and Adaptation Model (CIAM) to estimate the cost of sea-level rise under alternative adaptation strategies. CIAM is a global model used to estimate the economic cost and benefits of adaptation to sea-level rise (Diaz, 2016). The global coastline is divided into more than 12,000 segments of different length grouped by country. Sierra Leone's coastline is modeled using nine separate segments in CIAM that vary in length from 4.7 Km to 297 Km. Each segment is further divided into areas of different elevation. For each segment, the model has data on capital, population, and wetland coverage at different elevations. By using projections of local sea-level rise from Kopp et al. (2014), it is possible to estimate the areas that will be inundated and the amount of capital and population at risk. Storms cause periodic inundations on top of sea-level rise. The model does not consider increased risks from river floods.

The model calculates the cost of SLR—protection costs plus residual losses—under alternative adaptation options:

- The *no-adaptation* scenario assumes that population does not move until the sea inundates the area where they live and then relocates to areas with higher elevation. Society keeps building and maintaining capital until inundation causes irreversible losses and capital is abandoned. The cost of sea-level rise is calculated as the sum of the residual value of capital that is abandoned, demolition costs, and the value of land that is inundated. The model uses the rental value of agricultural land in proximity of the coastline, following Yohe et al. (1990), because as SLR progresses, coastal proximity rents will shift from land that is inundated to adjacent land. Population density and development opportunity costs are assumed to be capitalized in agricultural land values. The disutility cost of reactive migration is monetized.

- A *protection* scenario assumes that society invests in cost-effective seawalls and other barriers along the entire coastline to avoid inundation from sea-level rise, but storms can still periodically inundate protected areas if protection is not sufficiently high. Capital and land are not lost, the population does not move, but storms periodically cause capital and human losses. The cost of SLR is equal to the cost of protection plus the expected value of the cost of storms.

- Another adaptation option relies on *planned retreat* from areas that will be subject to inundation. The goal of retreat is to keep using coastal areas without building new capital and by letting the existing capital depreciate. For example, a coastal road is used until it needs major retrofitting investment. Then, a new coastal road is built in-land on higher grounds. This strategy accepts that land and some residual value of capital will be lost, but it avoids coastal protection costs. The population gradually moves to higher grounds before areas are inundated. This usually does not require migration to distant places, but rather relocation within the same coastal area. The cost of SLR is equal to the sum of the residual cost of capital, the value of inundated land, and the disutility cost of relocation.

- The model considers variants of protection and retreat scenarios to deal with risks from storm surge floods. For example, the model calculates the height of the coastal protections to contain SLR and

increasingly large storm surges (1/10, 1/100, 1/1,000 and 1/10,000 year events). In the base scenario (Retreat 1), the retreat perimeter is calculated to only deal with permanent inundation of land, but the retreat perimeter can be pushed to also avoid storm surges (from 1/10 to 1/10,000 year events).

- For each coastal segment, the model calculates the net present value of SLR costs for each adaptation strategy. Loss of life is monetized using the Value of Statistical Life and loss of wetland due to either SLR or protection of barriers that impede the normal circulation of tidal waters is monetized using estimates of willingness to pay for biodiversity preservation.

- The cost of building and maintaining seawalls, and other key parameters are from the literature. Storm surge costs are incremental with respect to a baseline scenario in which storms occur without SLR.

- Despite many uncertainties and some necessary simplifying assumptions, CIAM provides a useful framework to systematically study costs and benefits of alternative adaptation strategies to SLR. More granular coastal modeling and more accurate mapping of assets can provide a more precise assessment of costs and benefits, but the key insights developed with a baseline version provide a useful starting point to deal with a complex, multidecadal challenge.

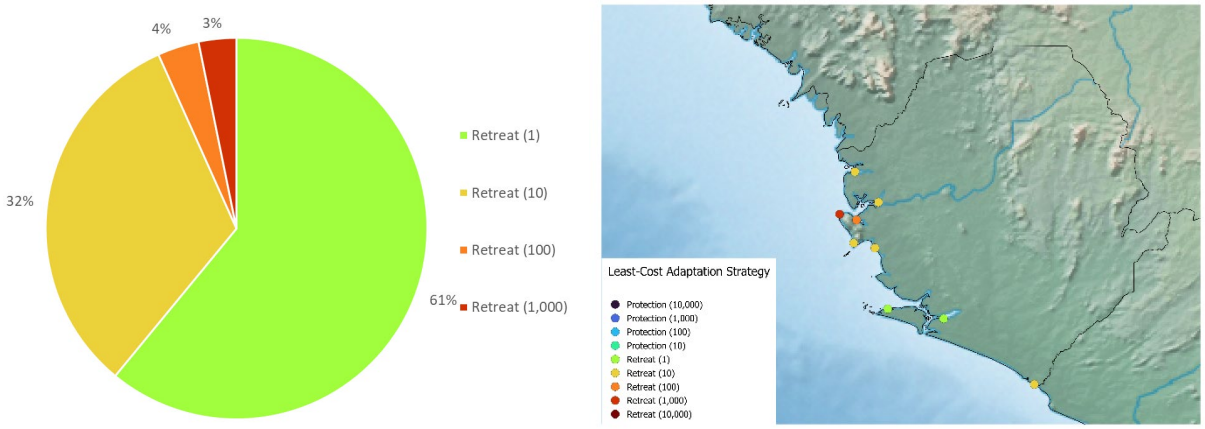
Coastal protection can be very effective at reducing the cost of SLR in Sierra Leone, but it can be expensive and may not reduce substantially the net impact of SLR. CIAM calculates the cost of SLR and the cost of protection considering many factors, including coastal topography, distribution of population and capital, and protection costs. An investment of approximately 0.3 percent of GDP annually throughout the century reduces losses from storms and permanent inundation of the coastline virtually to zero, but the cost of protection summed to the monetized cost of disruptions to ecosystems in wetlands is almost as large as the cost of inaction. Furthermore, to be effective, investment in protection must be front-loaded at the cost of more than 1 percent of GDP until 2039. This suggests that coastline protection can be expensive and weight on public finances for decades.

Planned retreat from the coastline can substantially lower the cost of sea-level rise, but it needs careful planning, and its distributional consequences need to be estimated and assessed. Planned retreat relies on a pro-active move of the population and on a long-term strategy that avoids construction in areas that will be inundated. Assets exposed to future inundation are let depreciate over time. Eventually, the main cost for society comes from the permanent loss of land and from the disutility from moving away from inundated areas. The opportunity cost of this land is low because it is equal to the value of agricultural or marginal land in the country, as established by Yohe (1990). The disutility cost is also estimated to be small because relocation is planned in advance, and the population affected does not need to move long distance to avoid sea-level rise predicted for this century. Relocation to different neighborhoods within the same coastal city is usually sufficient to avoid inundated areas. Planned retreat is the least-cost strategy along the entire coastline of Sierra Leone and it can cut the overall cost of SLR by more than 90 percent, from 0.3 percent to 0.015 percent of GDP under a moderate emission scenario and median SLR.

More granular and comprehensive data is necessary to exactly determine costs, but the preliminary analysis presented in this report establishes a useful roadmap. The coastline of Sierra Leone is divided in

nine separate segments in CIAM that vary in length from 4.7 Km to 297 Km to capture its most important features (Annex 1 Figure 1), but a more high-resolution analysis is needed for more precise estimates. While the model captures baseline erosion and vertical land movement, it does not capture the interaction of sea-level rise with the ongoing coastal erosion processes. The model also does not capture the cost of infiltration of saline water into coastal aquifers. However, the model includes non-market costs such as loss of life due to storm floods, wetland loss, and disutility from relocation which are usually omitted in similar analysis. While a more detailed analysis is warranted, CIAM's results are in line with Hinkel et al. (2018), a major study in the literature. Considering multiple sea-level rise, economic development, and adaptation scenarios, and using different discounting rates, Hinkel et al. (2018) find that the cost of SLR can range between 0.01 percent and 0.6 percent of GDP, annually, a result similar to CIAM's estimate.[35] Protection is cost-effective in all scenarios only for 3 percent of the coastline.

Annex 1 Figure 1. Coastal Segments in CIAM Model



Notes: Country's coastline is divided in 9 segments. Each dot in the map indicates the center of a coastal segment. Coastal segments vary in length from 4.7 Km to 297.2 Km, with a median length equal to 43.8 Km.
Source: IMF Staff based on coastal segment characteristics from the CIAM model (Diaz, 2016), country boundaries from EuroGeographics and UN-FAO, and free Natural Hearth vector and raster map data @ naturalearthdata.com

Cost-Benefit Analysis (CBA) can be challenging, but even preliminary and incomplete assessments of costs and benefits of alternative adaptation options to SLR are useful to identify trade-offs and the most attractive policy options using a transparent and systematic approach (Bellon and Massetti, 2022a). Best practices can be drawn from coastal protection analysis and policies in other countries, for instance in the Netherlands, where there is a long-standing tradition of using CBA and cost-effectiveness analysis for flood risk management and water governance. This tradition started in 1954 with the pioneering CBA of the Delta Works by Tinbergen (1954) and continues to this day (Bos and Zwaneveld, 2017).

[35] More precisely, the cost is estimated as the discounted sum of costs dividend by the discounted sum of GDP.

Annex II. Climate Policy Assessment Tool

The IMF-World Bank (WB) Climate Policy Assessment Tool (CPAT) is a spreadsheet-based 'model of models'. It allows for the rapid estimation of effects of mitigation policies for over 200 countries.[36]

CPAT helps governments design and implement climate mitigation strategies. It allows for:

- **Quantification of many impacts…** This includes impacts on energy production, consumption, trade, and prices; emissions of local and global pollutants including reductions needed to achieve NDCs; GDP and economic welfare; revenues; industry incidence (across many sectors); household incidence (across deciles, urban vs. rural samples, and horizontal equity); and development co-benefits (local air pollution and health impacts). This allows for assessment of tradeoffs (e.g., among efficiency, equity, or administrative burden) and, hence, **tailoring of policy design to each country's context**.
- **…for many climate mitigation policies...** CPAT can evaluate mitigation policies including carbon taxes, ETSs, fossil fuel subsidy reform, energy price liberalization, electricity and fuel taxes, removals of preferential VAT rates for fuels, energy efficiency and emission rate regulations, feebates, clean technology subsidies, and, most importantly, combinations of these policies ('policy mixes').
- **…for many countries...** CPAT covers over 200 countries accounting for more than 95 percent of global GHG emissions. CPAT's input data is complete and **there is no need for external data inputs**.
- **…in a transparent, user-friendly, and consistent framework.** Results are presented rapidly via a chart-driven interface, allowing for experimentation (and sensitivity analyses) in designing new policies or assessing existing proposals and quick incorporation of results into reports.

Additionally, CPAT contributes to national and global analysis by:

- **Emphasizing the importance of a 'just transition' through estimation of impacts on poverty, equity, and welfare across income groups and between urban and rural households.** It is increasingly recognized that mitigation policies should support vulnerable households. CPAT estimates impacts on households from changes in energy and non-energy prices, both across consumption deciles (vertical equity), within deciles (horizontal equity), and between urban and rural sub-groups.
- **Approximating the best available science.** CPAT is parametrized to be broadly in the mid-range of ex ante models and parameterized to ex post empirical literature. The model is streamlined, with transparent underlying parameters which are readily adjustable for sensitivity analyses.
- **Allowing for cross-country analysis, including through quantitative comparisons of all NDCs.** The model allows for consistent comparisons of mitigation ambition for over 200 countries, including all signatories of the landmark 2015 Paris Agreement (PA, 194 countries). Most signatories of the Paris Agreement have quantifiable emissions targets and CPAT converts these to a single, comparable metric (required emissions reductions vs. BAU).
- **Collating new, comprehensive datasets**: CPAT contains and contributes to new global datasets, including energy consumption and prices; GHGs; local air pollutants; price and income elasticities; environmental costs; and NDCs. It also includes comparable decile-level data on household consumption of energy and non-energy goods for 84 countries—one of the largest household budget survey (HBS) harmonization efforts to date. Lastly, CPAT includes new datasets from the IMF's Climate Change Indicators Dashboard and spreadsheets accompanying IMF products.

[36] CPAT is being made available to governments for internal use – more details can be found at www.imf.org/cpat.

Annex III. Payment for Environmental Service – Case of Tanzania

Payment for Environmental Services (PES) schemes to conserve forests are gaining popularity around the world, with an increasing number of African countries implementing them. PES schemes were originally introduced in Costa Rica and are common across countries in Latin America, including in Bolivia, Brazil, Colombia, Guyana and Peru. In Africa, Kenya, Burkina Faso, Rwanda, South Africa, Tanzania and Uganda have all implemented to some extent a PES scheme. In addition, the PES scheme could send an important signal about commitment to conservation, catalyzing external funding related to forest protection.

In Tanzania, PEs schemes started in 2009, where Non-Governmental Organizations (NGOs) started piloting in several districts to increase forest conservation. The villages received tangible benefits (construction of the village offices and grants on phones and bicycles in Kilosa district) and development benefits (introduction of conservation agriculture, field school, and improved charcoal stoves and bee-keeping). Some challenges of the pilots include:

- *Land rights*: obtaining land certificates and demarcation of village borders were the first step in the program since many participants didn't have land certificates. The process was very slow (6 years in some cases), and demarcation led to border conflicts in some villages. Some villagers were afraid to lose land to the program, while others equated land ownership to the right to use resources.
- *Land use planning*: each participating village was required to have land use plan or forest management plan and set aside land for productive and protective purposes. In some cases, there were internal conflicts over land use planning, especially in cases when some residents had to be relocated from forest reserves to villages.
- *Leakage*: NGOs that facilitated the program did not have power to prevent leakage (increased deforestation in areas outside pilots). The government will need to step in if the by-laws are not respected and need to be enforced.
- *Long-term effects*: the pilots run by NGOs were limited in time, and no studies were carried out to see the long-term impact of the projects. Absence of the long-term sustainability of the payments might reverse the positive impact on protecting the forest.
- *Compensation*: misunderstanding of the compensation structure dissatisfied some of the participants since they assumed they would be compensated for lost income from reduced access to the forests. There were also conflicts between charcoal burners, who more heavily relied on forest resources, and other villagers.

Source: Kulindwa, K. ed., 2016. Lessons and Implications for REDD+: Implementation Experiences from Tanzania. Chapters 4, 15.