# SUSTAINABLE CITIES: URBAN AREAS AND CLIMATE CHANGE IN SIERRA LEONE



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## LIST OF ACRONYMS

AAL	Annual Average Loss
BCC	Bo City Council
CAP	Climate Action Plan
CCDR	Country Climate and Development Report
CH4	Methane
CODOHSAPA	Centre for Dialogue on Human Settlement and Poverty Alleviation
COVID-19	Coronavirus Disease
CRS	Catholic Relief Services
DRM	Disaster Rick Management
FGTC	Flectricity Generation Transmission Company
EQ1C FPA	Environment Protection Agency
FII	Furoneen Union
EU	European emon
ECC	Freetown City Council
FCDO	Foreign Commonwealth & Development Office (UK)
FDI	Foreign Commonweath & Development Onice (OK)
	Foleign Direct Investment Eadaration of the Urban and Pural Poor
FEDURF	Federation of the Orban and Kurai roof
	Freetown Emergency Recovery Project
FIA	Freetown Improvement Act
FSU	Family Support Unit
GDP	Gross Domestic Product
GEF	Giobal Environmental Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GPURL	Global Practice for Urban, Disaster Risk Management, Resilience and Land
GHG	Greenhouse Gas
GoSL	Government of Sierra Leone
GVWC	Guma Valley Water Company
HFO	Heavy Fuel Oil
IBC	International Building Code
IDP	Internally Displaced Persons
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Inter-Tropical Convergence Zone
KCC	Kenema City Council
LC	Local Council
LGA	Local Government Act
LST	Land Surface Temperatures
MLGCA	Ministry of Local Government and Community Affairs
MLHCP	Ministry of Lands, Housing and Country Planning
MoECC	Ministry of Environment and Climate Change
MoF	Ministry of Finance
MTNDP	Medium-Term National Development Plan
NBS	Nature Base Solutions
NDC	National Determined Contribution
NDMA	National Disaster Management Agency
NAP	National Adaptation Plan
RET	Renewable Energy Technology
SLWC	Sierra Leone Water Company
SDG	Sustainable Development Goal
SLLGA	Sierra Leone Local Government Association
SLMET	Sierra Leone Meteorological Agency
SPEI	Standardize Precipitation – Evapotranspiration Index
SSP	Shared Socioeconomic Pathways
SSL	Statistics Sierra Leone
SWM	Solid Waste Management
UNDP	United Nations Development Program
WARDC	Western Area Rural District Council

## **EXECUTIVE SUMMARY**



The main victims of climate change risks and impacts in urban Sierra Leone are the urban poor who also bear the brunt of multiple crises such as Ebola and Coronavirus Disease (Covid-19). In response to these impacts, local councils are front and center in implementing climate action activities in Sierra Leone. Therefore, this report situates local councils at the center of climate action. By focusing at the urban and community level, it has three objectives: (i) Identify the risks and impacts of climate change, (ii) Explore what local councils are already doing, and (iii) Determine what they could do more of, or better.

**Sierra Leone is highly vulnerable to natural hazards whose impacts are exacerbated by unplanned rapid urbanization.** In 2023, the Notre Dame Global Adaptation Index ranks Sierra Leone 163 out of 182 countries in terms of vulnerability to climate change. Up to 13 percent of its area and 35 percent of the population are at risk with the majority in urban areas: alarmingly, the population at risk is on the rise. The need to prepare, accelerate and mainstream adaptation actions in all sectors of the economy is urgent. If not managed effectively, the urban agglomeration that should be a catalyst for socio-economic transformation, will instead continue to aggravate the country's vulnerability to natural hazards, entrench low productivity, environmental degradation, inequalities and poverty, thereby stunting all post-conflict development gains.

**Ubiquitous informal developments and economic activities require comprehensive climate adaptation measures at city-wide level.** Urbanization in Sierra Leone is on a steady increase, driven by rural to urban migration. About 30 percent of the national population resides in the six largest urban centers namely Freetown, Bo, Kenema, Koidu, Makeni and Port Loko. The proportion of population living in urban areas increased from 21 percent in 1976, to 34 percent in 2006 and stood at 43 percent in 2021. As in many emerging countries on the African continent, urbanization and urban growth patterns in the country is characterized by economic and spatial primacy of the capital city. This leads to high informality including land uses, developments and livelihoods that are extralegal, high socio-economic and spatial inequalities and unplanned urban sprawl. The result is weakened land use planning and enforcement of development control measures. Further, the country's urbanization is characterized by minimal access to critical services and limited access to economic activities thereby amplifying poverty and unsustainable resource use practices. This urban context calls for long-term adaptation strategies as opposed to seeing the aforementioned as bottlenecks to urban development.

The major economic driver of urbanization in Sierra Leone is the informal sector, and climate change impacts are expected to greatly affect workforce productivity. The 2018 Sierra Leone Integrated Household Survey showed an urban employment rate of 93.4 percent. Moreover, labour force participation rate for urban areas was estimated at 62.7 percent. Of the total 2,129,972 million people currently employed in Sierra Leone, about 39 percent are in urban centres. Urban informal employment is twice that of the rural informal employment, with paid income being minimal. About 74.3 percent of paid employees in the informal sector were resident in urban centres. This is due to the expansion of informal sector employment in the urban areas of Sierra Leone. However, the rate of demographic increase is faster than economic growth and job creation. Both the national and urban populations are very youthful (70 percent below the age of 35 years). This makes it critical to involve the youth in climate action activities and to boost economic growth. Further, climate change impacts in urban centers would mean significant workforce productivity losses, especially for the informal sector, as it is estimated that more than 90 percent of work hours are performed in non-climate-controlled conditions.

**Sierra Leone registers as having among the highest percentages of informal populations residing in hazard prone areas, on the African Continent, with a larger proportion being in urban areas.** Although the emerging urban agglomerations in Sierra Leone contribute over 50 percent of Gross Domestic Product (GDP), over 60 percent reside in informal settlements, with over 25 percent of urban residents residing on low elevation and coastal zones, vulnerable and exposed to multiple hazards. In 2018, the official poverty rate in Sierra Leone stood at 57 percent of the population, with the incidence of poverty varying significantly across the country.<sup>1</sup> In Freetown, poverty increased from 17.7 percent in 2018 to 29.1 percent in 2020. Whereas in other urban areas, poverty increased from 45.2 percent to 46.3 percent. Hence, inclusive measures to address social, spatial, and economic inequalities should be pursued, especially in cities.

<sup>&</sup>lt;sup>1</sup>World Bank. (2022). Sierra Leone Poverty Assessment, Poverty Trends, Development, and Drivers. Washington DC: World Bank.

**Urban sprawl and informality have widened social-spatial inequalities as the urban poor seek to secure housing in low-cost, and poorly serviced locations, widening vulnerability to disasters and other risks.** The absence of any form of development control by the local councils makes it harder to manage this informality, with councils limited in delivering services especially to the urban poor. Further, access to basic services is poor in urban centers. To illustrate, about 43 percent of urban residents have access to potable water for at least one day a week without disruption, while only 10 percent have access to clean drinking water indoors or piped into their compound. Only 55 percent of urban residents have access to improved sanitation facilities.<sup>2</sup> Moreover, over 40 percent of waste generated in urban areas is uncollected, and therefore dumped in unauthorized dumping sites, burnt, or buried. Further, over 65 percent of urban households use charcoal as a source of cooking energy.

## WHAT ARE THE CLIMATE CHANGE RISKS AND IMPACTS IN CITIES?

**Cities are expanding into high-risk zones making them vulnerable to flooding, landslides, and sea level rise.** For Freetown, as much as 80 percent of built-up expansion has taken place in medium to high-risk areas. Neighborhoods exposed to projected sea level rise have grown sharply from zero in 1985 to 1.1 km<sup>2</sup> in 2015. By the year 2100, sea level rise is projected to impact the entire coast of Freetown with potential to affect crucial businesses, historical sites, tourism infrastructure, public works infrastructure and services. By 2050, Freetown is expected to have 3.5 km<sup>2</sup> of settlements exposed to sea level rise. In addition, every city in the country is significantly vulnerable to flash flooding due to significant reduction in green zones to give way to urban development. Overall, across cities, built up areas have grown by 143.5 percent between 1985 and 2015 while the area exposed to flash flooding has significantly increased by 172.3 percent, totaling 33km<sup>2</sup>. Freetown has the largest built-up area exposed to flash flooding; this increased from 5km<sup>2</sup> in 1985 to 14km<sup>2</sup> in 2015. These hazard prone areas continue to be occupied by the urban poor.

**Cities are experiencing heat island effects with notable impacts on air quality and overall human health.** Analysis of climate change trends in this report shows that overall annual mean temperatures in the past century have increased by less than 1°C for Sierra Leone. However, there is seasonal variation and spatial diversity across cities. The number of days with a heat index greater than  $35^{\circ}$ C will increase significantly in the future (beyond 2051 - 2070). Due to the heat island effect, urban land surface temperatures (LST) are likely to increase the most, as urban areas continue to experience increased exposure to hyperthermia from extreme heat and humidity. Averages are higher in the built-up areas compared to the forested or vegetated areas. Bo, Makeni, and Port Loko had the highest mean LST during the 2015 – 2022 period. Continued urban expansion could cause a 0.47°C rise in summer temperatures by 2050.

	Freetown	Makeni	Во	Kenema	Koidu	Port Loko	Bonthe
Sea Level Rise	$\checkmark\checkmark$	×	×	×	×	×	×
Coastal Erosion	$\checkmark\checkmark$	×	×	×	×	×	$\checkmark\checkmark$
Fluvial flooding	$\checkmark\checkmark$	<b>v v</b>	$\checkmark$	✓	✓	✓	✓
Pluvial Flooding	$\checkmark\checkmark$	$\checkmark\checkmark$	✓	✓	$\checkmark$	$\checkmark\checkmark$	$\checkmark$
Landslides	$\checkmark\checkmark$	$\checkmark\checkmark$	$\checkmark\checkmark$	$\checkmark\checkmark$	$\checkmark\checkmark$	$\checkmark\checkmark$	$\checkmark$
Air Pollution	✓	✓	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

Table 1: Multi Hazards: Overview of Climate Change Hazards Affecting Sierra Leone Urban Settlements

★ - none or very low risk ✓ - minor to moderate risk ✓ ✓ - significant or high risk

Source: based on data supplied by local councils.

<sup>&</sup>lt;sup>2</sup> Statistics Sierra Leone. (2019). Sierra Leone Demographic and Health Survey 2019. Freetown: Statistics Sierra Leone.

**There are notable variances in city level climate risks among Sierra Leone cities, as the compounding multi-hazard crisis heightens the vulnerability of urban residents.** The changing hydro-meteorological trends interacting with unplanned urban systems have contributed to devastating cascading hazard events. Floods are the most frequent and calamitous hazards after epidemics. Intense and erratic rainfall triggers landslides or creates multi-hazard environments where flooding, landslides, sea level rise, and coastal flooding can affect large areas, especially in Freetown (see Table 1). Nationally, one-fourth of urban residents living in coastal and low elevation zones are vulnerable to flooding. Continued expansion of unplanned settlements onto flood plains and mountain slopes, means that more citizens are exposed to hazards brought about by coastal flooding, river (fluvial) flooding, surface flooding (pluvial) and flash floods. Flooding compromises sewer and drainage systems especially where poorly managed solid waste clogs these systems. Built-up areas exposed to climate-change related flooding and landslides are expected to increase across all cities. While different hazards affect different areas of the city, sometimes they coincide creating the compounding effects witnessed in the devastating Regent –Lumley landslides of 2017. Today, up to 10 percent of Freetown's population currently lives in multi-hazard zones.

Climate change has negatively impacted access to urban services and has amplified poverty in Sierra Leone's urban areas. Major cities like Freetown, Kenema and Makeni are multi-hazard environments experiencing flooding, coastal erosion, landslides, deforestation, and sea level rise creating catastrophic outcomes on service delivery and people's livelihoods. Intense, and prolonged rainfall that soaks and loosens mountain slopes affects the country's energy infrastructure leading to disruption of business, key services, and livelihoods. Sierra Leone's social infrastructure, such as schools and health facilities, are also exposed to natural hazards with significant impact such as interruption of health services and education for many affected communities. Further, frequent, and intense heatwaves in Sierra Leone can have serious impacts on human health, infrastructure, crop failures leading to poverty and urban food insecurity. The urban poor suffer disproportionally not only from direct effects of climate shocks, but also from its indirect effects.

Of immediate concern is high levels of air pollution, associated to changes in land use, unsustainable energy consumption practices (wood and charcoal use), poor solid waste management practices, increased private motorization, and deforestation. All cities are subject to high levels of pollution, with an average  $PM^{2.5}$  exceeding  $5\mu g/m^3$  (the World Health Organization (WHO) recommended threshold for long-term exposure). Data for 2019 shows that the  $PM^{2.5}$  concentration for Bo and Kenema was almost eight times the WHO threshold.  $PM^{2.5}$  concentrations are also high in built up areas, with inland cities showing higher concentrations than coastal cities.

**For urban Sierra Leone, no task is more urgent today than adapting to climate change.** This is because, Sierra Leone's urban centers are not large emitters of greenhouse gases (GHG) due to their low car ownership and subdued manufacturing industries. However, methane (CH4) emissions are on the rise. The main sources of GHG emissions come from agriculture, followed by land use and forestry, domestic and industrial waste. This reality means that pursuing low carbon urban growth as a long-term strategy contributes to development dividends such as less pollution and improved public health.

## WHAT ACTIONS HAVE LOCAL AND CENTRAL GOVERNMENT ROLLED OUT?

All cities have prepared development plans that are being used to anchor and finance climate change adaptation and low carbon growth initiatives. Actions taken include stakeholder engagements; public awareness campaigns; rehabilitation of critical infrastructure for water, sanitation, and drainage systems; tree planting and afforestation; participation of women and youth in improving waste management and drainage systems; and mapping of flooding and landslide-prone zones and communities. Councils are working with development partners in resource mobilization and capacity building.

**Despite a myriad of limitations, city leaders in Sierra Leone are forging ahead, championing climate action initiatives with tangible results to local communities.** Mayors and councilors are passing resolutions aimed at (i) enhancing climate action in their organizational structures, development plans and budgets; (ii) building the resilience and capacity of local communities and groups to cope with a range of climatic events; and (iii) translating community capacities into actions. Opportunities for local officials and councils to choose climate actions consistent with the needs and preferences of residents, and the administrative capabilities of the city are being harnessed.

In on-going climate action activities, residents, including poor and marginalized groups, such as those living in informal settlements are the most important stakeholders and partners. Local communities are driving nature-based solutions in urban areas. Further, most community-based adaptation strategies such as unclogging of storm drains rely on extensive participation of women and youth. Community-based solid waste management is contributing to the resilience of storm water systems. The involvement of residents during the development of the Transform Freetown Agenda and Freetown Climate Action Plan, was essential in tapping community lived realities of climate change impacts and helped map out potential community resilience strategies.

At national level, Sierra Leone has established institutions, adopted commendable policies and strategies including reviews of experiences since 2004. National level institutions to steer climate policy and action have been established. These include Environmental Protection Agency, Climate Change Secretariat, Ministry of Environment and Climate Change, Climate Finance Department, Sierra Leone Meteorological Agency, National Disaster Management Agency, and National Protected Area Authority. Further several policies, plans, and strategies have been adopted. The main ones are the National Climate Change Policy, Medium-Term National Development Plan, National Adaptation Plan, Integrated National Adaptation Plan, Climate Change Communications Strategy, and Nationally Determined Contribution. All these efforts demonstrate government's commitment to the climate agenda.

**Nonetheless, fiscal and capacity challenges undermine the financing of climate action at the local level.** Local councils are heavily reliant on central government-tied grants to cover decentralized mandates and human resources. Even though the Local Government Act (2004, 2022) encourages local authorities to raise their own revenues, these resources are very negligible. Discounting international development partner contributions (mainly World Bank, European Union and Foreign, Commonwealth and Development Office (UK)), insignificant resources are directed to support low carbon growth and adaptation measures. This is not just the result of the weak fiscal capacity of local councils, but also the competing need to address health disasters such as Ebola Virus (2014) and Covid-19 (2020-2023).

**Locally led climate action is essential for Sierra Leone's cities, especially as local councils are resource constrained.** Partnership with local stakeholders (local communities, local non-governmental and civil society organizations) is important to understand realities of climate change impacts at granular levels and climate data validation, as well as to drive locally led climate adaptation, especially in a fragile urban context.

**To scale up climate change actions especially at city levels, local councils can learn from international best practices.** This centers around funding research and innovation on (i) low carbon adaptation technology, (ii) developing platforms to integrate the private sector into climate change programs, (iii) developing risk-informed building codes and (iv) integration of funding mechanisms for urban adaptation programs into the budget planning cycles at local and national levels.

## A CALL TO ACTION: Interventions needed for cities to effectively manage climate change risks and impacts

**Sierra Leone is at the cusp of development change; wherein national government and local councils have a window of opportunity to make purposeful climate adaptation investments as a mainstream tool to deliver on national priorities.** Taking this long overdue step-change to harness opportunities of urbanization will set the country on a sustainable socio-economic pathway that would enhance progress towards a sustainable, and low carbon economy. Prevarication and course-correction in future will be more expensive and far harder. Three interventions should be prioritized given the multiple co-benefits that they engender:

- a) Build the technical and financial capacity of national and urban level institutions to develop and implement climate change programs.
- Bold steps are needed to streamline and resolve debilitating deficits in land use planning, and land administration, building codes, and approvals and development control. This requires further legal clarity on the relationship between central government, local councils, and chiefdoms in development control, building permits and the management of land. Further, incorporating green infrastructure into land use plans can help prevent flooding, improve water quality, and reduce urban heat island effect.

Name of Local Council	Climate Change risks	Investments required				
		SWM	Urban drainage	Transport ation	Flood risk reduction	Environmental protection e.g., tree planting
Во	Heavy rainfall leading to floods. Rising temperature and low rainfall leading to drought. Extreme heat in urban areas.	•	•		•	•
Bonthe	Heavy rainfall leading to floods.	•	•		•	•
Freetown	Heavy rainfall leading to floods and landslides. Extreme heat in urban areas.	•	•	•	•	•
Makeni	Heavy rainfall leading to floods. Extreme heat in urban areas.	•			•	
Kenema	Heavy rainfall leading to floods, and landslides. Rising temperature and extreme heat in urban areas.	•	•		•	•
Koidu City	Heavy rainfall leading to floods.	•	•		•	•
Port Loko	Rising temperature and low rainfall leading to drought. Extreme heat in urban areas.	•	•		•	•
WARDC	Heavy rainfall leading to floods. Extreme heat in urban areas.	•	•		•	•

Table 2: Infrastructure Investments for Building Climate Resilience

Source: based on data supplied by local councils.

- Enhance the financing of climate resilience and climate-resilient infrastructure at the urban level. This should include (i) improving the revenue collection capacity and compliance of two major local revenue sources (property tax and market dues), (ii) building the capacity of cities and local governments to access global climate financing facilities, (iii) setting minimum thresholds to fund climate action in each budget cycle, (iv) setting penalties for infringement on environmental assets within an urban jurisdiction, and (v) integrating national climate adaptation and low carbon growth actions into development and land use plans.
- **Expanding service delivery has potential to strengthen the resilience of emerging urban communities and building on locally led climate adaptation efforts.** Key services that need to be expanded are solid waste collection, provision of safe and clean water and improved sanitation facilities. This requires strong collaboration between local councils, communities, and utility companies like Guma Valley Water Company and Sierra Leone Water Company.
- An integrated approach to delivery of capital investments is needed in solid waste management, drainage and flood protection infrastructure is urgent. As captured in Table 2, all urban areas have prioritized solid waste management as this would enhance community level adaptation capacity to flooding and communicable diseases (especially cholera). Simultaneous investments will be needed in urban drainage systems and flood risks reduction. In cities like Freetown and Bo, this means upscaling ongoing programmes. Robust waste management systems including recycling programs, reducing the dependency on plastics, and implementing stringent laws that promote the separation of waste and increase community awareness is key.

## b) Improve local climate action with better access to information and mobilization of communities to address climate change issues at local level.

• Build the capacity of local communities to drive sustainable and climate-resilient urban development. The main actions are (i) building capacity and equipping community level structures such as Ward Development Committees to disseminate climate related information and engage in disaster emergency preparedness and response actions, (ii) establishing climate action and disaster risk management (DRM) committees at council level to prioritize decision making and financing on these themes, (iii) building the personnel, technical and resource capacity of Councils to effectively participate and contribute to city level National Disaster Management Agency DRM structures, and (iv) expanding social protection programs to local communities to assist in speeding up reconstruction and recovery for impacted residents and affected communities.

- c) Improve the generation, measurement and dissemination of climate change data and risks at national and urban levels.
- Support the establishment and strengthening of evidence-informed Early Warning Systems, Planning and Response Actions for all types of climate risks and hazards at national and city levels. The Government of Sierra Leone must strengthen the capacity of local councils' human resources, institutional and structural facilities to respond to multiple hazards such as floods, landslide, and other emergencies through: (i) supporting the operationalization of climate information, disaster management and early warning system and enhance partnerships with local councils and communities, (ii) enhancing channels for the communication and dissemination of early warning information to communities and local councils, and (iii) strengthening city and local-level disaster response structures.

## INTRODUCTION AND REPORT OUTLINE

This report examines the impacts of climate change on urban centers in Sierra Leone and identifies priority reforms and investments required for cities to effectively manage climate change potential impacts. Specifically, it (i) identifies climate change risks and impacts in Sierra Leone's urban areas, (ii) identifies strategies employed by Government and local councils to manage the current and potential impacts of climate change, and (iii) identifies and prioritizes reforms and investments required for cities to effectively manage climate change climate change potential impacts.

The Report focuses on seven cities namely Bo, Bonthe, Freetown, Kenema, Koidu, Makeni, and Port Loko and Western Area Rural District. The main audience of this report is the Government of Sierra Leone (GoSL), city leaders, and development partners. This Report is expected to establish a solid analytical base to inform the policy dialogue with the GoSL on climate-resilience and the urban agenda, especially in the context of multiple hazards that the country experiences often. Moreover, it provides Sierra Leone's cities with options for adaption and low carbon growth that could be embedded in city operations, bylaws, and regulations. Finally, it contributes evidence in the preparation of the Sierra Leone Climate Change and Development Report (CCDR).

**The Report is organized into 5 Chapters.** Chapter 1 develops an understanding of the dynamics of urbanization and urban growth in Sierra Leone. It maps gaps in the institutional architecture of urban development and management that have a bearing on resilience pathways. It finds that expansive informal developments and the inability of local councils to manage the built environment in a systematic manner exacerbates vulnerability and the impacts of climate change.

**Chapter 2 gives a synthesis of the current situation, trends, and projections for each risk category.** This is followed by a presentation of multi-hazard analysis and combined impacts of climate risks to urban systems and the potentially disastrous compounding effect of unplanned urbanization. Whilst the main impacts of climate change in cities vary, the major ones are loss of life, destruction of public infrastructure, damage to housing, disruption of infrastructure services and urban food supply chains as the direct result of flooding, landslides, and sea level rise. Combined, these impacts undermine the country's economic development.

**Chapter 3 examines the government's institutional, policy and legislative response to climate change.** While there are many institutions, policies, strategies, and plans put in place at national level, these have not yet filtered down to the local government level. Thus, an overfocus on national level responses has led to the omission of specific responses at urban, community, organizational and enterprise levels – fundamental arenas for climate action.

**Chapter 4 discusses and examines current climate adaptation and low carbon growth strategies at the urban level.** Broadly, this analysis contributes to identifying local climate action initiatives that have the potential for upscaling. These initiatives are low-scale and mainly community-based.

**Chapter 5 assesses and prioritizes priority policy reforms and investments required for cities to effectively manage potential impacts of climate change.** It summarizes the main recommendations towards improving climate adaptation and low carbon growth at urban levels. It points to priority actions for policy change and priority investments required. These priorities include upscaling drainage and solid waste managment, strengthening land use planning and local revenue raising capacities. Specific actions for policy change are categorized in an implementation matrix.

# CHAPTER 1: OVERVIEW OF URBANISATION TRENDS

**The seven urban centers have significant socio-economic diversity.** Freetown has a population of over a million while each of the other cities has less than 250 000.<sup>3</sup> Tourism, fishing, services, and mangrove agriculture are significant for the economies of coastal Freetown and Bonthe. Income from mineral extraction has direct impact on the socio-economic growth of Koidu in the east (diamonds), Kenema and Bo in the central and south regions (diamonds and gold), and Port Loko (iron ore and gold). Services (banking, higher education, administration) are significant for Kenema and Bo. Countrywide, agriculture employs up to 75 percent of the population and contributes to between 35 and 45 percent of GDP with rice, cassava, and cocoa the main crops. While agriculture is significant for all settlements, it is critical for the economies of Port Loko, Kenema, Bo, and other smaller settlements in coastal and riverine areas. Thus, the interlocking of rural farming and mining (including artisanal gold and diamond mining) determines rural-urban dynamics and urbanization.

**Urbanization in Sierra Leone is unfolding rapidly in a context of enduring vulnerability and fragility.** Since 2000, a succession of economic crises (downturns in commodity prices for key products such as iron ore (2014)), natural shocks<sup>4</sup> notably the Ebola epidemic (2014-2016), landslides and floods (2017) and the Covid-19 pandemic (2020-2021) have buffeted the country and undermined its development efforts. Informality, insecurity of tenure and livelihoods, weak institutional capacity to manage urban growth, poverty and inequality characterize the prevailing physical, social, and environmental conditions in the country's urban areas. Yet addressing these gaps fully would unlock the transformative potential of urban areas to be engines for economic and social transformation and open new pathways to resilience (socio-economic, environmental).

While landslides and floods, are a common hazard in Sierra Leone's urban centres, the most devastating one (which claimed more than 1,000 lives) was recorded in 2017. This event had a devastating economic impact of US\$ 30 million.<sup>5</sup> All seven urban centres covered in this report are vulnerable to landslides and floods. For example, in Makeni, floods could impact approximately 18 percent of the city's buildings and 27 percent of roads, respectively. Annual average losses due to flood damage in Freetown is as high as US\$2,5 million.<sup>6</sup> In urban Sierra Leone, the impacts of floods are severe due to uncontrolled urban growth into high-risk zones including steep slopes, mountain valleys, water ways and streams.

**The Ebola Virus Disease (EVD) crippled social services and led to declines in both employment and economic activities in cities.** In total 46.5 percent EVD cases were recorded in urban areas with devastating impacts.<sup>7</sup> For example, a January 2015 Survey found that among household heads, an estimated 9,000 wage workers and 170,000 self-employed workers outside of agriculture were no longer working since the EVD crisis.<sup>8</sup> At the same time, non-farm family run businesses recorded average annual revenue decrease of about 40 percent. The main impacts of EVD were job cuts and layoffs, rising prices, shortages of basic commodities and a rise in morbidity and mortality for those infected.

As of April 30, 2022, there were 7,681 confirmed COVID-19 cases, 125 deaths and 4,819 recoveries in Sierra Leone.<sup>9</sup> Of the total confirmed cases, about 68 percent were in urban centres. The subsequent impacts of the pandemic on poverty were severe in urban areas. To illustrate; in Freetown, poverty increased from 17.7 percent in 2018 to 29.1 percent in 2020.<sup>10</sup> Whereas in other urban areas, poverty increased from 45.2 percent to 46.3 percent. Further, the decrease in food security was largest in urban areas, which suffered the greatest decreases in consumption and as households cannot fall back on own-produced food.<sup>11</sup>

This chapter develops an understanding of the dynamics of urbanization and urban growth in the context of Sierra Leone's multiple urban crises. It maps gaps in the institutional architecture of urban development and management. In brief, it finds that urban areas are lacking in specific resilience-driven intervention pathways in spheres such as: (i) making disaggregated data available at the urban level, (ii) capacity building in spatial planning and management, (iii) realization of participatory and devolved governance, (iv) enhancing local revenue generation, and (v) collaborative working across public institutions.

<sup>&</sup>lt;sup>3</sup> SSL. (2017). Sierra Leone 2015 Population and Housing Census: "2015 Population and Housing Census: Summary of Final Results". Freetown: Statistics Sierra Leone.

<sup>&</sup>lt;sup>4</sup> See pages 18 – 20, The World Bank. (2022). Building Regulatory Capacity Assessment for Sierra Leone: Task 1.1 of the Building Regulatory Capacity Assessment for Africa Project | #1278827 Freetown: The World Bank/Government of Sierra Leone/ARUP and GeoHazards International.

<sup>&</sup>lt;sup>5</sup> World Bank. (2017). Rapid damage and Loss Assessment of August 14th, 2017 landslides and floods in the Western Area. Washington DC.: World Bank. <sup>6</sup> World Bank. (2020). Freetown: Options for Growth and Resilience. Washington DC.: World Bank.

<sup>&</sup>lt;sup>7</sup> SSL. (2017). Sierra Leone 2015 Population and Housing Census Thematic Report on socio-economic impact of the Ebola Virus Disease. Freetown: Statistics Sierra Leone.

<sup>&</sup>lt;sup>8</sup> World Bank. (2015). The Socio-Economic Impacts of Ebola in Sierra Leone Results from a High Frequency Cell Phone Survey Round 1, January 12, 2015. Washington DC.: World Bank.

<sup>9</sup> Ministry of Health and Sanitation Corona Virus Disease (COVID-19) Situational Report no 761 Date of Issue 30th April, 2022.

<sup>&</sup>lt;sup>10</sup> World Bank. (2021). "Welfare and Poverty Effects of the COVID-19 Pandemic" Sierra Leone Economic Update. Washington, DC.: World Bank. <sup>11</sup> Ibid.

### **URBANIZATION AND URBAN GROWTH PATTERNS**

**Data from the last six censuses (1963, 1974, 1985, 2004, 2015 and the 2021 mid-term census) show that the country's population rose from 2.7 million in 1974 to 7.5 million in 2021 while urbanisation has risen from 27.5% to 43% over the same period (Figure 1 & 2).** Figure 1 shows that except for the civil war years (1989-2001), national population growth rate has been consistently above 2 percent. The steady population growth is underpinned by high fertility rates and declining deaths rates. About 75 percent of the population of the country is under the age of 35 years<sup>12</sup> (young population): a feature illustrated in Figure 3 and Figure 4 for Freetown in 2015 with estimates for 2028<sup>13</sup>. These factors place Sierra Leone in the Phase 2 stage of the demographic transition. The youth bulge implies that investing in children and urban youth focused programs could spur future socio-economic growth and reduce the risk of conflicts. There are opportunities to integrate climate change education in schools and colleges to broaden awareness and develop a population able to participate in emerging net zero economies.

**Statistics Sierra Leone (SSL) census data show that urbanization has increased from a low level of 18.9 percent in 1963, 21 percent in 1967 to 36.7 percent in 2006, 40.9 in 2015, and to about 43 percent in 2021 (Figure 2).** This is driven by rural to urban migration and natural increase (significant in large settlements). About 25 percent to 30 percent of the national population is in the six largest urban centers Freetown, Bo, Kenema, Koidu, Makeni and Port Loko. SSL defines an urban area as any settlement with a human population equal to or more than 2000<sup>14</sup>. This is the basis for mapping urbanization (the national population in urban areas relative to the overall national population) and urban growth (the size of population in urban areas and its spatial distribution).



Figure 1: Sierra Leone National Population Growth Rates





<sup>12</sup> SSL Census 2015.

<sup>&</sup>lt;sup>13</sup> European Development Fund. (2014). Sierra Leone Preparatory components and studies for the Freetown Development Plan "The Urban Planning Project", October 2014: Freetown: European Aid and GOPA Consultants.

<sup>&</sup>lt;sup>14</sup> Criteria for urban definition vary; the population threshold can be as low as 200 persons (e.g., in Denmark) and as high as 20 000 (e.g., in India/Japan). Some countries also add economic factors e.g., value of non-agricultural production. Others have used or proposed functional definitions. However, functional definitions do not correspond to administrative jurisdictions and are consequently not popular with policy makers. Recently, European Commission led attempts to develop a universally applicable definition whose uptake in Africa has been limited (see Dijkstra, L. and Poelman, H. (2018). A harmonized definition of cities and rural areas: the new degree of urbanization. Working Paper 01/2014, European Commission; UN-HABITAT. (2022). World Cities Report 2022: Envisaging the Future of Cities, Nairobi: United Nations Habitat (pp. 33 – 38).

Figure 3: Sierra Leone Population Structure 2004-2015

Figure 4: Freetown's Youthful Population (2004 and 2028)



The major economic drivers of urbanization in Sierra Leone are employment opportunities, mining and informal economic activities. Currently, small, and medium enterprises provide livelihoods to approximately 70 percent of the population and represent over 90 percent of the domestic private sector.<sup>15</sup> Most of these operate in the informal sector, with only ten percent registered, and they struggle to grow.<sup>16</sup> Four years earlier, the 2018 Sierra Leone Integrated Household Survey showed an urban employment rate of 93.4 percent. Moreover, labour force participation rate for urban areas was estimated at 62.7 percent. Of the total 2,129,972 people currently employed in Sierra Leone, about 39 percent were in urban centres.<sup>17</sup> Further, the survey showed that urban informal sector employment was twice that of rural informal employment. About 74.3 percent of paid employees in the informal sector were resident in urban centres. The major non-farm activities in Sierra Leone are wholesale and retail trade (71 percent) and some kind of manufacturing (29 percent) (out of a sample of 886,209 activities).<sup>18</sup> Thus, urbanization in Sierra Leone is not accompanied by industrialisation. In fact, Sierra Leone has de-industrialized, with manufacturing now only 2 percent of national GDP, down from 10 percent in 1994.<sup>19</sup>

**Migration accounts for much urbanization especially in the Western Area region.** For example, the 2015 Census found out that respectively about 50.3 percent and 64.3 percent of the Freetown and WARDC population were lifetime in-migrants.<sup>20</sup> This shows that the Western Area Region is the most popular destination of rural-urban migration. At the same time, regions with the highest lifetime out-migrants were Northern (22.4 percent), and Southern (17.9 percent).<sup>21</sup> Also, the districts with the highest lifetime out-migrants were Bombali (28.1 percent), Kambia (23.4 percent), and Moyamba (23.3 percent). This migration from some of the poorest districts often lead to people settling in urban informal settlements. However, elites participate in a variety of ways including erecting the type of unregulated hillslope, large-footprint mansions that exacerbated the 2017 landslides. Clearly, these informal settlements are highly vulnerable to climate risks. This is consistent with the latest research which shows that climate induced urbanization is often leading to informal urban growth.<sup>22</sup>

<sup>21</sup> Ibid.

<sup>&</sup>lt;sup>15</sup> World Bank. (2022). "Sierra Leone Economic Update 2022: Leveraging SME Financing and Digitization for Inclusive Growth. Washington DC.: World Bank.

<sup>&</sup>lt;sup>16</sup> Ibid.

<sup>&</sup>lt;sup>17</sup> The rural area employs more of the population because of the high proportion of people in unpaid family work and self-employment in agriculture in the rural areas. SSL. (2019). Sierra Leone Integrated Household Survey (SLIHS) Report 2018. Freetown: Statistics Sierra Leone. <sup>18</sup> Ibid.

<sup>&</sup>lt;sup>19</sup> World Bank. (2018). Sierra Leone Economic Update: Reviving Urban Development the Importance of Freetown for the National Economy. Washington D.C: World Bank.

<sup>&</sup>lt;sup>20</sup> SSL. (2017). Sierra Leone 2015 Population and Housing Census: Thematic Report on Migration and Urbanization. Freetown: Statistics Sierra Leone.

<sup>&</sup>lt;sup>22</sup> Chlouba, V., Mukim, M and Zaveri, E. D. (2023). After Big Droughts Come Big Cities: Does Drought Drive Urbanization? Policy Research Working Paper, 10408, (April 2023) Washington DC: World Bank

**There is a strong influence of mineral production and commodity cycles as well as fluctuations in agricultural incomes on the migration to cities and urban growth.** This catalytic effect of mining (both artisanal and large scale) has been largely ignored in the urbanization discourse<sup>23</sup> but is very significant in the contemporary growth and/or decline, especially of intermediate cities and small towns in African countries ranging from Tanzania in the east, Zimbabwe in the south and Liberia, Sierra Leone, Ghana and Guinea in the west. For Sierra Leone, mineralized urbanization (i.e. the force of mineral boom and busts on nation states, settlement patterns, their growth and welfare of citizens) is notable in the growth and decline of Kenema and Koidu in the East and more recently in the iron mining north and north west and its influence on growth of Tonkolili, Magburaka, Lunsar and Port Loko.

**Thinking about mining and urbanization makes at least two points clear.** First is to recognize that dynamics and drivers of urbanization for primate cities like Freetown can be and are materially different from those for smaller regional settlements like Bo, Kenema and Koidu. Second is the need to prioritize mining not only in national economic development but also in settlement planning and environmental management given the scarring effects caused by mineral exploitation.

**Freetown occupies 0.114 percent of the land in Sierra Leone but had 15.5 percent of the total population in 2004 and 2015.** If the population of Western Rural Region (WARDC) (90 percent urban) is added to Freetown, this urban agglomeration held 21 percent of the national population in 2015. Urban areas are not only home to increasing populations, they are vital generators of economic growth and have the potential to power the country's economic structural transformation. Freetown accounted for 30 percent of the country's GDP in 2018<sup>24</sup>. Congestion; poor connectivity; road, water, and electricity infrastructure deficits; dysfunctional land use planning; and unclear land rights undermine the country's potential. Addressing such bottlenecks would attract the manufacturers and skilled workers to make the city a regional hub for exports, propelling growth throughout the country. Better planned, this agglomeration can create a transformative socio-economic corridor serving as a pilot for developing climate change adaptation and low carbon growth strategies for the country. This applies to other cities in the country.

**Regionally, the population densities are highest in the Western Regions dominated by Freetown (Western Region Urban) and in the Southeast where there are significant mining centres** (See Figure 5 & 6). Districts in the Northeast and Southwest of the country had sparse population density over the four-year census period to 2021. Unfortunately, publicly available data from SSL is not disaggregated at the urban settlement level (ward, enumeration tracts) thus constraining local level analysis of trends. Given the evidence-driven nature of policy formulation and practice, it is imperative that SSL, research centres and partners produce timely, credible, comprehensive, trustworthy, and dis-aggregated population data.



Figure 5: Population Density by District, 1985 and 2004

Source: SSL (2006) Republic of Sierra Leone, 2004 Population and Housing Census: Analytical Report on Population Distribution and Urbanization in Sierra Leone. Freetown (page 20 and 21)

<sup>&</sup>lt;sup>23</sup> Bryceson, D. and MacKinnon, (2012) Eureka and beyond: mining's impact on African urbanization. Journal of Contemporary African Studies, 30 (4): 513 – 537, page 513; Fanthorpe, R. and Maconachie, R. (2010) Beyond the 'crisis of youth'? mining, farming, civil society in post-war Sierra Leone. African Affairs, 109/435: 251 – 272.

<sup>&</sup>lt;sup>24</sup> World Bank. (2018). Sierra Leone Economic Update (Edition No.1) Reviewing urban development: The Importance of Freetown for the national economy. Washington D.C: World Bank.

Figure 6: Population Density by District, 2015 and 2021



Source: Plotted using data from Statistics Sierra Leone (SSL)

**The number of urban areas/settlements with over two thousand people increased from sixty (60) in 1963 to over one hundred and twenty-four (124) in 2004.** Within this hierarchy, switching of positions is noticeable, with mineralized urbanization a significant feature outside Freetown. For instance, diamond mining activities led to Koidu's population growing from 14 309 to 75 600 between 1963 and 1974. This saw Koidu overtake Bo as the second largest city. Still the second largest settlement in 1985, Koidu was pushed to 4th place by 2004; replaced first by Bo and then Kenema in 2004 and 2015 respectively. Migration during the war years as well as the lure of fortunes in the capital city, mining or agricultural centers have influenced the population growth and spatial patterns of settlements.

**Urbanisation and urban growth patterns in the country exhibit four key features; namely, rank switching (discussed above), primacy, sprawl/peri-urbanisation, and informality.** Urban sprawl (the physical expansion of built-up areas) and informality (land uses, developments and livelihoods that are extra-legal)<sup>25</sup> are discussed in the next section on unplanned urban development. Using the rank-size relationship indicator, the settlement hierarchy is dominated by one large settlement, Freetown (Greater Freetown Area) made up of Freetown (Western Region Urban) and the peri-urban area (Western Region Rural) (see Figure 7).

**Social, spatial, and economic inequalities are evident in the country's urban landscape.** Sierra Leone's urbanization level of 40.9 percent in 2015 mirrored the 41 percent average for the African continent. However, the number of urban residents residing in informal settlements (over 60 percent) places Sierra Leone in the upper quartile at continental level. Equally, the percentage of urban residents (over 25 percent) in low elevation and coastal zones at risk to flooding is one of the highest in Africa. Consequently, informality, lack of capacity and location of populations in sensitive low elevation areas plus mountain slopes exacerbate exposure to hazards, especially flooding (storm surges, fluvial and pluvial) and landslides.

**In the West Africa region, Sierra Leone has one of the lowest levels of urbanisation.** The West Africa Region became majority urban around 2020, while Sierra Leone is only expected to reach that threshold after 2035. The region has the fastest rate of urbanisation after East Africa driven by natural growth in its mega cities<sup>26</sup>. However, for Sierra Leone, rural to urban migration remains significant especially from poverty-stricken districts in the north, northwest and south of the country. In other respects, with high levels of uneven urban development, high levels of urbanisation is unfolding in a context of low economic growth (compared to countries like Ghana). Urban Sierra Leone (including Freetown) does not feature as a major attraction for FDI and has a lower transport connectivity level compared to other countries in the region. However, it has similar levels of vulnerability to sea level rise and other climatic hazards.

 <sup>&</sup>lt;sup>25</sup> Hansen, K.T. and Vaa, M. (eds.) (2004). Reconsidering informality: perspectives from urban Africa. Uppsala: Nordic Africa Institute (pages 7-11).
 <sup>26</sup> UN-Habitat. (2014). State of African Cities 2014: Re-imagining sustainable urban transitions. Nairobi: UN-Habitat.

**Sierra Leone's urbanization shows primacy which is contributing to unbalanced territorial development.** As much as 55 percent of the urban population is in Freetown, the capital city (Figure 7). While this primacy should decline over time, for Sierra Leone, the level has remained very high (between 55 and 60 percent) since the 1963 census. Such a scenario is an indicator of spatial inequality where development is concentrated in the primary settlement at the expense of other areas. A comprehensive spatial development plan is needed to guide socio-economic development and reduce regional inequalities associated with such primacy.



Figure 7: Top Settlements Rank Size Pattern in Sierra Leone, 2004 and 2015

**Rapid urbanization in Sierra Leone threatens the environment and biodiversity. About 40 percent of Sierra Leone's population lives in urban areas.** Each year, more than 100,000 people move to cities in search of employment. This has attendant impacts on environmental conditions. For instance, the urban fringes of Freetown push ever deeper into the steep forest expanses outside the city. Despite being one of the rainiest cities on the planet, it has lost 12 percent of canopy cover between 2011 and 2018. This loss of green canopy, increasing hard surfaces in the city and other urban areas in the country has exacerbated geo-hazards and climate-driven risks, especially for residents already living in informal settlements and precarious conditions. The decline of vegetation (which acts as binding frame for sand and sediments, absorb water, and reduce wave energy) has increased the severity and impact of landslides, flooding, and coastal erosion.

**Apart from Freetown, urban development in Sierra Leone's other cities is taking place in Chiefdom areas.** This has revenue implications (as Chiefdoms may require a share) and complicates coordinated city expansion where two authorities (Chiefdom and councils) claim to be in charge. Bo city now covers two Chiefdoms: namely Kakua and Tikonko Chiefdoms. Kenema is located within Nongowa Chiefdom and is growing toward two other small Chiefdoms. Makeni city's wards are within the Bombali Shebora Chiefdom while Koidu New Sembehun city falls within Tankoro and Gbense Chiefdoms.

**Highly urbanized regions are characterized by low poverty rates.** For example, the Western Area region composed of Freetown and WARDC has poverty rates of 28.5 percent and 53 percent respectively (Table 3). In regions with a mix of both urban and rural areas, poverty rates are high, averaging 69 percent. Freetown, WARDC and Bo are the top three urban centres with the highest population density. Freetown has a density of about 8,450 people per square kilometre.

Administrative Region	City	Urban population (2015)	Population projection for 2030	Population density (per km²)	Urban poverty rate (%)*
Western Area	Freetown	1,088,957	1,488,217	8,450	28.5
	Western Area District	450,755	630,118	724	53.0
Eastern	Kenema	206,889	284,428	96	62.4
	Koidu	132,125	177,526	93	65.9
Southern	Во	179,725	247,450	105	64.9
	Bonthe	10,255	14,041	56	82.5
Northern	Makeni	129,611	178,316	73	65.9
North West	Port Loko	44,285	64,130	103	70.9

Table 3: Key Data for Major Cities

Sources: SSL, 2017. \*Urban poverty rate for districts with secondary cities. Urban poverty rate for Freetown.

## UNPLANNED URBAN DEVELOPMENT AND INFORMALITY EXACERBATES IMPACTS OF CLIMATE CHANGE

**Since 1974, all urban settlements have grown significantly both in population and the size of their built-up areas.** The built-up areas of Freetown expanded by as much as 70 percent during the 2000 – 2014 period<sup>27</sup>. The expansion estimate for Makeni was 85 percent, from 13km<sup>2</sup> in 2009 to 24km<sup>2</sup> in 2017<sup>28</sup> (Figure 8). Between 2006 and 2017, the built-up area for Bo expanded from 19km<sup>2</sup> to 53km<sup>2</sup>; a 179 percent increase<sup>29</sup> (Figure 9).

#### Figure 8: Freetown Urban Sprawl, 1975-2014



Source: City Scan Freetown: City resilience Program, The World Bank, page 14



#### Figure 9: Bo City Urban Sprawl and Built Up Area at Risk to River Flooding

Source: World Settlement Footprint Landsat 5/7"; SSBN 3 arc second (90 m) Global Hazard Data (World Bank License)

<sup>&</sup>lt;sup>27</sup> Koroma, B., Oviedo, D., Yusuf, Y. Macarthy, J., Cavoli, C. Jones, P., Levy, C. and Sellu, A.S. et al. (2021). City profile of Freetown: base conditions of mobility, accessibility, and land use. Transitions to Sustainable Urban Mobility Project. Freetown: Sierra Leone Urban Research Centre and University College London.

<sup>28</sup> World Bank. (2018). Sierra Leone Multi-City Hazard review and risk assessment, Vol 1. Washington DC: World Bank.

<sup>&</sup>lt;sup>29</sup> World Bank. (2018). Volume 4 page 46.

**Demographic and spatial growth has been unstructured and characterised by unplanned informal settlements.** Thirty-five percent of Freetown's population is spread in over 68 informal settlements<sup>30</sup> and about 60 percent of people nationally live in informal settlements<sup>31</sup>. Informal settlements grew rapidly during the civil war when up to 500,000 internally displaced people migrated to Freetown. The nature of informality in Freetown takes the form of: (i) unauthorised use and development of land (development that violates land use plans or occurrs in areas not covered by plans), (ii) buildings that do not meet minimum building standards, health and safety standards and are devoid of services such as for running water and sanitation, (iii) unclear land rights, and (iv) unregulated businesses including those in transport services. These have attendant impacts on the economy and amplify vulnerability to climate risks and disasters.

**Urban sprawl and informality have widened social and spatial inequalities as poor people seek housing in low-cost locations.** The absence of formal development control makes this informality harder to manage. Urban sprawl and informal urban expansion in Sierra Leone increases vulnerability as settlements expand into areas at risk to hazards such as flooding, landslides, and coastal erosion. In some instances, opportunistic developers and elites build informal housing as a way of earning rental income. In the case of Freetown, due to its steep topography and location between the ocean and hills, the city's expansion is limited, hence low-income informal settlements have expanded along river estuaries, transport corridors, vital forestlands, coastal areas, and the steep hills. Makeni is located on flat, broad natural flood plains with 10 percent (at least 12,500) of its population residing in high-risk zones. This number will increase if building in these zones is not managed<sup>32</sup>.

**Limited access to basic services for most urban residents widens the spatial inequalities and vulnerability to disasters and other risks.** In terms of water supply, 45 percent in urban areas, have access to water for at least one day without disruption. About 55 percent of Sierra Leone households use improved toilet facilities - 84 percent in urban areas and 33 percent in rural areas. A pit latrine with a slab is the most common type of improved sanitation facility, used by 42 percent of households (60 percent in urban areas and 29 percent in rural areas). Open defecation is still widespread in Sierra Leone, with 19 percent of households (30 percent of rural households and 4 percent of urban households) engaging in this practice.<sup>33</sup> This demonstrates the low supply and reliability challenges experienced especially in urban areas. These infrastructure and service deficits exacerbate difficulties in earning a living and vulnerability to climate change for the urban poor.

A COVID-19 Contagion Risk Study<sup>34</sup> of 50 informal settlements in Freetown further demonstrates the disparities in service provision. Across the sampled settlements (fifty profiled slums), 46 percent accessed drinking water from community taps while 15 percent buy sachets water for drinking. Only 17 percent have a utility connection at home and 22 percent use a borehole/spring nearby. Of the respondents, 86 percent across the five communities pay five hundred leones per jerry-can. On average, residents spend 18 minutes traveling to the water point and one hour ten minutes waiting in the queue for water. Further, 11 percent use flush facilities, 39 percent use hanging toilets, 26 percent use public toilet and 5 percent use pour flush, 5 percent use traditional pit latrine while 10 percent use bucket, and 4 percent practice open defecation around the coast. The toilets are not well maintained and women in the community are afraid to use the facilities especially during the night due to increased risk of gender-based violence. The study demonstrated the impact of livelihood disruption especially on the poor and in poorly serviced neighbourhoods in the event of a disaster.

**High housing costs can make informal settlements seem a viable option for urban residents.** The actual purchase price of a formal two-bedroom house is estimated at US\$ 15,000, while the affordability range for low-income earners sits at between US\$ 3,000 to US\$ 5,000.<sup>35</sup> Both in urban and rural areas, the housing situation is dire. Households often lack adequate sanitation (68 percent of the population), contend with overcrowding (35 percent), live in sub-standard structures (31 percent), or have no access potable water on hand (28 percent).<sup>36</sup>

<sup>&</sup>lt;sup>30</sup> World Bank (2018). Freetown: Options for growth and resilience. Urban Sector Review, Washington: The World Bank

<sup>&</sup>lt;sup>31</sup> World Bank. (2022). Building Regulatory Capacity Assessment for Sierra Leone: Task 1.1 of the Building Regulatory Capacity Assessment for Africa Project | #1278827 Freetown: The World Bank/Government of Sierra Leone/ARUP and GeoHazards International, (page 15).

 $<sup>^{\</sup>scriptscriptstyle 32}$  World Bank. 2018. Volume 3, page 37.

<sup>&</sup>lt;sup>33</sup> Statistics Sierra Leone, Sierra Leone Demographic and Health Survey 2019

<sup>&</sup>lt;sup>34</sup> The contagion Risk Study was undertaken in close collaboration between the World Bank and Slum Dwellers International. In the wake of the COVID 19 pandemic, the contagion risk assessment study was undertaken as a pilot study, sampling 50 informal settlements within Freetown in assessing the access to water and sanitation services, and the associated implications on COVID 19 exposure and spread.

<sup>&</sup>lt;sup>35</sup> MoPED and SALHOC. 2018. Housing Sector Strategy Paper: An Analysis of Housing Affordability and Housing Needs in Sierra Leone.

<sup>&</sup>lt;sup>36</sup> Ibid.

**Much of the unplanned, fragmented urban sprawl occurs in coastal areas, flood plains, drainage systems and mountain slopes; the very areas at high risk of hazards such as flooding and landslides.** For Freetown, as much as 80 percent of built-up expansion has taken place in medium to high-risk areas<sup>37</sup>. Lack of basic services exacerbates hazard risks. Nationally, only 10 percent of the urban residents had access to a flushing toilet (indoors and communal).<sup>38</sup> Only 20 percent of residents in Freetown have access to improved private sanitation and just 40 percent of municipal waste is collected. However, Bo City doubled its collection rate to 43 percent in three years (see Chapter 4) indicating that rapid progress is possible. Uncollected waste blocks drainage systems and hinders their capacity to carry away rain and storm water thereby contributing to flood risks. For the city of Bo, due to continued urban expansion onto floodplains, an increasing number of people are at risk from fluvial flooding and the resulting damage to infrastructure, housing, and crops, as well as loss of life and livestock. These serve as setbacks for recovery and emergency responses during crisis. Further elements of vulnerability, risks and climate change are presented in Chapter 2.

Lack of collaboration between Chiefdoms who own land and local councils which are responsible for spatial planning is exacerbating informality. Much of the land outside the Western Area Region is owned by Chiefdoms which are not local planning authorities. Thus, many informal developments within and on the periphery of Bo, Makeni, Kenema, Koidu, Bonthe, Port Loko are because of people taking advantage of the lack of a functional collaboration between Councils and Chiefdoms on planning. Moreover, some settlements outside the recognised boundaries of cities do not pay any rates or tariffs and are often without services. While the new Local Government Act (2022) purports to enhance the authority of local councils the legal provisions leave room for conflict and competition between local councils and chieftains in land management, resource mobilisation and allocation.

### **URBAN POLICY, LEGAL AND OPERATIONAL ENVIRONMENT: RESPONSIVENESS TO URBAN CHALLENGES**

The primary legislation that governs urban planning and development management is the Town and Country Planning Act (of 1946) which is outdated and does not consider the integration of climate change actions in urban planning and development. There are other statutes that support the operation of this primary legislation (Table 4). However, the Town and Country Planning Act and allied acts, such as those for the planning of Freetown, are obsolete. The Local Government Act (2022) devolves the preparation of structure plans to local councils, but local councils lack the technical capacity in the preparation and implementation of land use plans. On the contrary, the regulatory framework guiding development control activities favors a centralized, top-down approach, with local councils having limited mandate in the approval of building plans and in controlling urban development. Further, lack of political will and inadequate support for land use planning, lack of institutional capacity, weak coordination across sectors, statutory ambiguities, institutional conflicts, and weak public participation are key factors that hamper the effective utilization of land use laws in ensuring sustainable urban development.

	Allied Acts (Key examples)	
Town and Country Planning Act, 1946 The Primary Legislation for land use planning and development/town	Local Government Act (2004,2022)	
	The National Decentralisation Policy (2021)	
	The Environmental Protection Agency Act (2008)	
	The National Protected Areas Act (2012)	
	The Chieftaincy Act (2009)	
	The Building Ordinance Act (1960)	
Freetown Improvement Act, 1953	The Public Health Ordinance (1960)	
The main development control legislation for Freetown.	Public Lands Act Cap. 116 (1960)	
(See Habitat III National Report, 2015: 38)	Survey Act and Rules Cap 128 (1960)	
	Airfield and Defence Lands Act Cap. 121 (1960)	
	Development of Tourism Act (1990)	
	Sierra Leone Roads Authority Act	
	The Mines and Minerals Development Act (2022)	
	Laws relating to water, forestry, and agriculture	

Table 4: Primary and Allied Legislation for Land Use Planning and Development

<sup>38</sup> SSL. (2017). 2015 Population and Housing Census: Summary Results – Planning a Better Future. Freetown: Statistics Sierra Leone.

<sup>&</sup>lt;sup>37</sup> World Bank Urban Sector Review, page 27.

**Planning programs and short-term projects to address emergencies - rather than long term strategic planning to forestall the impacts - has been a key feature of responses to urban challenges since 2000.** Efforts at post-conflict reconstruction focused on rehabilitation of infrastructure with priority given to the needs of the informal settlements where internally displaced persons (IDPs) had settled in their thousands. Disjointed but well-meaning programs and projects for upgrading and building housing proliferated in the absence of a comprehensive urban development strategy, and local development plans have been implemented. The significant role of international development agencies such as the EU, FCDO and the World Bank as sources of finance and expertise is notable and on the increase.

While the government has crafted policies (Box 1) to help guide urban development, training programs towards building the technical capacity of local staff has been suboptimal. Though some development organizations have attempted to provide skills training in urban planning and development, this has been in an unstructured manner. Low technical capacities limit local councils in the execution of their mandates as stipulated in the Local Government Act (2004, 2022), giving local authorities mandates for land use planning and development. The National Housing Policy (2006) sought to spur locally driven settlement upgrading programs and the National Agenda for Change (2008) in which infrastructure was a key mandate for local authorities.

#### Box 1: Key Project, Programs and Policy Initiatives

- Position Paper on Enforcement of Planning and Building Regulations
- National Framework for Human Settlements Development and Shelter Delivery (2002) with support from UNDP/UN-HABITAT
- World Bank Improvement of Informal Settlements 2006 2007
- Cities Alliance Initiative (2008)
- EU Urban Planning Project/National Spatial Development Framework (2011 2014)
- Freetown Urban Structure Plan (2014)
- Comic Relief Freetown Urban Slum Initiative (2014 +)
- Agenda for Prosperity (2013 2018) (The Third Poverty Reduction Strategy Paper)
- Medium Term National Development Plan (2019 2013)
- Freetown Mayor's Transform Freetown Framework (2019-2022)
- World Bank Resilient Urban Sierra Leone Project

## **CHAPTER 2:**

CLIMATE CHANGE RISKS AND IMPACTS IN URBAN SIERRA LEONE The Notre Dame Global Adaptation Index ranks Sierra Leone 163 out of 182 countries in terms of vulnerability to climate change with up to 13 percent of its area and 35 percent of the population at risk.<sup>39</sup> The major direct climate change hazards and risks for the country's urban settlements relate to flooding and landslides, temperature increase, increased and erratic rainfall, air pollution and greenhouse gas emissions, and wildfires.

This chapter gives a synthesis of current situation, trends, and projections under varied scenarios for each risk category.<sup>40</sup> This is followed by a presentation of multi-hazard analysis and combined impacts of climate risks to urban systems and the dangerous compounding effect of unplanned urbanization. This chapter draws mainly from the Sierra Leone urban climate risk analysis jointly done by the Global Facility for Disaster Reduction and Recovery (GFDRR) and Global Practice for Urban, Disaster Risk Management, Resilience and Land (GPURL) teams. It also draws from the Sierra Leone Climate Risk Overview, and the Disaster Risk Management Diagnostic Note.

## **TEMPERATURE CHANGE, AIR POLLUTION AND GHGS**

#### Historical and current temperature trends

Compared to the rest of the world, Sierra Leone has a warm climate where the observed annual mean temperature hasn't gone beyond 27.01°C and the observed annual maximum temperature hasn't gone beyond 32.12°C (1991–2020). The local climate in Sierra Leone is tropical, with coastal areas having hot and humid weather and inland areas having a more temperate climate. Regionally, it is warmer than the countries in the southern half of Africa (Botswana, Congo, Angola, Namibia) but slightly cooler than some other countries in Western Africa (Mali, Niger, Burkina Faso).

The observed annual mean temperature in the past century has increased on average, but the rate of change has not been drastic: in the past three decades, observed annual mean temperature has increased by less than 1°C. Similarly, seasonal trends in recent decades show that maximum temperatures for each month have increased; although April, a warm month and July a cooler month, have some outliers. Moreover, compared to the change in mean and maximum temperatures over the last three decades, minimum temperature is rising at a faster rate (Figure 10).



#### Figure 10: Temperature Variations

<sup>&</sup>lt;sup>39</sup> World Bank (2017: 12)

<sup>&</sup>lt;sup>40</sup> Climate information is presented using SSP1 and SSP5 to provide a more complete understanding of possible future scenarios based on different socioeconomic factors and policy decisions. SSP1 portrays a future focused on sustainable development, equity, social inclusiveness, and environmental sustainability, while SSP5 emphasizes economic growth, competitiveness, and innovation.

The observed mean temperature increases from November to January and reaches its highest in March, April, and May. Between 1991 and 2020, the monthly mean temperature was highest in March (28.46°C) and lowest in August (25.24°C).

**Seasonal variability of maximum temperature has shown a slightly increasing trend in the past several decades.** Across the country, regional variability exists in temperature. Coastal and eastern regions have lower average temperatures compared to the inland north and north-western regions. Hence, Freetown and Bonthe (coastal cities) and Koidu and Kenema (inland eastern regions) have lower mean temperatures than Makeni, Bo and Port Loko in the inland north, south and northwest respectively (Figure 11).





#### **Projected Temperature Trends**

The IPCC has affirmed that urban environments will amplify the higher average temperatures and regional heatwaves associated with climate change<sup>41</sup>. It warns that Sierra Leone, as part of the West Africa Region, will experience increased exposure to hyperthermia from extreme heat and humidity. It cautions that countries such as Sierra Leone in the region of West Africa are likely to experience extreme heat and health issues related to rising temperatures.

As per 2040–2059 climate projections, the monthly mean temperatures may increase by approximately 1°C according to an optimistic climate scenario (SSP1-1.9) and by approximately 2°C according to a more pessimistic one (SSP5-8.5)<sup>42</sup>. However, overall, projected increases follow the same monthly trend as the historical time period, namely, that March remains the month with the highest mean temperature, even under the worst climate scenario (SSP5-8.5). The mean projections for daily maximum temperature are expected to increase by approximately 1°C each decade from 2021, i.e., a projected steady increase in maximum daily temperatures from 2020 in 2030s, 2040s and 2050s.

Another trend observed in future climate projections (2040 - 2059) is that the minimum temperatures are rising slower than the maximum temperatures. There is a 1°C increase in minimum temperatures starting in 2039 instead of 2030. In contrast to countries in Southern Africa for instance, it is important to note that despite increasing temperatures, the country is not prone to droughts. Its Standardized Precipitation-Evapotranspiration Index (SPEI drought index) remains below -0.5°C even in the worst climate scenario. It is only near the end of the century (2080 - 2099) that the SPEI drought index goes up to -0.23°C in the northern province under SSP5-8.5.

<sup>&</sup>lt;sup>41</sup> IPCC. (2022). Climate Change 2022: Sixth Assessment Report of the Intergovernmental Panel on Climate Change, page 922 – 923.

<sup>&</sup>lt;sup>42</sup> Shared Social Economic Pathways.

#### Figure 12: Projected Mean Temperature

Figure 13: Projected Days with Heat Index above 35°C



All cities are projected to experience mean temperature increases of 0.7°C - 1.7°C by 2040-2059. Projected average temperatures will be between 27°C and 29°C (Figure 12). The UNDP predicted future weather changing trends with an expected increase of the average temperature in 2100 of about 7 percent to 9 percent relative to the average for the period 1961-1990<sup>43</sup>. However, lower average temperatures are expected in coastal towns like Freetown and Bonthe. There are seasonal as well as day and night temperature variations. The number of hot days (>35°C) and tropical nights (>26°C) is projected to increase. Significantly, Sierra Leone is expected to endure longer warm spells by 2040-2059<sup>44</sup>. Coastal cities including Bonthe and Freetown are projected to endure some of the longest warm spells, reaching up to 220 days. By 2050, roughly two thirds of the year could be at least as hot as the 10 percent hottest under the current climate.

**Figure 13 shows that beyond 2061** – **2070, the number of days with a heat index greater than 35°C (an indicator of how hot it feels outside, with humidity and other factors considered) increases significantly.** Beyond 2061 – 2070, this significant change in number of days with heat index greater than 35°C spills over to June, indicating an increase in the duration of heat spells. Moreover, the number of tropical nights where the minimum temperature goes beyond 20°C significantly increases in January – February and November – December during the 2051 – 2060 period and beyond. In addition, the number of cooling degree days (i.e., when temperature is above 18°C (65°5-degree Fahrenheit) and fans / air conditioning are needed) increases significantly throughout the years beyond 2070. These significant changes in climate would have significant impacts on human health, and implications for an increased electricity demand for the country.

**Due to the heat island effect, urban land surface temperatures (LST) are likely to increase the most.** In the hottest months of March to May, the 2015 – 2022 period has experienced extremes levels of LST of up to 72°C. Averages are higher in the built-up areas compared to forested or vegetated areas. Bo, Makeni and Port Loko had the highest mean LST during the 2015 – 2022 period (Figure 14). Continued urban expansion could cause a 0.47°C rise in summer temperatures by 2050.

In some cities in Sierra Leone, the spatial distribution of heat correlates with patterns of older and newer settlements. Across cities, areas with higher surface temperature values correspond with the spatial pattern of existing built-up areas. By and large, lower temperatures are generally seen atop blue and green infrastructure, including agricultural land and open space, as well as rivers, waterways, or coastal areas. In Kenema, the denser built-up areas in the central, northern, and southern parts of the city suffer from surface temperatures in the late 40s, while forested areas on the western side are significantly cooler, depicting a classic urban heat island. Increased incidence of extreme heat represents a major threat to human health in Sierra Leone. The extreme heat in certain areas reaches the high 40s (Figure 14), creating dangerous living conditions and public health problems (Figure 15). All of these could be linked to the correlation between vegetated land cover and low land surface temperature. This pattern is consistent across the assessed areas and implies the significance of accessibility to green spaces for populations residing in urban environments.

 <sup>&</sup>lt;sup>43</sup> UNDP. (2012). Diagnostic analysis of climate change and disaster management in relation to the PRSP IIIO in Sierra Leone. Freetown: UNDP.
 <sup>44</sup> Using the Warm Spell Duration Index (WSDI) which measures the total number of days in a year that are part of a heatwave of six days or longer, when maximum temperature is higher than in the 90% of days in the reference period 1995-2014.

Figure 14: Average Summer Surface Temperatures for Koidu and Kenema (°C) 2012 – 2022

Koidu (range: 31.3-46.2 degrees)

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Kenema (range 28.9-48.4 degrees)
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Source: USGS Landsat 8 Level 2, Collection 2, Tier 1 https://www.usgs.gov/



Figure 15: Average PM 2.5 Concentration in 2019

Air quality and pollution is another key risk related to temperature rise. Although most cities in Sierra Leone are not large emitters of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>), these greenhouse gas emissions are on the rise<sup>45</sup>. The main sources of the emissions are agriculture followed by land use and forestry, domestic and industrial waste. Of immediate concern is air pollution. All cities are subject to high levels of pollution, with an average (Particulate Matter)PM<sub>2.5</sub> count exceeding  $5\mu$ g/m<sup>3</sup> (the World Health Organization recommended threshold for long-term exposure). Data for 2019 shows that the PM<sub>2.5</sub> concentration for Bo and Kenema was almost eight times the WHO threshold (Figure 15). PM<sub>2.5</sub> concentrations are high in built up areas, with inland cities showing higher concentrations than coastal cities.

**Transportation, industry, and domestic fires contribute heavily to air pollution.** Private vehicles, factories, domestic waste burning and wood or charcoal fires for heating or cooking all release pollutants into the air. Fine particulate matter ( $PM_{2.5}$ ) is of concern because their size allows them to travel deep into the cardiopulmonary system. Long-term exposure to  $PM_{2.5}$  is associated with a 6 – 13 percent increase in long-term risk of cardiopulmonary mortality of per 10µg/m<sup>3</sup> of  $PM_{2.5}$ . The government should continue to support climate low carbon growth initiatives and sustainable emissions transitions in its cities. This could be achieved by: (i) incentivizing businesses, suppliers, and consumers to switch to renewable energy sources through greater supply and subsidies, (ii) promoting improved public transportation options including electric vehicles, (iii) making buildings more energy efficient through new compact construction guidelines and retrofits and (iv) supporting low-carbon urban planning and development to reduce congestion, and long commuter journeys due to unplanned urban growth and sprawl.

**Most cities in Sierra Leone are not large emitters of carbon dioxide (CO2), however methane (CH4) emissions are on the rise.** In this analysis, greenhouse gasses (GHG) include both CH4 and CO<sub>2</sub> emissions, expressed in kg/m<sup>2</sup>/s. The main sources of GHG emissions come from agriculture, followed by land use and forestry, domestic and industrial waste. Despite being the nation's capital and economic engine, Freetown is the smallest emitter of CO<sub>2</sub> emissions (Figure 16) across the six cities. This is likely the result of its recent transition to renewable energy sources. Nonetheless, since many cities in Sierra Leone are subject to increasing frequency and severity of extreme weather events as well as sea-level rise that threaten livelihoods and key economic sectors, curbing GHG emissions will be critical to reducing the country's risk and vulnerability to climate-related disasters. The country's NDC considers the transition to Renewable Energy Technologies (RETs) a major means of reducing current emission levels<sup>46</sup>.





<sup>&</sup>lt;sup>45</sup> The low GHG emissions are an opportunity for Sierra Leone to follow a pathway that gives precedence to public non-motorised transport, electric vehicles and to renewable energy while moving away from fossil fuels driven economy (Koroma, et al. 2021).

<sup>&</sup>lt;sup>46</sup> World Bank. 2023. Sierra Leone Urban Climate Risk Analysis.

## RAINFALL AND DROUGHTS: HISTORICAL TRENDS AND PROJECTIONS

#### Historical trends and current patterns

The rainfall patterns for Sierra Leone are controlled largely by the movement of the tropical rain belt, Inter-Tropical Convergence Zone (ITCZ), which oscillates between the northern and southern tropics over the course of a year. Observed seasonal precipitation is at the highest in June, July, and August, at 1368mm (1991 – 2020). The current national average annual rainfall is 2746 mm but, there are also regional and local variations: eastern regions have experienced significant changes in temperature and precipitation since 2009. For instance, 3659mm for Bonthe, 2979 mm for Lungi in the west and 2618 mm for Kabala and Bo<sup>47</sup>.

Historically, coastal cities such as Freetown and Bonthe have received more rainfall than inland cities. However, there is high variability. Figure 17 describes the general annual pattern of temperatures and rainfall in Sierra Leone. Although overall, the precipitation levels have shown a slight decreasing trend (Figure 18), there has been a statistically significant increase in the frequency of large (5-day) precipitation events in the last 10 - 11years. Moreover, variability and trends of large (5-day) precipitation events show that the rainier months (July to September) are becoming rainier and drier months (December, January, February) becoming drier.

in Sierra Leone

Figure 18: Change in Distribution of Precipitation

3250

3000



#### Figure 17: Average Annual Temperatures and Precipitation in Sierra Leone

#### Projections on Rainfall and droughts

Warmer temperatures are associated with increases in precipitation. The Clausius-Clapeyron-Relationship dictates that for every 1°C increase in air temperature, that air's potential to carry moisture increases by 7 percent. The projected average largest 5-day cumulative rainfall for 2040 to 2059 does not diverge much from the trend seen in the historical period. Under SSP1-1.9, the historical 5-day cumulative rainfall for each month is slightly higher than the projected climatology for 2040 – 2059, but this difference narrows as the level of pessimism for the climate scenario increases, i.e., as we go from SSP1-1.9 to SSP5-8.5. Over 2010-2039 (center 2025), Northern and Western provinces are expected to experience the highest change in the volume (in mm) of 5-day cumulative precipitation while, over the 2035 – 2064 period, Eastern and Southern regions are expected to experience this change the most. Moreover, projections on extremes of a large 5-day precipitation event show an increase in intensity (return level) as the frequency of the event decreases, i.e., 1 in 100-year extreme precipitation events will be more intense in scale than a 1 in 5-year event.

47 UNDP. 2012.

All cities are projected to experience more rainfall by 2040 – 2059 although Freetown and Bonthe are projected to register an annual decline of between 10mm and 50mm. Yet, crucially, even these coastal cities are expected to have higher amounts of extreme precipitation. Heavy precipitation is measured by the average count of days with at least 20mm and 50mm of daily precipitation; a threshold considered to be disaster-triggering. As an example, Koidu is expected to witness an additional eight days of precipitation over 20mm. Given the city's vulnerability to pluvial flooding, measures to mitigate this phenomenon will be needed.

**By 2040-2059, dry spells across cities in Sierra Leone are projected to range from approximately 120 to 200 days with dry spells (consecutive dry days)**<sup>48</sup> **climbing up by an additional day in Freetown.** Kenema in the Eastern region will have the shortest projected dry spells of about 120 days per year. This increase in consecutive dry days implies that the rainfall received will be concentrated in the remaining days and months, causing the weather to fluctuate. Effective water management and water harvesting strategies will be needed to ensure optimal service delivery to urban residents.

## **URBAN FLOODING HAZARDS: OBSERVATIONS, TRENDS, AND PREDICTIONS**

**Urban flooding hazard arises from hydro-meteorological events interacting with human systems.** For Sierra Leone urban settlements, the key hazard events are coastal flooding, river (fluvial) flooding, precipitationdriven surface (pluvial) flooding and flash floods, infrastructure flooding due to solid waste clogging the drainage systems. Flooding is the second most frequent major natural hazard after epidemics (Figure 19). Landslides, storms, and wildfires are also significant risks.



Figure 19: Average Natural Hazard Occurrence, 1980 – 2020

#### Source: Climate Change Portal, World Bank Group

**Sea level rise and coastal flooding:** Historically (2011 – 2020) the country has experienced a change in sea-level which inundated a small portion of the northwestern part of the country. From 2040 onwards, storm surges of 0.5 to 0.6m are expected to occur in the country. This impact is more pronounced compared to historical change in mean sea-level rise which has been approximately 0.02m. Freetown is the only settlement for which sea-level data was available for analysis although Bonthe would be equally affected. Coastal flooding is likely to occur as a result of one or more factors of sea level rise; tidal surges, tropical storms, and high rainfall intensity. Freetown neighborhoods exposed to projected sea level rise have grown sharply from zero in 1985 to 1.1 km<sup>2</sup> in 2015. By the year 2100, sea level rise is projected to impact the entire coast of Freetown with potential to affect crucial businesses, historical sites, tourism infrastructure, public works infrastructure and services. By 2050, Freetown is expected to have 3.5 km<sup>2</sup> of settlements exposed to sea level rise.

<sup>&</sup>lt;sup>48</sup> Consecutive dry days (CDD) refers to the maximum number of days in a row with precipitation below 1mm in a year.

**Sierra Leone's 460 km coastline, of which 150 km is significantly developed, is also facing coastal erosion challenges caused by natural and man-made factors.** Natural causes include storms, wave and swell actions, and mechanical and chemical weathering. Human pressures include alluvial and sand mining, poor coastal management, and deforestation. Coastal erosion has led to loss of private and public property, threatening beaches, settlements, and shoreline facilities, including hotels and resorts. The erosion of sandy beaches is accelerated by sand extraction activities for construction purposes. Past efforts to halt shoreline retreat in some areas, especially on the Freetown Peninsula, have been unsuccessful. Addressing these challenges requires coordinated efforts and sustained investments in coastal management to reduce the impact of human activities and improve natural resilience<sup>49</sup>.

**Fluvial flooding:** The climatic and locational characteristics of Sierra Leone mean that many cities are prone to some level of fluvial flood hazard ranging from low to moderate threat. Fluvial flooding occurs when river systems overflow their banks due to excessive rain. Heavy rainfall in neighboring countries may cause floods in Sierra Leone due to the overflowing of three rivers: Great Scarcies and Little Scarcies rivers from Guinea and Mano from Liberia<sup>50</sup>. Due to continued urban expansion onto floodplains, an increasing number of people and urban infrastructure is exposed to this risk of fluvial flooding. Koidu has the largest area exposed to fluvial flooding. For all cities, although the total built up area exposed to fluvial flooding hazards is small (1.4 m<sup>2</sup> in 2015), the rate of growth between 1985 and 2015 was 155.8 percent and the area at risk is projected to increase by 2050.

**Pluvial flooding:** Every city in the country is significantly threatened by pluvial flooding. Pluvial flooding occurs due to high intensity rainfall, can happen in any relatively low-lying location, and is exacerbated by poor drainage, reduced vegetation cover and high surface imperviousness such as hard ground or concrete in built up areas. Freetown has the largest built-up area exposed to pluvial flooding; this increased from 5km<sup>2</sup> in 1985 to 14km<sup>2</sup> in 2015. Across the cities overall, built up areas have grown by 143.5 percent between 1985 and 2015 while the area exposed to pluvial flood hazard grew by 172.3 percent, totaling 33km<sup>2</sup>. An increase in built-up areas exposed to pluvial flood risks is expected in all cities. Take Kenema for instance, by 2050, the built-up area exposed will range from 8.4km<sup>2</sup> to 9.8km<sup>2</sup> (Figure 20). Pluvial flooding has affected Makeni, Port Loko and Kenema in significant ways.

#### Figure 20: Built-Up Areas Exposed to Pluvial Flood Hazard



**In recent years; the areas worst affected by floods included Kroo Bay, Lumley in Western Area Peninsular, Port Loko, Pujehun and Bo areas, Moyamba Districts and Kenema.** In general, flooding recedes within an hour as it is driven primarily by intense, localized rainfall over a short time. However, there have been occasions when it has taken much longer to recede due to longer-lasting, lower intensity rainfall over a wide area. For example, in Port Loko and Kambia Districts, floodwater in 2003 and 2004 lasted for about a month. Therefore, there is a need to recognize localized variability, which is likely to be more pronounced with climate change.

<sup>&</sup>lt;sup>49</sup> Sierra Leone Multi-City Hazard Review and Risk Assessment Final Report, the World Bank 2018

<sup>50</sup> World Bank. (2018), page 21.

## **CLIMATE CHANGE IMPACTS AT SECTOR LEVEL**

**Climate change is also expected to impact various sectors of the economy.** Sector-level impacts are most significant in the energy, agriculture, transport, and waste sectors. Potential economic, fiscal, and social impacts of climate change are also discussed in ensuing paragraphs.

**Increased demand for energy due to urbanization is leading to excessive fuel consumption and contributing to GHG emissions.** A study by the International Energy Agency (IEA) found that electricity demand in West Africa, including Sierra Leone, is expected to grow by 80 percent between 2017 and 2040, particularly in cities. This growth is driven by population growth and urbanization, as well as rising incomes and increasing access to electricity<sup>51</sup>. The current installed electricity generation capacity connected to the main grid is about 104 MW, consisting of 50 MW of hydropower (Bumbuna), 24 MW of heavy fuel oil (HFO) (Kingtom and Blackhall Road) units owned and operated by the Electricity Generation and Transmission Company (EGTC), as well as a 30-MW biomass (Adax) plant owned by the private sector<sup>52</sup>.

Sierra Leone's energy sector faces several challenges, including limited access to electricity, inadequate transmission and distribution infrastructure, and heavy reliance on expensive and environmentally harmful diesel generators<sup>53</sup>. These individual generators are leading to excessive fuel consumption and contributing to GHG emissions. Table 5 shows projection of CO<sub>2</sub> emissions by fuel type (in GgCO<sub>2</sub>e), with diesel emissions surpassing all other fuel types combined.<sup>54</sup> The second largest GHG contributor is solid waste, specifically from landfills, where methane is the largest byproduct. Other contributors of methane are livestock waste and agriculture.

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

Table 5: Projection of CO2 Emissions by Fuel Type

**Household demands for firewood and charcoal is the biggest driver of deforestation.** The percentage of households using firewood decreased from 78.7 percent in 2011 to 72 percent in 2018 and that of charcoal increased from 20.2 percent in 2011 to 27.7 percent in 2018. Firewood remains the main source of cooking fuel in rural areas, although the percentage declined from 97.2 percent in 2011 to 95.2 percent in 2018. In urban areas, charcoal is the most common energy source for cooking, with an increase from 48.8 percent in 2011 to 66.7 percent in 2018. The use of gas as source of energy for cooking increased in urban areas (Urban West and urban Bo) from 0.06 percent in 2011 to 0.2 percent in 2018. Western Area has the highest percentage of households using Charcoal (87.2 percent) and gas (0.8 percent) for cooking.<sup>55</sup>

<sup>&</sup>lt;sup>51</sup> International Energy Agency (2019).

<sup>&</sup>lt;sup>52</sup> World Bank. (2021). Project Appraisal Document, Enhancing Sierra Leone Energy Access Project (P171059).

<sup>&</sup>lt;sup>53</sup> UNDP. (2019). "Sierra Leone: Sustainable Energy for All Acceleration Framework"

<sup>&</sup>lt;sup>54</sup> NDC (2021).

<sup>&</sup>lt;sup>55</sup> Sierra Leone integrated household survey (SLIHS) report 2018

**Climate change may have considerable impact on future water resources and thus hydropower generation.** A large share (39.7 percent) of the country's installed energy capacity comes from hydropower<sup>56</sup>. As climate change is expected to increase the frequency and intensity of extreme weather events such as floods and droughts, this will impact the availability and reliability of water resources to produce energy.

The urban transportation system in Sierra Leone is at a significant risk of damage from natural disasters which will worsen due to climate change. In Freetown, the roads and drainage structures are poorly designed and constructed, and in a state of disrepair due to inadequate maintenance. Climate change is expected to increase the risk of damage, particularly during July-September when there may be more frequent and intense rainfall. The risks posed to the transportation system were made clear by the landslide and floods that occurred in August 2017 in the western area of the city. This and other flooding events have resulted in collapsed bridges and damaged roads, making recovery efforts more challenging<sup>57</sup>.

**Sierra Leone's transport sector also contributes to the country's total GHG emissions, mainly due to the use of fossil fuels.** The carbon footprint of the transport sector is anticipated to significantly increase by 2035<sup>58</sup>. Reducing GHG emissions in the transport sector would have economic benefits such as reducing dependence on imported fossil fuels and promoting sustainable economic growth. Encouraging low-carbon transportation options and investing in climate-resilient infrastructure can help to reduce emissions and provide cost savings for consumers, while mitigating the impacts of climate change.

In Sierra Leone, the waste sector is a major source of GHG emissions, mainly from open burning, methane emissions from landfills, and waste transportation. Freetown generates 0.5kg per capita per day of waste which amounts to 600 metric tons of waste per day or 219,000 metric tons of waste annually.<sup>59</sup> Over 40 percent of waste generated in urban areas is uncollected, and therefore dumped into unauthorized dumping sites, burnt, or buried. The economic impacts of emissions generated because of poor solid waste management include negative effects on public health and agriculture productivity, damage to ecosystems, and high waste management costs. Moreover, challenges of urban flooding have been attributed to the clogging of drains because of poor waste management. However, implementing sustainable waste management practices such as methane capture and recycling can reduce GHG emissions, lower waste disposal costs, reduce urban flooding, and create new economic opportunities. Overall, reducing GHG emissions in the waste sector can have significant economic benefits while mitigating climate change impacts.

**Based on historical events and available disaster risk information**<sup>60</sup>, **an approximate value of annual costs of disaster and climate-related shocks in Sierra Leone has been estimated.** This estimate includes asset losses due to natural catastrophes as well as response costs to support communities. Damages to building and infrastructure assets from events such as floods, landslides, windstorms, and fires are estimated to cost \$5.7–10 million per year. On the other hand, the annual costs of responding to disasters and epidemics are estimated to be \$9–16.9 million. Due to limited information and relatively high uncertainty on the available data, the estimates are to be seen as rough values resulting from 'back-of-the-envelope' calculations. The purpose of these estimates is to get an idea of the overall order of magnitude of disaster risk in Sierra Leone and should not be considered as definite values. The estimates correspond to the current risk picture, which could increase in coming years due to population growth, urban expansion in disaster-prone areas, and future climate scenarios.

**Sierra Leone's NDC, suggests that the country will need to spend approximately US\$2.8 billion between 2021 and 2030 to tackle climate change.** This amount is a significant increase from the previous estimate of US\$900 million. Of the total estimated costs, US\$1.7 billion will be required for low carbon growth efforts, and US\$1.1 billion will be necessary for adaptation measures. The proposed spending amounts to about US\$276 million annually, which represents 6.6 percent of Sierra Leone's GDP or 43 percent of its fiscal revenue in 2021<sup>61</sup>. It is worth noting that while the cost of low carbon growth and adaptation measures is high, a significant portion of the spending will be allocated towards development projects that are not solely related to climate change. The Sierra Leone government plans to fund its climate-related spending using both domestic and international funding sources, but progress in obtaining these funds is still in the early stages. The updated NDC states that Sierra Leone will allocate 10 percent of its annual budget to climate change efforts and seek to secure 40 percent of donor funding for adaptation priorities. However, there is no clear financing plan for expenditure requirements, nor a practical approach to mobilizing international resources.

<sup>&</sup>lt;sup>56</sup> World Bank. (2021). Project Appraisal Document, Enhancing Sierra Leone Energy Access Project (P171059).

<sup>&</sup>lt;sup>57</sup> Road geohazard risk management: Sierra Leone case study, World Bank, 2020

<sup>&</sup>lt;sup>58</sup> Understanding Transport Related Carbon Emissions: Learning from the Past, Looking into the Future

<sup>&</sup>lt;sup>59</sup> NDC. (2021).

<sup>60</sup> Disaster Risk Management Diagnostic Note, World Bank, 2020

<sup>&</sup>lt;sup>61</sup> IMF. (2021) Climate change: mainstreaming adaptation in Sierra Leone. International Monetary Fund, Africa Department. https://www.elibrary. imf.org/view/journals/002/2022/260/article-A001-en.xml (last visited 30th June 2023).
**The National Adaptation Plan (NAP) recognizes the impacts of climate change on communities.** The NAP highlights that vulnerable communities in Sierra Leone, particularly those living in coastal and mountainous areas, are highly exposed to the potential impacts of climate change like increased flooding, landslides, and droughts. The NAP also recognizes that climate change has significant impacts on public health, food security and water availability, emphasizing the need for adaptation measures that prioritize the needs of the most vulnerable communities. The NAP identifies priority areas for adaptation action, including improving water management, promoting sustainable agriculture and forestry, and strengthening early warning systems for natural disasters. Furthermore, the NAP highlights the importance of engaging with communities and promoting community-led approaches to adaptation. This includes building the capacity of local institutions and communities to identify and respond to the impacts of climate change, as well as promoting the participation of women, youth, and other marginalized groups in decision-making processes related to climate change adaptation.

## **IMPACTS OF CLIMATE CHANGE IN CITIES**

The impacts of climate change hazards are direct and indirect; short term and long-term; material and immaterial. Table 6 gives an overview of some key historical hazards from recent years for each city. Flooding and landslides are dominant. The recurrence of these hazard incidents reverses development gains Sierra Leone has made since 2000 and leaves behind a traumatized society.

	Freetown	Makeni	Во	Kenema	Koidu	Port Loko	Bonthe
Sea level rise	$\checkmark\checkmark$	×	×	×	×	×	×
Coastal Erosion	$\checkmark\checkmark$	×	×	×	×	×	$\checkmark\checkmark$
Fluvial flooding	$\checkmark\checkmark$	$\checkmark\checkmark$	$\checkmark\checkmark$	✓	✓	✓	$\checkmark$
Pluvial Flooding	$\checkmark\checkmark$						
Landslides	$\checkmark\checkmark$						
Air Pollution	<ul> <li>✓</li> </ul>	✓	✓	<ul> <li>✓</li> </ul>	✓	✓	✓

Table 6: Overview of Climate Change Hazards Affecting Sierra Leone Urban Settlements

★ - none or very low risk ✓ - minor to moderate risk ✓ ✓ - significant or high risk

**In Makeni, extreme heat, landslides and pluvial flooding are likely to affect a considerable number of people and infrastructure including roads and buildings.** Pluvial flooding could affect 18 percent of the city's buildings and 27 percent of roads. Heat is projected to affect almost 90 percent of the urban population while landslides may affect 11 percent of the population. Koidu, could face a similar scale of impact, with floodwaters encroaching on the city from all directions affecting older and newer settlements alike, and putting residents at risk.

**Freetown is a multi-hazard environment experiencing flooding, coastal erosion, landslides, deforestation, and sea level rise.** While different hazards affect different areas of the city, sometimes they coincide creating compounding effects as witnessed in the devastating Regent –Lumley landslides of 2017. A cocktail of intense rainfall, flooding, and landslides, compounded to create devastating outcomes. Rapid population growth and unplanned urbanization has increased residents' exposure to hazards. Due to continued urban expansion onto flood plains, more people are at risk from flooding and landslides with up to 10 percent of Freetown's population now living in combined hazard zones.

**By 2100, under the RCP4.5 scenario, sea level rise is projected to impact critical areas of Freetown's existing settlements.** Even if built-up areas do not expand, remaining as they were in 2015, there would still be 1.5 km2 of exposed settlements across the city by 2100. Furthermore, the compound disasters of coastal flooding and sea level rise could yield catastrophic impacts.

Landslide data analyzed for this report was only available for three cities, Freetown, Kenema and Makeni. Rainfall triggered landslides are considered a major threat in all the cities, and extreme in Freetown and Western Region (Rural). A direct link between climate change and landslides is not easy to quantify. However, intense, and prolonged rainfall that soaks and loosens mountain slopes has direct climate change links. Factors that increase the risk of rainfall induced landslide hazard include rainfall patterns, terrain slope, geology, soil, and vegetation cover.

**Over the 1980** – **2018 period, Freetown has witnessed catastrophic landslides with many neighborhoods considered high risk.** The rainfall-induced landslides have a short return period of twenty-five years. Intense precipitation in the Winter months of May to November trigger landslides, and these converge with infrastructure deficiency and high-density informal settlements to create deadly compound hazards. Similar patterns are observed in Kenema where the hills of Gola Forest Reserve connect with the urban extent. For Makeni, this type of hazard is likely in only a fraction of the city area. However, it remains significant given that the high-risk areas are close to the zones of economic significance. In these areas, lack of resources diminishes the ability of communities to cope with hazard events and their consequences.

Most cities in this analysis are expected to experience moderate to substantial disruption to community infrastructure because of pluvial flooding<sup>62</sup>. In Freetown for example, approximately 17 community assets including schools, health facilities and police stations are expected to be impacted by pluvial flooding, which would leave many neighborhoods without access to critical resources. In Kenema and Bo for example, a 1-in-100-year flood could affect a considerable percentage of their infrastructural assets, with floodwaters encroaching from all directions. This calls for councils to prepare plans for service disruptions in the event of a flood and build community responsiveness to better manage flood risks.

**Built-up areas exposed to floods are projected to increase through 2100 due to climate change, under all three SSP scenarios.** Across the seven cities, overall, built-up areas have grown by 143.5 percent from 1985 to 2015, while built-up areas exposed to pluvial flood hazard have grown by 172.3 percent, higher than the overall rate. Urban intensification and expansion will push more built-up areas into flood zones in the remainder of the 21st century under all three scenarios. This implies the importance of effective flood control measures when planning for urban growth.

**Flooding could affect the country's energy infrastructure leading to disruption of business and key services in cities.** Floods could affect hydropower plants that provide about half of the country's electricity. When heavy rains cause rivers and streams to overflow, the dams used to generate hydropower can become overwhelmed and release large amounts of water downstream.

**The supply of water in urban areas can be affected by climate change.** Changes in rainfall patterns have caused water supply issues, resulting in reduced access to water and lower flow rates in rivers and streams. Stream flow has decreased since the 1970s due to less rainfall. For instance, the Mano River's stream flow dropped by 30 percent between 1971 and 1989. This has significant consequences for access to water, as surface sources, such as streams and ponds, provide water to around 80 percent of the rural population<sup>63</sup>.

**In addition to physical infrastructure, Sierra Leone's social infrastructure, such as schools and health facilities, is also exposed to natural hazards.** The loss of these essential services can have significant impacts on communities, particularly in times of crisis. For example, during the 2017 landslide and flooding disaster in Freetown, several health facilities and schools were destroyed, leading to the interruption of health services and education for many affected communities. Similarly, during the Ebola outbreak, many health facilities were damaged or destroyed, leading to further challenges in responding to the crisis.

**Rising temperatures are leading to more frequent and intense heatwaves, which can have serious impacts on human health, agriculture, and infrastructure.** Extreme heat can cause heat exhaustion, heat stroke, and other heat-related illnesses, particularly in vulnerable populations such as the elderly, young children, and people with pre-existing medical conditions. This can lead to increased hospitalizations and deaths.

**Extreme heat can lead to crop failures, and urban food insecurity.** In 2020, the agricultural sector employed over half of the total population and contributed to 59 percent of the country's GDP, along with fishing and forestry<sup>64</sup>. This can have serious implications for food security and livelihoods, where a significant proportion of the population relies on agriculture for their income. Crop failure can affect the urban food supply chain and lead to social unrest.

<sup>62</sup> Community infrastructure includes, schools, clinics, police stations, local roads, and bridges.

<sup>&</sup>lt;sup>63</sup>Sierra Leone National Adaption Plan, Government of Sierra Leone 2021.

<sup>&</sup>lt;sup>64</sup> IMF. (2022). Climate change: mainstreaming adaptation in Sierra Leone. International Monetary Fund, Africa Department. https://www.elibrary. imf.org/view/journals/002/2022/260/article-A001-en.xml (last visited 30th June 2023).

**Climate change impacts in urban centers would mean significant workforce productivity losses.** It is estimated that more than 90 percent of work hours are in non-climate-controlled conditions<sup>65</sup>. In a country experiencing fuel inflation, low adoption of air conditioning and only 26.2 percent electrification<sup>66</sup>, this would pose a huge challenge to human health and wellbeing. These impacts would disproportionately impact the poorer segments of the population, who are more vulnerable to extreme weather events.

**Climate change impacts in Freetown could have significant impacts on the country's GDP.** In Freetown, pluvial flood zones cut through high-GDP areas observed in 2015, which means that a flood event could disrupt vital economic activities and isolate centers of production from the rest of the city. For the same city, projected GDP for a single grid cell could reach US\$371 million under SSP1<sup>67</sup>.

**The combined fluvial and pluvial flood Annual Average Loss (AAL) to buildings for Freetown, Makeni, and Bo is \$2.8 million (0.03 percent of the modelled exposure).** Although data at the national level was not provided, a back-of-the-envelope extrapolation under different assumptions yields that the national AAL from fluvial and pluvial floods could be between \$3.6 and 6.0 million.<sup>68</sup> It is estimated that flood risk is largely concentrated in the capital Freetown where a flood causing at least \$32 million in losses has a 5 percent probability of happening any given year. A simple overlay of fluvial and pluvial flood hazard maps and high-resolution building footprints suggests that about 0.8 percent of the buildings in the country are exposed to fluvial flood risk, whereas 4.5 percent are exposed to pluvial flood risk.<sup>69</sup>

**Natural hazards in Sierra Leone, such as floods, landslides, and droughts, can have significant social impacts on the country's population.** Loss of life is one of the most devastating social impacts of disasters. Freetown's 2017 landslide caused the deaths of more than 1,100 people. Such events can have long-lasting social impacts, particularly on families who have lost loved ones and breadwinners. In cities, displacement after disasters will lead to resettlement in even more environmentally sensitive zones. Thus, sensitive environmental assets of most cities will continuously be under threat.

## LOCAL COUNCILS HAVE WEAK CAPACITY TO MANAGE CLIMATE CHANGE IMPACTS

**Due to capacity and legal constraints, local councils in Sierra Leone are unable to manage the built environment in a coordinated manner which exacerbates vulnerability and the impacts of climate change.** At national level, agencies such as the Ministry of Lands, Housing and Country Planning (MLHCP) suffer from acute lack of human and technical capacities for city management. For example, there have been no national or urban level land use plans prepared and approved over the past 3 decades. Further, the MLHCP has less than 5 qualified planners. Table 7 summarizes the main weaknesses in planning related institutions.

<sup>&</sup>lt;sup>65</sup> Hot Cities, Chilled Economies Freetown, Sierra Leone, Adrienne Arsht-Rockefeller Foundation Resilience Center 2022.

<sup>&</sup>lt;sup>66</sup> 'Access to electricity (% of the population) - Sierra Leone', World Bank Group Data, 2020. URL: https://data.worldbank.org/indicator/EG.ELC. ACCS.ZS?locations=SL (last visited 20 June 2023)

<sup>&</sup>lt;sup>67</sup> Urban Climate Risk Analysis, World Bank 2022. Source for 2015 GDP: Kummu, M., Taka, M. & Guillaume, J. Gridded global datasets for Gross Domestic Product and Human Development Index over 1990–2015. Sci Data 5, 180004 (2018). https://doi.org/10.1038/sdata.2018.4. Projected GDP: Wang, T., Sun, F. Global gridded GDP data set consistent with the shared socioeconomic pathways. Sci Data 9, 221 (2022). https://doi. org/10.1038/s41597-022-01300-x.

<sup>&</sup>lt;sup>68</sup> This extrapolation was based on exposure estimates from the METEOR project and the Digitize Africa building exposure dataset, and the FATHOM Global Flood Hazard Dataset. Different assumptions of the distribution of flood risks were applied. The sole purpose of this extrapolation is to get an order of magnitude of the AAL at the national level. Considering that it is not based on a probabilistic or historical risk calculation approach, it corresponds to a rough estimate and should be treated with caution.

<sup>&</sup>lt;sup>69</sup> The Digitize Africa building exposure dataset and the FATHOM Global Flood Hazard Dataset were used to carry out this exercise. A building was considered to be exposed to fluvial (pluvial) flood risk if it is located in an area that would be flooded by more than 30cm under a 100-year return period fluvial (pluvial) flood.

#### Table 7: Assessment of Key Planning Institutions

Institution	Main mandate	Assessment
MLHCP	Town and country planning and 'land tenure and administration'.	<ul> <li>Obsolete laws, land use plans that are not up to date</li> <li>Building permit system is in a shambolic state,</li> <li>Disputes and corruption bedevil land administration.</li> <li>No clear link with local councils on land use planning and issuance of building permits</li> </ul>
MFED	Crafts the national economic visions such as Medium-Term National Development Plans and decides on central government grants to local authorities.	<ul> <li>Local councils prepare development plans (based on The National Development Plan) which guide their budgeting framework</li> <li>These plans have no spatial dimension.</li> <li>Transfers insignificant to champion local development.</li> </ul>
High Court	Final arbiter for dispute resolution arising in land development processes	Huge backlog in land-related disputes
Local Councils	Responsible for land use planning	<ul> <li>Due to capacity issues, not performing land use planning,</li> <li>Not performing any form of development control functions</li> </ul>
MLGRD	Supervises and overseas local councils	<ul> <li>Limited capacity to monitor and supervise the operations of local authorities including FCC as mandated by law<sup>70</sup></li> </ul>

**Local councils have significant delegated land use planning and service delivery powers.** They are responsible for land use planning, though due to capacity constraints they are not practicing this function. Further, the MLHCP continues issuing building permits even though on paper these functions have been devolved through the 2004 Local Government Act<sup>71</sup>. Local councils are not engaging in any form of development control. Thus, the built environment grows organically without any form of regulation exacerbating the impacts of climate change.

**The recent re-centralization of the building permit function further hampers the ability of councils to organize the built environment.** The 2022 LGA rolls back the function of issuing building permits to the national government. Functions of local councils keep changing and there are many unresolved devolution issues making dynamics of center-local relations important in local development outcomes. Further, contrary to the spirit of the Local Government Act (2004, 2022), the MLGRD retains significant powers to intervene in the management and politics of local authorities including in the largest city, Freetown<sup>72</sup>. The Local Government Act (2022) does not account for the diversity of urban settlements and does not distinguish between the potentially vibrant metropole (Freetown) and cities (e.g., Bo, Koidu, Kenema) on one hand versus smaller town and district councils.

**Overall, of the 80 mandated functions of local councils, by 2022, about 70 had been devolved**<sup>73</sup>**.** However, most of these functions do not raise any significant local revenues. Examples include primary and secondary health care, primary and junior–secondary education, environmental health, agriculture extension services and community development. To support the delivery of these functions, local councils receive administrative grants, grants for decentralized services, and local government development grants. The national government transfers earmarked grants to local councils to finance devolved services.

<sup>&</sup>lt;sup>70</sup> Pages 10 – 11 in MLGRD. (2021c). Administrative Inquiry Report into the Management of Freetown City Council. Freetown: Ministry of Local Government and Rural Development

 $<sup>^{\</sup>prime\prime}$  FCC (2021) Government suspension of FCC's internationally recognized property tax reform.

 $<sup>^{72}</sup>$  FCC (2021) Government suspension of FCC's internationally recognized property tax reform.

<sup>73</sup> IOM. (2022). Migration Governance Indicators: City of Makeni Profile 2022. Geneva: (International Organisation for Migration).

**Local councils are responsible for a few key urban services which can be leveraged.** The main ones are sanitation, solid waste, and drainage networks. Local councils contract, supervise, and monitor local sanitation services and enforce sanitation regulations and by-laws with support from the Ministry of Health and Sanitation, which issues guidelines and provides on-going technical assistance to local authorities. On SWM, councils are responsible for collection and the management of waste disposal sites. The construction and maintenance of drainage networks is a key function of local councils.

**Weak coordination between local councils and water utility companies is contributing to developments without infrastructure services.** The provision of water in urban areas is the responsibility of two water companies, namely Guma Valley Water Company (GVWC) and the Sierra Leone Water Company (SALWACO). GVWC is responsible for water supply in Greater Freetown with SALWACO supplying water in the provinces. There are numerous developments in cities without water facilities which increases risk of disease outbreaks. Nationally, as of 2015, only about 44 percent of urban residents had access to piped water (indoors, compound, and public), with a paltry two percent having indoor access<sup>74</sup>.

**Overall, capacity for land use planning, service provision, enforcement of building regulations, and development control is a major deficit at local authority level.** Councils lack the necessary equipment and human resources to provide vital services. Most councils lack technical staff such as engineers, planners, valuers, architects, and others who are essential in the service delivery chain. Similarly, their revenue collection systems are outdated, and compliance is very low. Due to inadequate provision of services, residents do not see any reason to pay rates and levies. The resulting vicious cycle exacerbates service delivery challenges and compounds risks.

<sup>&</sup>lt;sup>74</sup> SSL (2016). 2015 Population and housing census: Summary of results - planning a better future. Freetown: Statistics Sierra Leone, pages 140-141.

# CHAPTER 3: GOVERNMENT RESPONSE TO CLIMATE CHANGE

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In response to current and expected impacts of climate change (discussed in Chapter 2), the GoSL has established institutions, adopted plans, policies and strategies all aimed at facilitating the country's resilience to these risks and impacts. This chapter examines the government's institutional, policy and legislative response to climate change. Though the GoSL has made strides on the institutional and policy front, the translation of these into financed climate action programs is suboptimal. In addition, government responses have largely been national in outlook. This level of focus has led to the omission of specific responses at urban, community, organizational and enterprise levels – fundamental arenas for climate actions. Furthermore, political fragility and polarization between north and south is an underlying basis of the struggle for resources. Transitioning of land from traditional to commercial use and its tenure and management poses a huge challenge for the GoSL.

## **KEY INSTITUTIONS ADDRESSING CLIMATE CHANGE**

**Sierra Leone has established several key institutions mandated with climate related functions.** The main ones are in Table 8. though the overarching challenge in these institutions remains very limited human and financial resources to execute their mandates. Further, the ability to generate data is a common challenge across these institutions.

Institution	Main functions	Main challenges
Environmental Protection Agency (EPA)	Created in 2008 to protect the environment and ensure sustainable development in the country. Pursuing environmental education to raise public awareness of environmental issues. Mobilizing climate finance. Provides regulations on increasing resilience to climate change in	The EPA lacks monitoring equipment to perform daily environmental auditing and monitoring. Currently no laboratory equipment exists to test samples obtained from the monitoring field. The agency relies mostly on third-party testing.
	the waste, energy, transport, and agriculture sectors and reduce impacts at sector level. It is the environmental focal point to ensure that Sierra Leone	
	complies with relevant Multilateral Environmental Agreements (MEAs).	
Climate Change Secretariat (CCS)	Coordinating the development of the various convention reports, including the NDC and its implementation and financing strategy,	There is no direct budget allocation to this unit. There is a huge gap in climate change expertise and
(within EPA)	Coordinating the development and implementation of the National Adaptation Plan (NAP) in collaboration with relevant stakeholders.	in most cases, subject matter experts and activities are outsourced.
	Ensuring that the NAP is aligned with national development priorities and plans.	
	Facilitating stakeholder engagement and participation in the NAP process, including consultations with vulnerable communities.	
	Providing technical assistance and support to relevant government agencies and stakeholders on climate change adaptation.	
	Monitoring and evaluating the implementation of the NAP to ensure effectiveness and relevance.	
Ministry of Environment and	Developing policies and strategies to reduce greenhouse gas emissions and increase resilience to the impacts of climate change.	Limited resources, capacity, public awareness, access to finance, and data.
Climate Change (MoECC)	Coordinating climate change activities across different sectors and stakeholders.	
Climate Finance Department	Established in 2023 to facilitate the mainstreaming of climate budgeting as part of the annual budget planning process.	No explicit strategy is in place to guide mobilization of the required resources.
(CFD), Ministry of Finance	Mobilize climate finance, green finance, and disaster risk financing. Identifying and accessing the various financing windows toward climate finance green finance disaster risk finance and other	Enshrined in the policy to implement climate actions.
	Developing the National Climate Finance Strategy.	The level of funding available does not meet the annual target needed to address impacts of climate change.
Sierra Leone Meteorological	Created in 2017 to build the capacity of Sierra Leone's climatic monitoring and data collection.	Inadequate staff and poor facilities for weather forecasting and related activities have undermined
Agency (SL-MET)	Providing meteorological and climatological information, and advice to agriculture, civil and military aviation, surface and marine transport on operational hydrology and management of energy and water resources.	the ability of the SL-MET to provide adequate support and information to all sectors and stakeholders so that they can better adapt to the impacts of climate change.

Table 8: Assessment of Key Institutions Mandated with Climate Related Functions

Institution	Main functions	Main challenges
National Disaster Management Agency (NDMA)	Risk assessment, including the analysis of potential hazards and their impact on the population and the environment. Disaster preparedness, including development of emergency	Limited financing hampers the agency's operations.
	response plans and planning for resources to respond to disasters. Disaster emergency response coordination.	
	Awareness-creation around disaster risk reduction and the importance of preparedness among communities and stakeholders.	
National Protected Area Authority (NPAA)	Established in 2012 to oversee and manage national parks and protected areas in Sierra Leone, with the goal of promoting sustainable land use practices and environmental management.	Weak enforcement is leading to significant loss of tree cover, with a 32% decrease (equivalent to 1.82 million hectares) since 2000, according to Global Forest Watch.
Conservation Trust Fund of Sierra Leone (CTFSL)	Supports the NPAA by providing financial resources for conservation and sustainable development initiatives in protected areas.	Limited financial resources to execute its mandate.
	Raises funds through donations, grants and investments to support activities such as habitat restoration, anti-poaching efforts, and community development projects.	
Local Councils	Implementing local climate action activities in line with their core service delivery mandates.	Very limited finances and mandates which constrains local climate action.

**Collaboration between national institutions mentioned in Table 8 and local councils is very weak, affecting the latter's ability to convert national level policies into local level action plans.** Perhaps, this explains why most climate action initiatives (discussed in Chapter 4) are largely local level without much consideration to scaling in other urban centres. Further, there are no structured platforms for engagement between local councils and key institutions mandated with climate related functions.

The Nationally Determined Contributions (NDCs) highlight the importance of strengthening the capacity of local councils to implement climate change adaptation measures, particularly in vulnerable sectors such as agriculture, water resources, and coastal areas. It calls for the development of local-level adaptation plans and the integration of climate change considerations into local development planning processes. This includes the promotion of climate-resilient infrastructure and the development of early warning systems and disaster preparedness plans to help communities respond to and recover from climate-related shocks and disasters. Similarly, the National Adaptation Plan (NAP) recognizes the importance of engaging with local councils and other stakeholders at the local level to ensure that adaptation planning and implementation is context-specific and considers the unique needs and vulnerabilities of local communities. The NAP highlights the need to promote community-based adaptation approaches and to involve local communities in the design and implementation of adaptation measures.

## **KEY CLIMATE CHANGE POLICIES, STRATEGIES AND TOOLS**

#### Sierra Leone has developed several key policies, strategies, and tools to address climate change. Some of the main ones are summarized in Table 9:

Policy/Strategy/ Plan	Focus
Medium-Term National Development Plan (MTNDP)	Strategic planning framework for Sierra Leone's national development for the period 2019-2023. It provides a roadmap for achieving the country's long-term development goals.
	Focuses on i) Economic Diversification and Job Creation, (ii) Human Development, (iii) Environmental Management and Natural Resources, and (iv) Governance, Peace, and Security.
National Climate Change	Guides Sierra Leone's efforts to address climate change.
Policy (NCCP)	It has five key objectives including i) Mainstreaming climate change into national planning, ii) Building the adaptive capacity of vulnerable communities, iii) Reducing greenhouse gas emissions, iv) Enhancing knowledge, and understanding of climate change, and v) Strengthening institutional and governance arrangements for climate change adaptation and low carbon growth.
National Adaptation Plan (NAP)	A comprehensive plan for addressing climate change adaptation in Sierra Leone and a key tool for implementing adaptation measures as part of the broader framework of the National Climate Change Policy (NCCP).
	Outlines priority adaptation actions across various sectors, including agriculture, water resources, health, and infrastructure. Provides guidance for integrating adaptation into national planning and budgeting processes.
The Integrated National	A more comprehensive and integrated approach to adaptation planning.
Adaptation Plan (iNAP)	Emphasizes the importance of stakeholder engagement, capacity building, and monitoring and evaluation to ensure that adaptation actions are effective and sustainable.
Climate Change Communications Strategy	Key objectives include raising awareness, mobilizing, and engaging stakeholders, building capacity, and promoting multi-stakeholder collaboration.
Nationally Determined Contribution (NDC)	Targets set as (i) Reducing greenhouse gas (GHG) emissions by 41% by 2030 compared to a business-as-usual scenario, which includes both conditional (22%) and unconditional (19%) targets, (ii) Achieving 20% renewable energy generation by 2030, up from the current level of less than 1%, (iii) Improving energy efficiency across all sectors, including buildings, transport, and industry, (iv) Enhancing climate resilience in agriculture, forestry, water resources, and coastal zones, as well as improving early warning systems for extreme weather events, (v) Ensuring gender mainstreaming in climate change action, and (vi) Developing a national monitoring, reporting, and verification system to track progress on its NDC targets and provide regular updates on its implementation.

Table 9: Key Climate Change Policies, Plans, and Strategies

Sources: Various GoSL documents

**Some of the plans highlighted in Table 9 have an urban focus.** For example, the Medium-Term National Development Plan (MTNDP) highlights the need to promote efficient and sustainable urban services such as water supply, sanitation, waste management and energy, to enhance the quality of life for urban residents and to support economic development. It also identifies the need to improve urban infrastructure, such as roads, transportation systems and housing, to support the growth of cities and to promote urbanization that is inclusive, equitable and environmentally sustainable. Moreover, the MTNDP recognizes the role of urban areas in driving economic growth and reducing poverty. It aims to promote the development of urban centers as engines of growth and job creation.

The MTNDP highlights the need to address the impacts of climate change, which pose a significant threat to Sierra Leone's economic development, environmental sustainability, and social wellbeing. It includes several initiatives to enhance the resilience of Sierra Leone's natural and built environments. These initiatives include promoting sustainable land use and natural resource management practices, investing in climate-smart agriculture, sustainable forestry, and tree planting in the country, promoting the use of renewable energy sources and improving water supply and sanitation systems. The MTNDP also calls for the development of early warning systems and disaster preparedness plans to help communities respond to, and recover from, climate-related shocks and disasters. **The mid-term review of the implementation of the MTNDP shows some progress on climate change aspects.** The main ones are (i) establishing new ministries, departments, and agencies (MDAs) to tackle climate change, (ii) revision of six environmental laws to incorporate climate resilience issues, and (iii) setting up of national and subnational level coordination structures on environmental issues.<sup>75</sup> An elaborate plan for improvement in coordination and implementation that further enhances decentralization was accomplished<sup>76</sup>. As an example of sustainable forest management and reforestation efforts, a national tree-planting exercise commenced on an environmental day, in 2020. The project aims at planting 5 million trees across 14,706 hectares of degraded land and coastal areas. The project is expected to last for four years, through 5 phases. The timeline for phases 2 to 5 was from May 2021 through June 2024 with an expectation of 3.8 million trees planted.<sup>77</sup>

The NAP recognizes the increasing importance of urban areas in Sierra Leone and highlights the need to build resilience in these areas. The NAP identifies some of the unique challenges faced by urban areas in adapting to climate change, such as increasing temperatures, urban heat island effects, and flooding from heavy rains. It outlines several strategies to address these challenges, including improving urban planning and design, increasing green infrastructure, enhancing early warning systems and emergency response, and promoting public awareness and education. The NAP also emphasizes the need for greater collaboration between local authorities, civil society, and other stakeholders to develop and implement adaptation measures that address the specific needs of urban areas in Sierra Leone.

The 2021 Sierra Leone NDC focuses on reducing greenhouse gas emissions and adapting to the impacts of climate change. The main areas of focus include energy, agriculture, forestry, water resources, health, and waste management. Sierra Leone aims to promote sustainable development and resilience to the impacts of climate change while reducing greenhouse gas emissions to contribute to global efforts to address climate change.<sup>78</sup> Proposed actions under the NDC promise to encourage sustainable transport and urban development by shifting from traditional infrastructure to greener alternatives for urban mobility (such as mass transit systems), waste management, and fuel-efficient vehicles.

**Sierra Leone has a small-undiversified economy with state enterprises, a large informal sector (largely small enterprises) and private sector engaged in extractive industries (mining, agriculture, tourism).** Recognizing that enterprises are an important arena for climate change adaptation mainstreaming and finance, the NAP proposed a Private Sector Consultative Group to support integration of adaptive practices and increase private sector resilience. Its partners include water, packaging, fertilizer, agri-business, and mining companies to name a few. As mentioned in chapter 1, informality in the financial and digital literacy sector coupled with inadequate record-keeping makes it challenging to prove eligibility through formal channels.<sup>79</sup>

Of the 12 actions prioritized in the 2015 NDC, bankable climate change projects progress was reported through national communication. Restoration of 100ha of mangroves and trees planted on degraded lands has been a success. Proposed actions in several sectors such as climate change adaptation in health and mining sectors, resilience of private sector, agriculture and security, strategies have not been implemented. The gaps include lack of scientific investigation of context-specific issues to define appropriate solutions.

<sup>&</sup>lt;sup>75</sup> MoPED. 2022. Mid-Term Review of The Implementation of Sierra Leone's Medium-Term National Development Plan 2019 – 2023. Freetown: Ministry of Planning and Economic Development.

<sup>&</sup>lt;sup>76</sup> Sierra Leone Medium-Term National Development Plan 2019-2023

 $<sup>^{\</sup>prime\prime}$  UNDP Launch of National Tree Planting to Address Climate Change and National Development 2020

<sup>&</sup>lt;sup>78</sup> Sierra Leone National Adaptation Plan 2021, UNDP

<sup>&</sup>lt;sup>79</sup> World Bank. (2022). Sierra Leone Economic Update. Leveraging SME Financing and Digitization for Inclusive Growth. Washington D.C: World Bank.

## LOCAL GOVERNMENTS INSTITUTIONAL RESPONSES TO CLIMATE CHANGE

**Councils have undertaken some institutional initiatives to enhance climate resilience at urban level.** Environmental and Social Officers have been onboarded and Environmental Committees established in all the country's 22 local councils. Their role is to monitor the environment and promote environmental education and awareness. Similarly, councils are preparing development plans with resilience as a key focus area (see Chapter 4). Development plans are the basis of budgeting at the municipal level. For example, Freetown's "The Transform Freetown Strategy" (2019–2022) aims to make the capital city productive, livable, and resilient by improving urban governance, physical planning and development control, and provision of basic urban services and green infrastructure. In January 2023, Freetown City Council (FCC) launched its Climate Action Plan (CAP), the first prepared by a city in Sierra Leone. It serves as a blueprint in the effort to reduce carbon emissions and build climate resilience in Freetown, while improving the well-being of its residents.

The capacity of local councils in Sierra Leone is being strengthened through a range of initiatives, including training and capacity-building programs, technical assistance, and institutional strengthening efforts. For example, the Sierra Leone Local Government Association has been working with local councils to develop and implement climate change adaptation plans and has conducted a range of training programs to build the capacity of local officials to respond to climate change challenges. In addition, international organizations such as the United Nations Development Program (UNDP) and the Global Environment Facility (GEF) have provided technical and financial support to local councils to implement climate change adaptation and low carbon growth initiatives. This includes supporting the development of early warning systems, promoting sustainable land use and natural resource management practices, and investing in renewable energy and energy efficiency measures.

**Despite the above-mentioned efforts, the capacity of local councils in Sierra Leone to address climate change is limited.** There is very limited collaboration and knowledge-sharing among local councils and national institutions. Further, external support for local councils on climate change responses at the local level is fragmented. Local councils are poorly funded and their ability to finance climate change initiatives is severely constrained. Despite these capacity challenges, councils are championing several climate adaptation and low carbon growth strategies at urban level (as discussed in the next chapter).

# **CHAPTER 4**:

# CURRENT CLIMATE ADAPTATION AND LOW CARBON GROWTH STRATEGIES

This chapter discusses and examines current climate adaptation and low carbon growth strategies at urban level. It aims to explore climate action initiatives that are being implemented by local councils. Principally, the chapter discusses the financing of climate action, management and regulation of the built environment, greening urban environments, urban services provision, urban farming initiatives and city markets. It concludes by discussing social and community adaptation strategies and lessons from city and local adaptation. Broadly, this analysis contributes to identifying local climate action initiatives that have potential for upscaling. Data presented in this chapter was collected from a questionnaire administered to all the city councils<sup>80</sup>. The chapter also draws from local councils' budgets, development plans and annual progress reports.

**Overall, the main climate action initiatives at city level are nature-based solutions (mainly tree planting), urban farming, upgrading of city central markets, unclogging of storm water drains, and community based solid waste collection.** These are facilitated by partnerships with communities and development partners, development plans (the basis of financing local climate action) and institutional reforms which prioritize climate focus at city level. Broadly, lack of basic planning tools is constraining the effectiveness of ongoing local climate initiatives.

While the actions discussed in this chapter may seem to be of low value, they show committed climate action attempts by local councils operating in a very challenging environment. The major issues affecting upscaling of these actions are limited financial and human resources, absence of enabling legislation, lack of integration of climate change in many local councils' administrative structures, and the absence of readily available and easy to comprehend climate information.

**Despite the above, city leaders in Sierra Leone are forging ahead championing climate action initiatives with tangible results to local communities.** They are passing resolutions aimed at (i) enhancing low carbon growth in their organizational structures, development plans and budgets; (ii) building the resilience and capacity of local communities and groups to cope with a range of climatic events; and (iii) translating these capacities into actions. There exist opportunities for local officials and councils to choose climate actions consistent with the needs and preferences of residents, and the administrative capabilities of the city<sup>81</sup>. Below are some of the main actions underway in urban centers.

#### DEVELOPMENT PLANS ARE THE BASIS OF FINANCING CLIMATE ACTION AT THE LOCAL LEVEL

A development plan is the main instrument used by local councils to anchor and justify any financing of climate action initiatives. Currently, every local council in Sierra Leone prepares a development plan which outlines priorities for a three-year period. To realize the objectives of a development plan, each council passes a budget annually to finance the outlined priorities. As the case studies below demonstrate, those councils which prioritized climate change actions in their development plans have financed and implemented those actions. The

**Transform Freetown Strategy which seeks to 'increase the capacity of Freetown's 48 wards to recognize risk and identify resilient solutions to prevent and recover from disasters'<sup>82</sup> has produced promising results.** FCC has conducted several flood reduction measures. These include (i) mapping of flood prone sites and communities, (ii) engaging stakeholders on short-medium and long-term solutions, (iii) cleaning key waterways and drainage infrastructure, (iv) continuous public awareness, and (v) rehabilitating of critical drainage networks.<sup>83</sup>

**Bo City Council has identified several solutions to prevent and recover from climate induced disasters.** The main ones are (i) undertaking tree planting activities and involving the urban poor, the disabled and women, (ii) mapping of flood prone areas and communities, (ii) harmonization of budgetary support for the procurement of tools and equipment for youth labor-intensive public works, (iii) cleaning key waterways and drainage infrastructure, and (iv) grant support for women and children under the ministry of social welfare. With aid from the disaster management committee coordinated by the Council, women and children are supported with food items, school materials and referral for medical care.

<sup>&</sup>lt;sup>80</sup> The questionnaire collected data on climate risks, urban level climate interventions, local financial and human capacities, and relationships with national government.

<sup>&</sup>lt;sup>81</sup> "The Cities for Climate Protection Campaign (CCPC) and the Framing of Local Climate Policy," Local Environment, Vol. 9, No. 4, 2004, 325-336. doi:10.1080/1354983042000246252.

<sup>&</sup>lt;sup>82</sup> FCC. 2019. Transform Freetown. Target 1 on Environmental Management.

<sup>&</sup>lt;sup>83</sup> About 22 water ways were cleaned, 18 bridges cleaned, 33 culverts desilted, and 5,200 meters of gutters excavated. (FCC. 2018). Transform Freetown- First 100 Days 18th August 2018. Freetown: FCC). From 2019 to 2022, FCC conducted routine clearing of drainage networks, and constructed 1,850 meters of drainage network. In 2019, within Freetown, 12.64 km of gutters were excavated, 27 bridges were cleaned, 57 waterways were cleared, and 31 Wards targeted. A year later, 9.64 km of gutters were excavated, 19 bridges cleared, 38 waterways were cleared, and 22 Wards were targeted.

**Main climate actions financed by Kenema City Council relate to information dissemination and afforestation.** Specifically, these are (i) advocacy and continuous engagement with stake holders and community residents, (ii) awareness-raising campaigns and community sensitization, and (iii) tree planting, afforestation, and regular waste management to reduce climate change impacts.

The above actions by FCC, KCC and BCC were made possible because of their inclusion in development plans and the active role of communities in local climate action. For example, BCC's current development plan, mentions climate about 9 times. Second, the actions were based on a strong community engagement and participation. This makes the actions sustainable over time as communities act as stewards of climate action activities.

**Even though data from the seven councils show prioritization of climate actions, financing these actions is a major challenge.** The financial capacity for councils is too weak to embark on extensive climate change programs. As a result, most small-scale climate action activities are financed by local councils (through own source revenues and central government transfers) and non-state actors. Thus, there exist huge gaps in terms of financing climate action within the local councils. On average, between 2013 and 2017, 80.32 percent of expenditure by local councils is funded through intergovernmental fiscal transfers from the national government (Table 10). During the same period, local councils generated about 19.68 percent of total revenues from own source revenue. The bulk of fiscal transfers are spent on salaries and wages, leaving very minimal amounts for any development expenditure. For illustration, actual fiscal transfers as a share of actual non-salary expenditures were an average of 8.9 percent annually between 2005 and 2017.

Indicators	2013	2014	2015	2016	2017
Government budgeted transfers to LCs (direct & indirect)	79.23	71.43	94.57	91.84	96.24
Government actual transfers to LCs (direct & indirect)	84.27	62.67	103.29	67.96	62.55
Total Local Councils Revenues	15.55	16.76	17.62	25.69	15.37
Total Revenues of LCs (local revenues & transfers)	99.82	79.43	120.91	93.65	77.92
Local revenues as share of total revenues of LCs	15.6%	21.1%	14.6%	27.4%	19.7%
Local Councils Revenue expenditure	99.82	79.43	20.91	93.65	77.92

 Table 10: Local Councils Finance Statistics and Indicators (In billion Leones, unless otherwise indicated)

Source: Department of Local Government Finance, MOF, GSL database. (One US\$ was equivalent to about 7,320.00 Leones in 2017).

**Own source revenues generated by each local council average about US\$150,000 annually and are insignificant to trigger huge climate investments.** Between 2005 and 2017, the 19 local councils raised about US\$37.45million from local revenues. This amount translates to US\$151,578 per local council annually. Total local revenues between 2005 and 2017 constituted an average of 0.7 percent of GDP annually. This financial reality makes large scale financing of climate action by local councils doubtful.

**Development partner funding is critical for local climate action.** For example, over the years, Irish Aid provided (i)  $\pounds$ 159,150 to support Concern Worldwide to increase the resilience of the extremely poor/vulnerable to hazards; (ii)  $\pounds$ 556,404 to support GOAL to increase community access to water and water quality, and to improve sanitation and hygiene practices in Freetown and Kenema; and (iii)  $\pounds$ 50,098 to support GOAL with environmental programming. The World Bank funded FCC's tree planting activities with an amount of US\$500,000. Such resources are complementing the little resources councils are able to set aside.

**Despite the importance of development plans to inform financing of climate action, some of these plans are neither updated nor based on climate risk data.** Some 80 percent of the councils have updated their development plans and only 40 percent of them considered climate risk data and projections and prioritization in the preparation of their development plans and programs. The Comprehensive Local Government Performance Assessment System constantly shows inherent weaknesses such as non-review of development plans and weak involvement of key stakeholders during review of these plans. Further, about 90 percent of the local councils pointed out that there is not enough climate information available to inform climate-oriented development planning decisions. Among the local councils, the FCC is leading in the integration of climate risk data. For example, it used GHG inventory as well as the climate risk assessment to prepare the 'Transform Freetown' Strategy.

**Except Freetown, all other local councils are yet to reconfigure their administrative structure to embrace climate change.** Through its CAP, FCC reconfigured its structure in a bid to accelerate climate action. The CAP brought about changes in the institutional set up of the council. The council established a Climate Action and DRM unit within its administrative arm and a corresponding council committee. This is a right step toward coordinating climate response at the city level. Furthermore, FCC appointed a Chief Heat Officer mandated to deal with rising temperatures in the city - a first in African cities.

**Co-developing adaptation solutions among Councils can strengthen local climate action initiatives.** While the capacity for councils to embark on extensive climate change programs is weak, setting up institutional arrangements to ensure resource and knowledge sharing among councils in Sierra Leone will strengthen the conversation on city climate practices and allow lower-capacity councils to better achieve their sustainable development objectives.

## ADAPTING THE PROVISION OF URBAN SERVICES

**Of the present water production, only 50 percent is accounted for.** The remainder is lost to leaks and illegal use. The demand for water is growing rapidly due to urbanization, hydroelectric power generation, industrialization, and irrigation activities. The destruction of critical watersheds and water catchment areas by various human activities and changing climatic conditions has resulted in water scarcity, leading to the drying up of many streams and the associated decline of the groundwater aquifers.

An assessment done in 2020 in 43 catchment areas in the Western Area confirmed that 50 percent of the catchment has been depleted. This points to the need for the enforcement of laws and regulations to avoid further deterioration of these catchment areas. According to this assessment, it was noted that the water quality was 67.6 percent of the SDG 6.3.2 indicator, which is considered poor quality and unsafe for drinking.

**In all the local councils, the lack of sewer and waste transport systems results in unregulated disposal, which in turn increases the risk of infections from preventable diseases**. In Sierra Leone's rapidly growing mid-sized cities, each resident generates about 450 grams of solid waste per day and 250 grams of sewage<sup>84</sup>. Sewage management in Sierra Leone's cities is poorly managed. For example, in Freetown, of the over 90 percent of the population that rely on on-site sanitation, only a very small proportion of the faecal sludge collected in pit latrines and septic tanks is disposed of at Kingtom, the official treatment and disposal site. Most faecal sludge is illegally dumped into drains or natural waterways, or buried on-site, presenting serious health and environmental risks.

Since 2016, FCC along with development partners<sup>85</sup> has played a key role in improving sanitation services in the city. This involved building the capacity of FCC to promote, regulate, monitor, and evaluate faecal sludge management (FSM) service delivery, while creating an enabling environment in which private sector operators can develop their businesses. This included the development and roll-out of standard operating procedures (SOPs) for the FSM Unit as well as for FSM service providers, which aim to minimize operator and public health risks throughout the emptying, transportation, and disposal process. These SOPs were developed and approved in discussion with FCC, the Ministry of Health and Sanitation, and private sector service providers. FCC completed the installation of Freetown's first ever FSM plant at the Kingtom dumpsite. Faecal sludge collected from households will be deposited in a mixing tank at the Kingtom site, preventing or at least diminishing the environmental and health hazards caused by the current practice of discharging untreated waste into the ocean.

**In Bo city, the introduction of hand pumps has revolutionized the work of latrine 'emptiers'.** These pumps are easy to use and can be assembled on site. They serve to pump the faecal sludge out of the pits into a tank that is attached to a simple vehicle – like a motorized three-wheeler. Faecal sludge can thus be taken away for proper treatment and disposal without any ground-water contamination. It is no longer necessary to dig local pits, which is time-consuming and costly.

A considerable part of Freetown's storm water system was upgraded through the Bank financed Freetown Emergency Recovery Project (FERP). The project constructed over 1,300 meters of improved drainage in ten disaster-prone communities: Kolleh Town, Sumaila Town, Coconut Farm, Leicester Road, Kissy Mental Catchment, New England Ville, Moeba, Hill Station, Tree Planting Community and Sorie Town. Existing drains were too small and footbridges too precarious which meant communities experienced extensive flooding during the rainy season. This intervention significantly reduces the risk of flooding and prevents destructive soil erosion. Further, the Start Fund, through Concern Worldwide, rehabilitated 384 meters of drainage network at six FERP locations.

<sup>&</sup>lt;sup>84</sup> https://www.dandc.eu/en/article/bos-city-council-setting-new-standards-waste-disposal. (last visited 20 June 2023)

<sup>&</sup>lt;sup>85</sup> Water & Sanitation for the Urban Poor (WSUP) Advisory and GOAL, with funding from DFID and BMGF.

The participation of communities and youth in waste management is contributing to the resilience of storm water management systems. For example, the FCC divides its waste management system into three distinct zones namely public areas (such as markets, streets, drains and open areas across the city), households and businesses. The council directly supervises and manages cleaning and waste collection in public spaces. It hires youth groups to conduct twice-daily street sweeping and removal of waste. The city is divided into eight blocks, and six-person groups are assigned specific areas within each block. Block coordinators are responsible for monitoring the groups to ensure they are working effectively and collecting data on the amount of waste generated. It has an additional support team of 47, using eight trucks and five tricycles, whose sole responsibility is to clean and dispose of the waste from the city's 42 markets. The waste management system was anchored on the 2019 Solid and Liquid Waste Collection Bylaws, prepared to help FCC enforce clean waste management practices. The bylaw regulates the registration of waste collection service providers and obliges water producers to arrange for waste collection.

**To improve waste collection, FCC developed seven transfer stations across the city.** With support from FCDO and Catholic Relief Services, the FCC launched the Improved Solid Waste System Project in 2019. Sites for transfer stations were selected through a robust community participation process, as the functioning of these stations are predicated upon community buy-in. The aim of establishing transfer station sites across all eight blocks is to improve the waste collection system in each block by providing a nearby transfer station for use by tricycles and omolankes collecting waste from households and businesses<sup>86</sup>. It also reduces the distance waste collectors must travel to dispose of collected waste, thus reducing their overheads and disincentivizing illegal dumping of waste<sup>87</sup>. By 2022, all seven transfer stations had been completed and FCC was working on operationalizing these.

**Individual waste pickers generally operate around waste hotspots including legal and illegal dumpsites and skip locations.** In Freetown, individual small-scale waste collection service providers operate within business areas with a pushcart (omolanke) as the mode of transport. They either have formal or informal arrangements with shop or market stall owners to collect their mixed waste for disposal at a fee. During the operations, the omolanke drivers also recover valuable waste sold to aggregators for additional income and only dispose of the non-valuables either at the legal or illegal dumpsites and/or skip locations.

**For Bo, the city's waste-management system has improved considerably.** In the past, most of Bo's rubbish ended up in informal dump sites, courtyards, and sewers or it was simply burned. Today, the municipal waste-management department and private collectors bring 45 percent of all the waste generated by the city to a disposal site for proper disposal and recycling. The collection rate has thus doubled in three years. Further, the dump site that is currently in use is located outside the city limits.

While some councils have taken some strides to improve the provision of key services, the incorporation of resilience principles in overall service delivery is below par. For illustration, many transfer stations are not operational and refuse collection trucks have broken down. Waste disposal sites are not properly managed. This situation means a significant percentage of waste is still being dumped in drains and burnt. Sewer management is yet to incorporate climate resilience principles as people dump human waste in water bodies. Thus, actions to support local councils to not only improve service delivery but also incorporate resilience principles are needed.

#### **GREENING URBAN ENVIRONMENTS**

**Urban councils are taking action to make themselves more environmentally friendly by applying nature-based solutions such as planting trees on degraded land, and sustainable urban-drainage solutions.** Freetown has been devastated by massive deforestation following decades of civil strife. Deforestation has resulted in catastrophic flooding and mudslides. FreetownTheTreetown project (Box 2) is FCC's campaign launched to plant and grow a million trees by the end of 2022. It prioritizes areas at risk of landslides, riverbanks, and the low-income areas most in need of regreening. By taking a community ownership approach and using blended sources of finance and digital innovation, Freetown has developed a replicable, sustainable financing model for urban nature-based solutions.

<sup>&</sup>lt;sup>86</sup> Transfer Stations for Waste Management in Freetown.

<sup>&</sup>lt;sup>87</sup> Ibid.

#### Box 2: Freetown Treetown Project.

Launched in January 2020 as part of the Transform Freetown campaign by the Mayor of Freetown. The #FreetownTheTreeTown project aimed to plant, track and grow 1 million trees over three years (2020-2022), focusing on higher slope areas where communities are most susceptible to landslide risks and along the coast where there are risks from sea level rise. It aims to increase vegetation cover in Freetown by 50%, contributing to the restoration of its lush green mountains and once-pristine coastal mangroves. Funding for the first two years of planting was secured from

- World Bank Resilient Urban Sierra Leone project,
- Donations made at the Mayor's Ball,
- Transform Freetown Inc, a specially created diaspora organization.

Planting happened in the Western Area Peninsula in 13 catchment areas that have been massively affected by deforestation as was highlighted by the World Bank Multi City Hazards Report of 2018. The 13 catchment areas are: Aberdeen; Congo Town, Tower Hill, Glouscester/Leicester, Kissy, Sumaila Town, Regent-Grafton, Yams Farm, York, Sussex, Angola Town, Baoma and Regent-Lumley.

Twelve economic and non-economic species of trees (Mango, Teak, Neem, Moringa, Cashew, African Wattle, Flame of the Forest, Tamarind, Jackfruit, Almond, Soursop and Albizia Zygia) were carefully selected based on biodiversity needs and slope stabilization needs. The project successfully planted and tracked 250,000 trees in 2020 and in 2021, they exceeded that number by planting another 300,000 trees. This included 100,000 trees planted in the Guma Valley Watershed, whose rapid deforestation has impacted the water levels at the Guma Dam that supplies pipe-borne water to Freetown. The trees planted included 60,000 mangroves planted by members of 6 communities in Aberdeen creek with funding from Catholic Relief Services. Approximately 20,000 trees planted in the year were planted in other public spaces and the remainder 120,000 in private spaces.

The breakdown of trees, shrubs, grasses, and mangrove planted is as follows: Grasses (20,000), Ornamental Shrubs (43,481), Ornamental trees (36,564), Fruit Trees (38,424), Hardwood (101,531) and Mangroves (60,000). About 13 wards covered, 62 communities engaged, 45 schools participated, 4 cemeteries included, 3 Dams/Community water sources planted, 34 roadsides planted, 603 green jobs created in tree planting communities.

Sources: RUSLP Project status reports.

In the first two years since its launch, 560,000 trees were planted, digitally tracked and 'tokenized', with 578 hectares of urban land in and around Freetown restored. To improve the equitable distribution of trees and green space, 35 percent of areas targeted for new trees or vegetation are informal settlements that currently have low coverage. Planting by roadsides, schools and in residential areas (totalling almost 165 hectares to date) aims to reduce heat stress and improve air quality. Planting in Freetown's water catchment and greenbelt (104 hectares) aims to improve water security. Planting in the upper water catchment and on high slopes around Freetown (280 hectares) aims to reduce the risk of flash flooding and landslides. Mangrove reforestation (32 hectares) aims to reduce coastal erosion and flooding.

**Tree planting in Bo has both climate and economic benefits.** For instance, between 2021 and 2023, major tree planting activities were aimed at reducing GHG emissions, beautifying the city, improving livelihoods (through economic trees), preserving road and public utility reserves. This approach helps in appealing to various stakeholders' interests and promotes widespread buy-in. Tree planting was also popularized through 'Tree Planting Day' celebrations.

**Tree growing also generates jobs and stimulates urban economies.** In Freetown, growers re-visit each seedling periodically, to water and maintain, verify, and document its growth. They receive mobile money micropayments for their efforts, ensuring a long-term survival rate of 80 percent. In Bo, the council promotes the planting of economic trees, which benefits local communities when these mature.

#### ADAPTING CITY MARKETS - MAJOR URBAN ECONOMIC BASES

**Markets are a major driver of local economies, and several initiatives are underway to make these structurally resilient.** These efforts are aimed at improving working conditions for traders, stimulating local economies, and providing city councils with increased local revenues. Women represent about 90 percent of traders in city markets (Table 11), making these markets a vital source of livelihood for families. Market dues, paid daily or weekly, are the lifeblood of councils because they finance council operations - contributing, on average, about 33.5 percent of total own-source revenue in councils.

#### Table 11: Markets, Traders, and Revenues in Select Cities

City	No. of traders	Female traders	Total Monthly revenue (Leones)	Total Annual Revenue (Leones)
Во	4,000	3,200	52,000,000	624,000,000
Kenema	5,000	4,500	52,769,236.8	633,230,841.6
Makeni	2,148	1,948	38,400,000	508,800,000
Total	11,148	9,648	143,147,236.8	1,204,430,841.6

Source: Data supplied by city councils (One US\$ is about 20,000.00 Sierra Leone Leones, in March 2023).

**During rainy seasons, markets are often flooded, and upgrading of these markets is ongoing in Kenema and Makeni.** Market upgrading is expected to make these markets resilient and yield the same broad economic and social benefits the central markets bring to the cities. Improvements include better market stalls, roofing, water and sanitation facilities, drains, electricity, and childcare centers. They will integrate universal access designs. This will also avoid market interruptions, especially during floods, and maintain a constant supply chain of commodities, especially food items. Upgrading the markets will improve local councils' financial resilience through increased collection of market dues.

The agriculture sector is the backbone of Sierra Leone's economy and any disruption to this sector due to climate change related events, like drought or floods, can have significant economic consequences, impacting livelihoods and will have indirect long-term negative effects on health, nutrition, and education in cities. The agriculture sector employs over 70 percent of the population and contributes about 60 percent to the country's GDP. Changes in temperature and precipitation patterns are affecting crop growth and productivity. For instance, farmers in Sierra Leone are experiencing a reduction in yields of staple crops such as rice, maize, and cassava due to prolonged dry spells and heat stress. This leads to food shortages and increased food prices, which negatively impact the country's economy. Climate change is also causing an increase in the prevalence and severity of pests and diseases that affect crops, further lowering crop yields and increasing productivity of farmland while floods and landslides can also have indirect impacts, such as damaging infrastructure (e.g., roads, bridges, and irrigation systems) that supports agricultural activities. This could also add to production costs and reduce the efficiency of the agricultural supply chain. Further, farmers face challenges in managing climate-related risks due to limited access to financial resources and the absence of crop insurance, which puts them at a disadvantage compared to more developed markets.

**Urban farming initiatives are the main response to urban food security in Sierra Leone.** Urban food challenges have been exacerbated by droughts and flooding. Urban farming initiatives provide beneficiaries with seedlings, tools, other farming items and training. In 2021, the FCC built on gains made by the urban farming initiative launched in 2020 by expanding its target communities to include Ojuku Junction and Kamayama, with funding from UN-Habitat. Together with other partners, Catholic Relief Services (CRS), FEDURP and CODOHSAPA, 200 female-headed households benefitted from the project. This was in addition to 300 female-headed households that were beneficiaries in 2020 through funding from the European Union. The enhancement of food security and livelihoods, and the empowerment of women form the core of the urban farming initiatives. By encouraging and facilitating the growing of crops at the household level, urban farming improves access to nutrient-rich foods for women and children and acts as an economic cushion for beneficiaries if excess produce is sold.

## SOCIAL AND COMMUNITY ADAPTATION STRATEGIES

**Community level and focused adaptation strategies are complementing previously discussed city level adaptation and low carbon growth strategies.** No single option is sufficient by itself. Effective implementation depends on policies and cooperation at all scales and can be enhanced through integrated responses that link adaptation and low carbon growth initiatives with other societal objectives.

**Communities and their structures are playing a vital role in flood resilience.** Each year before the onset of the rainy season, all the seven local councils identify flood-prone areas through intensive community engagement processes. Upon availability of resources, councils in collaboration with community groups clear waterways and conduct community sensitization through various media platforms and community outreaches. The FCC goes further to support communities to continuously clean and desilt drainage systems and construct culverts in key areas across the city.

**Nature based solutions are pivotal to the participation of communities especially women and youth.** A key component of this ecosystem-based adaptation strategy is the planting, growing and digital tracking of trees. The roles of communities are to (i) plant trees, (ii) monitor tree growing, (iii) track trees, and (iv) finance tree monitoring through purchasing 'tokens'. In other words, without the essential roles played by these communities, tree planting would not have been that successful.

**The most important stakeholders and partners in climate action are residents, including poor and marginalized groups, such as those living in informal settlements.** The development of the Transform Freetown Agenda, for example, involved focus group discussions with 15,000 residents. This was essential in tapping community lived realities of climate change impacts and helped map out potential community resilience strategies. For Freetown's Climate Action Plan (CAP), the stakeholder engagement process was based on the development plan and further research. The CAP carries forward the previous work and honours the extensive engagement as part of the Transform Freetown Strategy preparation process that took place in 2018. The priority clusters and sectors have been looked at through a climate lens, adjusted and expanded based on: (i) research conducted by the FCC as part of the development of the GHG inventory, (ii) emissions trajectory modelling exercise, and research on the city's air quality, and (iii) the city's climate risk and hazard assessment.

To tap into community views and inputs into climate action activities, other councils have established structures to engage communities. FCC established Climate Action and DRM Committees in 2021 to provide the Council with a local perspective on climate change initiatives and a framework to work towards Freetown's climate change goals. Specifically, the Committee supports the council in developing, strengthening, and delivering climate and Disaster Risk Management (DRM) actions. It does so by establishing and upholding two-way communication channels for climate-related topics between the Council and communities.

## LACK OF BASIC PLANNING TOOLS IS HINDERING THE PROMOTION OF LOCAL CLIMATE INITIATIVES

**Local councils lack the basic development control tools that have potential to help them climate-proof the built environment.** Issuing building permits remains the responsibility of the national government (through the MLHCP), even though this function was devolved to the Local Councils by the Local Government Act of 2004. Thus, in most cases buildings are being constructed without either permits or site inspections. The process of monitoring building projects after obtaining building permits is not carried out at the different stages of construction as there was no evidence in the form of routine monitoring reports in the files reviewed<sup>788</sup>. However, the Local Government Act, 2022 does centralize the building permits issuing function to national government.

While planning and zoning are vital tools to chart a resilience path for an urban area, local councils do not practice spatial planning despite being given the powers to do so. As a result, no structured zoning and enforcement exists leading to severe build-up in areas in high-risk zones. This has led to a situation where existing regulations in respect of land and housing activities are flouted with impunity. This has led to situations where houses are erected in an unplanned manner in disaster-prone areas and without the necessary services to support human habitation.<sup>89</sup> Nonetheless only one council, Freetown, prepared a land use plan. The Freetown Structure Plan (2012-2028) was however not adopted or approved. The plan clearly designated zones prone to flooding and landslides (Figure 21).

<sup>&</sup>lt;sup>88</sup> Auditor General, 2019. Performance Audit Report on The Assessment and Issuance of Building Permits Ministry of Lands, Housing and Environment (MLHE). Freetown: Auditor General.

<sup>&</sup>lt;sup>89</sup> Auditor General, 2019. Performance Audit Report on The Assessment and Issuance of Building Permits Ministry Of Lands, Housing And Environment (MLHE). Freetown: Auditor General.

Figure 21: Freetown Hazard Prone Zones



Source: Sierra Leone Preparatory Components and Studies for the Freetown Structure Plan

Nearly all the poor in the Western Area live in informal housing situated in hazard-prone areas (Figure 21), with almost 60 percent in neighborhoods with extremely deficient municipal infrastructure and services. Informal housing is a manifestation of the trade-offs made by residents between available shelter options and affordability: both in terms of locations that allow them to earn their livelihoods, and with respect to available space in households located in neighborhoods where living conditions are squalid (Figure 22).

Figure 22: Residential Areas and Population Densities



Source: Sierra Leone Preparatory Components and Studies for the Freetown Structure Plan

**The FCC has been trying to discourage settlement in high-risk zones, though without success.** Year in and year out there is a massive influx of people building houses in the hazard prone areas by backfilling along the coastal areas and cutting trees on the hilly areas. Hillside settlements on the steep hills and lower mountain slopes of the city, such as the Regent, Hill Station, Bathurst, and Grafton areas, are rapidly encroaching on vital forest land (Figure 23). Likewise, informal settlement 'hotspots' close to the coast, particularly in the north of the peninsula where river deltas have formed because of increases in population density and housing density on the prone areas. Informal settlements are contributing to shoreline transformation via artificially reclaimed land at the coast.



Freetown | Built Environment Density

Source: Sierra Leone Multi-City Hazard Review and Risk Assessment Final Report

**Like Freetown, Bo City Council has been trying to discourage settlement in high-risk zones, though with limited success.** Figure 24 shows the hazard zones for Bo. The present day, hazard zones are shown in dark pink, the lighter pink areas show the extent of the Combined Hazard Zones in the near future (year 2050) accounting for climate change. A major problem with the rapid unplanned urban development in Bo is that people now live in areas that are subject to natural hazards, particularly flooding. The hazard and exposure data have been overlaid and used to identify where existing development coincides with the current (dark pink) and future 2050 (lighter pink) Hazard Zones across Bo. The Hazard Zones will be larger by 2050 due to climate change causing more flooding. The situation (of failing to stop development in hazard zones) is similar in all the other cities.

**The lack of a National Building Code and no standardization and certification of building materials being used for construction projects increases the likelihood of unsafe buildings.** Further, the main development control instrument used by local councils, the Freetown Improvement Act (FIA) 1961 'did not take into consideration new methods of construction (such as fire protection systems, structural design, elevation and conveying systems, special inspections and tests, and encroachments into the Public Right-of-Way) and demolition of structures as stated in the International Building Code (IBC), 2015'.<sup>90</sup> In its current form, the FIA is a weak instrument with which to regulate the built environment.

 $<sup>^{\</sup>rm 90}$  Auditor General, 2019, p. 8.

#### Figure 24: Bo Combined Hazard Zones



Source: Sierra Leone Multi-City Hazard Review and Risk Assessment Final Report

## LESSONS LEARNED FROM CITY AND LOCAL ADAPTATION

**Partnerships are a powerful tool to advance climate action at the city level.** Successful initiatives pointed to in this chapter were implemented in collaboration with national level agencies, development partners and residents. Each of these made specific contributions to each climate action initiative. For example, agencies provide policy and strategy framework which is translated into city level plans. The main role of development partners is financing climate actions, as borne out in the cases of Freetown and Bo. Residents are playing roles such as being custodians and stewards of climate action initiatives (as shown in urban greening examples). Hence, promoting inclusivity and collaborating with multiple stakeholders at city level creates an enabling environment for climate action now and in the future.

#### Box 3: Lessons Learned from Ebola Epidemic

Decentralization, community engagement and ownership, social mobilization and innovation efforts are the key lessons learned from the fight against the Ebola epidemic.

Leaders play a key role in preventing the spread of Ebola: Leaders' active involvement in emergency response was crucial in providing guidance, mobilizing resources, and building the community's trust and sense of ownership in preventing the spread of EVD.

Social mobilization was pivotal in the fight against the spread of the Ebola virus: Social mobilization is successful when there is mutual trust and respect between the leaders and their communities. which increases public participation and boosts their sense of emergency response ownership. The involvement of local leaders and key community members in social mobilization builds trust and collaboration that helps the effectiveness of EVD containment strategies.

Response coordination was central in the prevention of the spread of the Ebola virus: A lesson from the EVD response in Sierra Leone was the risk posed by the absence of a national disaster risk management policy or contingency plan to tackle public health epidemics. The lack of coherent policy response and actions, when the Emergency Operations Centre was in charge resulted in the rapid spread of the virus across the country. An independent coordination structure such as the National Ebola Response Centre proved effective when there is an evident lack of operational capacity to mount an emergency response of the scale and magnitude demanded by the EVD outbreak. Its effectiveness is attributed to – among others – high-level political commitment and involvement, technical expertise in operations and logistics; strong human and financial support from the international community; and sound leadership and management practices.

Nurturing and sustaining a culture of innovation was evident in the response to the Ebola crisis. The Ebola response was characterized by considerable innovation. Examples include the introduction of Observation Interim Care Centers; provision of coconut water to sustain and nourish EVD patients; use and display of healthcare workers' nametags to help patients identify them; widespread involvement of EVD survivors throughout the response; use of transparent fencing in treatment facilities; development of a SitRoom Academy to build 16 information and management analysis capacity across Sierra Leone; and mobile payments for Ebola Response Workers (ERWs). Apart from the specific innovations, nurturing and sustaining a culture of innovation as a process itself matters greatly for Sierra Leone's future development.

Sources: Adapted from NERC. Lessons From the Response to The Ebola Virus Disease Outbreak in Sierra Leone, May 2014–November 2015 Summary Report. https://www.afro.who.int/sites/default/files/2017-05/evdlessonslearned. pdf (Accessed May 24, 2023).

**Development plans are essential tools to advance climate action in urban Sierra Leone.** Development plans are a statutory requirement that guide investment prioritization, budgeting, and expenditure of local councils. This chapter shows that when climate action initiatives are incorporated in development plans, funds for implementation are thereafter budgeted for. Among others, this is the case in Bo, Makeni and Freetown. In councils without development plans (i.e., WARDC), there are no significant investments in climate action. The process of preparing development plans is highly participatory, with communities ranking investment priorities. The review of these plans acts as an accountability mechanism with communities checking whether their priorities were financed.

The development of a comprehensive CAP for major cities in Sierra Leone can solidify the resolve to tackle climate change. The development of Freetown's CAP also brought about changes in the institutional set up of the council. A climate action and disaster risk management unit and a corresponding council committee were established. Formation of these management and governance structures supports the prioritization of climate action activities so projects and programs addressing climate-related issues can have funding allocated accordingly. In cities without a CAP, it is evident that the understanding and deepening of climate change initiatives is very limited. Moreover, climate actions tend to be disjointed and not well interwoven into city development plans.

The economic value of local adaptation and low carbon growth strategies is a huge incentive especially in urban poor communities. Climate action initiatives must bring immediate economic and social benefits for the urban poor to invest their time and energy. Experience shows that tree planting, de-blocking of storm water drains, and waste-picking had monetary benefits to woo community participation. In Bo, the city prioritized the growing of economic trees, which benefit local communities when they mature. It is vital to embed local benefits when designing climate change interventions. In summary, climate action at the very local level should take into consideration people's livelihoods, needs and aspirations.

The ability of a city to adapt to climate change impacts is dependent upon the legal mandate of the city council. Local councils in Sierra Leone have very limited powers: they are not responsible for issuing building permits, thus cannot effectively manage and regulate the built environment. Councils do not perform any form of development control leading to numerous unplanned developments. Spatial planning is yet to be practiced, meaning councils cannot use zoning regulations as a strategy to guide urban development in a particular manner. On water, they will have to collaborate with national water utility companies to safeguard adequate urban water supply. Where they do have powers in the management of matters such as solid waste, storm water and sanitation, councils have taken significant strides to finance climate resilient activities.

**Climate action requires financing, which is a major constraint in all local councils.** On average, a local council generates about US\$ 150,000 annually from local revenues. Even with transfers from the national government, no local council in Sierra Leone can have total revenues exceeding US\$2 million annually. This financial reality leaves most climate action activities to be financed by development partners. For example, major activities that build city and community resilience in Freetown and Bo were supported by the World Bank, Irish Aid, EU and FCDO among others.

# CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

**For urban Sierra Leone, no task is more urgent today than adapting to climate change.** Therefore, this Chapter summarizes the main recommendations towards improving climate adaptation as an urgent task. Similarly, it points to low carbon growth initiatives as a long-term strategy. Further, the chapter discusses priority policy reforms, actions and investments required for cities to effectively manage climate change impacts. These recommendations are categorized by time, urgency, and responsible agency. Implementing these recommendations requires partnerships with stakeholders such as local communities, NGOs and CSOs, local councils, government agencies and development partners. Specifically, communities worst affected by climate change should be part of any investment or reform that will directly impact their lives.

The following key messages informed policy recommendations and investment prioritization:

- a) The population migrating to urban areas continues to rise, with the urban population recording **43 percent of the total population in 2021.** As much as 60 percent of the urban population lives in informal settlements, and over 25 percent live in low elevation coastal zones vulnerable to flooding the highest proportion in Africa.
- b) A huge deficit exists in the capacity for land use planning, service provision, enforcement of building regulations and development control at the local authority level. Increased mushrooming of informal developments coupled with the inability of LCs to manage the built environment in a systematic manner exacerbates vulnerability and climate change impacts.
- c) The capacity of local governments to limit development in hazard prone areas is constrained. Legal and regulatory inadequacies including the lack of a National Building Code, an outdated Town and Country Planning Act and limited mandate in development control prevent the roll-out and policing of effective policies at local level.
- d) Climate change-related risks are increasing in urban areas with widespread negative impacts on people (health, livelihoods, and assets) and on local and national economies. Urban areas are experiencing increasing temperatures from the heat island effect, increasing air pollution from transportation, land use conflicts resulting in destruction of catchment zones at city peripheries, water shortages and increased risk from sea level rise and flash flooding.
- e) Deficits in financing limits the scale of implementation of climate actions, though avenues for own source generation by local councils are heavily untapped.
- f) Key regulatory and institutional frameworks required to address climate change exist mainly at national level.
- g) Data on climate change risks and urbanization indicators are not disaggregated and often outdated especially at the local council levels.
- h) Innovations by local councils on climate action tapping into community views and efforts are underway and have potential for replication and scaling up.
- i) Locally led climate action has the potential to yield city-wide climate adaptation and low carbon growth gains, though the economic value of such actions can be a huge incentive especially in urban poor communities.
- j) Knowledge sharing and co-developing adaptation solutions among councils can strengthen local climate action initiatives.

Apart from the above, Sierra Leone can learn from international best practices on city level climate action. These practices are mainly on financing climate action, strengthening city-level coordination, scaling up climate investments, local community climate action, and climate resilient land use planning (Table 12).

#### Table 12: City Level Climate Action International Best Practices.

Action	Practices			
Financing climate resilience and climate resilient infrastructure at city level	Targeting science and innovation funds to kick-start research into low-carbon and adaptation technologies as practiced in Reading, United Kingdom.			
Strengthening institutional coordination at city level in	Jilizing incremental and transformative pathways to build human and institutional capacity for limate adaptation at local government levels.			
addressing climate change	nstitutionalizing coordinated support from higher levels of governments, private sector, civil society, nd professional bodies to manage climate change risks at local level.			
	Creating a database for collection and analysis of local disaster records, including smaller events than those in international databases. This will aid local governments to periodically develop capacities to manage potential future hazards.			
	Researching and planning for Carbon Reduction and Climate Change Adaptation.			
	Developing a program for local authorities to regularly update risk assessment programs to keep urban adaptation plans current as practiced in Melbourne.			
Scaling up climate change investments at city levels	Developing a strategy to reduce basic service deficits in urban areas and build resilient infrastructure systems especially in vulnerable communities.			
	Adopting retrofitting strategies for existing public infrastructure vulnerable to flood and landslide risk in urban areas.			
	Drumming up awareness to switch to low/zero carbon modes of public transport and support the phased replacement of petrol/diesel vehicles with electric vehicles.			
	Establishing a baseline and set meaningful targets for reducing waste (especially plastic) and maximize strategies for recovery of resources.			
Local community action in disaster risk planning and management	Addressing political interests and ensuring the needs of vulnerable people and victims of disasters are considered in important strategic adaptation plans in cities.			
	Developing strategy to enhance the capacity of low-income groups and vulnerable communities to partner with local governments for people-partnered urban adaptation strategy.			
	Encouraging programs within local governments and communities to support urban adaptation agenda.			
Climate resilient land use planning and development control	As implemented in Costa Rica, encouraging the development of risk-informed building codes at national level and sub-national level.			
	Revising construction standards especially in coastal areas to strengthen barriers and realign them to cope with coastal flood and sea rise as in the case of Durban.			
	Reducing urban emissions by developing plans locating employment, services and leisure facilities close to where people live and integrate opportunities for sustainable living and shopping in new development plans.			

#### **PRIORITIES FOR POLICY CHANGE**

**The major priorities for policy change are classified into three main actions.** (i) Build the technical and financial capacity of national and urban level institutions to develop and implement climate change programs, (ii) Improve local climate action with better access to information and mobilization of communities to address climate change issues at local level, and (iii) Improve the generation, measurement and dissemination of climate change data and risks at national and urban levels. Policy actions are categorized into a matrix action which if implemented can promote low-carbon and resilient urban development (Table 13).

**Implementing these recommendations requires concerted collaboration among national level actors, local councils and communities.** The main ones being local councils, community-based structures (i.e. Ward Development Committees), SLMet, NDMA, MoF, MLHCP, and MoECC. Therefore, it is imperative that coordination structures (vertical and horizontal) be established and strengthened to facilitate dialogue among the aforementioned actors. This can be achieved through the development of strategies for effective coordination of urban development and climate change activities among actors. This strategy will serve as a framwork to build consensus on an operational road map to manage climate change risks in the urban sector.

#### **Suggested Actions**

# ACTIONS TO BUILD THE TECHNICAL AND FINANCIAL CAPACITY OF NATIONAL AND URBAN LEVEL INSTITUTIONS TO DEVELOP AND IMPLEMENT CLIMATE CHANGE PROGRAMS

At the national level, the following recommendations are proposed:

**Recommendation 1: Strengthen policies and regulatory frameworks, financing, tools and coordination mechanisms for climate adaptation actions and disaster preparedness more specifically at city and local level.** Sierra Leone has developed several policies to address climate change risk especially after the landslide in 2017, however, these policies are yet to be fully translated into the operational documents of local councils.

Priority actions include (i) creating and sustaining a coordination platform between national, provincial and local councils towards implementation and effective enforcement of climate change laws and regulations, (ii) adopting a National Building Code which integrates climate change elements, (iii) preparing a National Spatial Development Plan and National Human Settlement Plan that will act as a framework for long-term climate resilience urban development, and (iv) reviewing the Town and Country Planning Act (TCPA) to incorporate climate adaptation, low carbon growth and resilience into urban and local land use plans.

## Recommendation 2: Combat air pollution by developing a National Strategy on Clean Air cascading to cities.

A national strategy on clean air would identify current and future trends in air pollution, and the required regulations and measures for reducing emissions by sector. This should be followed by an action plan or roadmap to involve both the public and private sectors in air pollution management, training, and ongoing capacity building to enhance reporting and enforcing of regulations.

At the local / urban level, the following recommendations are suggested:

**Recommendation 3: Enhance mechanisms to finance climate resilience and climate-resilient infrastructure at the urban level.** Many urban areas in Sierra Leone do not have adequate resources to finance climate focused urban projects and the capacity to prepare climate friendly projects. Therefore, enhancing channels for urban areas to access climate change finance presents an opportunity for urban areas to enhance investment in urban adaptation projects and can enhance their economic advantage.

Priority actions to enhance this include (i) improving the revenue collection capacity and compliance of two major local revenue sources (property tax and market dues), (ii) building the capacity of cities and local governments to access global climate financing facilities, (iii) setting minimum thresholds to fund climate action in each budget cycle, and (iv) setting penalties for infringement on environmental assets within an urban jurisdiction, and (v) integrating national climate adaptation and low carbon growth actions with urban development goals.

Further, government could develop and incentivize tax credit systems towards enhancing integration of clean energy businesses. Through this, the government can provide tax credits for climate-sensitive businesses, including clean energy, climate-smart agricultural inputs, recycling, composting, and clean waste incineration. Government could also consider setting up and capitalizing a domestic climate fund to promote high volume climate low carbon growth and adaptation activities.

# Recommendation 4: Enhance institutional and regulatory instruments that support climate resilient land use planning and development control at urban level.

This entails four priority actions: (i) building capacity of development control agencies to integrate climate resilience measures to enable resilient spatial planning practices (i.e., enhancing personnel and technical capacity to develop climate friendly spatial plans and city specific building bylaws and enforce development control at local levels), (ii) supporting efforts to map out hazard zones, restrict development within mapped areas including restoration of critical wetlands to support biodiversity and resilience and (iii) promoting the development of spatial plans that encourage modal shift towards public transport, walking and bicycling including pedestrianized streets within and across urban and local areas (iv) developing resilience design guidelines to enhance planning of public spaces in urban and coastal areas.

**Recommendation 5: Improve city-level climate resilience through Nature-based Solutions (NBS).** Promoting NBS to other urban areas outside Freetown will help Sierra Leone reduce GHG emissions, reduce the impacts of flooding and improve local economies.

Five actions are proposed. These are (i) supporting both climate and economic objectives in tree planting initiatives (ii) investing in nature-based protection measures that do not only result in hazard reduction (i.e., less flooding and/or erosion) but also enhance the living environment, biodiversity, economic revitalization, and rehabilitation of the natural ecosystems especially along flood-prone areas (iii) strengthening the administrative and investment environment to attract investors to partner with the government especially at local government level on carbon credit registration (iv) creating an inter-ministrial taskforce tasked to eliminate land invasion problems on re-afforested lands, (v) incentivizing pathways to protect the natural environment and away from harmful practices, like sand mining, stone mining and charcoal burning.<sup>91</sup>

# ACTIONS TO IMPROVE LOCAL CLIMATE ACTION BY IMPROVING ACCESS TO INFORMATION AND MOBILIZATION OF COMMUNITIES TO ADDRESS CLIMATE CHANGE ISSUES AT THE LOCAL LEVELS

**Recommendation 6: Build local communities' capacity to drive sustainable and climate resilient urban development.** Vulnerability to climate risk has been related to social inequality in many urban areas in Sierra Leone. Poorer residents in urban areas are more exposed to landslides and flooding because their homes are often poorly constructed and located in precarious areas. Scaling up actions to build the capacity of local councils for climate resilience can support communities and accelerate post-disaster recovery, while providing a valuable socio-economic opportunity.

Enhancing community resilience to disasters can be promoted through focusing on five priority actions. These are (i) building capacity and equip community level structures such as Ward Development Communities to disseminate climate related information and engage in disaster emergency preparedness and response actions (ii) establishing Climate Action and DRM committees at council level to prioritize decision making and financing on these themes, (iii) building the personnel, technical and resource capacity of Councils to effectively participate and contribute at city level to the NDMA DRM structures (iv) expanding social protection programs to local communities to assist in speeding up reconstruction and recovery for impacted residents and affected communities.

# ACTIONS TO IMPROVE THE GENERATION, DISSEMINATION, AND USE OF CLIMATE INFORMATION AT NATIONAL AND URBAN LEVELS

**Climate change adaptation and low carbon growth actions are dependent on good quality and timely, accurate information.** From the study, it is noted that the local councils are aware of the National Climate Change Frameworks, as most cited their involvement in the preparation and validation processes. Though it is evident that climate change data is crucial in development planning, investment prioritization and strengthening DRM response, the following challenges are cited: (i) local council staff lack the skills and competence to undertake climate risk assessments, (ii) local councils lack capacity and finance to collect and disseminate climate change data, (iii) SLMet is not adequately equipped to provide reliable and easy-to-understand climate information to local councils and communities, and (iv) poor coordination between relevant sectors. To address these bottlenecks, the following is recommended:

<sup>&</sup>lt;sup>91</sup> This can include provision of financial incentives for citizens and engagement of youth and women as tree planting ambassadors/ stewards in local areas. In addition, protecting forest reserves especially located in proximity to cities, and clearly outlining the role of local governments in protection of forest reserves and benefiting from the co-benefits to be generated needs to be spelt out.

**Recommendation 7: Improve generation of, and access to, climate information towards preparation and implementation of climate-oriented development planning decisions at the city level.** Effective management (preparedness and response) of climate risks depends on good quality and timely information. However, the SLMet is not adequately equipped to provide reliable climate information to local councils and communities. The following actions are recommended to improve collection, generation, and dissemination of climate information.

Three actions proposed are: (i) enhancing the technical, personnel and financial capacity of EPA and SL-MET for collection, generation and dissemination of quality, timely climate information including mapping and monitoring of hazard locations and infrastructure at risk, then presenting the information to national government and local councils, (ii) supporting local councils in the preparation and enforcement of development plans, spatial plans and zoning schemes backed by climate risk considerations, and (iii) introducing climate change, green technologies and built environment subjects (such as spatial planning, landscape design, land administration) into the education curriculum of academic institutions in order to boost local expertise to manage climate change impacts.

**Recommendation 8: Support the establishment and strengthening of evidence-informed Early Warning Systems, Planning and Response Actions for all types of climate risks and hazards at national and city levels.** In Sierra Leone, national and sub-national level governments do not possess sufficient technical expertise or resources to pursue climate risk and disaster response efforts. The Government of Sierra Leone must strengthen the capacity of local councils with the human resources, institutional and structural facilities to respond to multiple hazards such as flood, landslide, and other emergencies by implementing three main actions:

These are: (i) supporting the operationalization of the climate information, disaster management and early warning system and enhance partnerships with local councils and communities, and (ii) enhancing channels for the communication and dissemination of early warning information to communities and local councils, and (iii) strengthening city and local level disaster response structures.

## PRIORITY INVESTMENTS FOR CLIMATE CHANGE RESILIENCE

**Urbanization in Sierra Leone has not been accompanied by the delivery of urban investments to cope with the accelerated demand which has amplified the climate change impacts.** Climate risks and impacts affect various sectors and population groups in different ways. Therefore, prioritization of sector-based measures for both adaptation and low carbon growth (as project and policy actions) (i) will assist the government to deal with current and emerging vulnerabilities, as well as contribute to the reduction of GHG emissions, (ii) provides a pathway toward strengthening local knowledge systems and improving access to technical knowledge on climate risk, (iii) integrates climate change adaptation strategies in a coherent manner within all relevant sectors and at different levels, as appropriate. Table 13 shows some priority investment options as prioritized by the largest urban areas in Sierra Leone. Local communities should actively participate in the prioritization of investments and the validation of data, towards enhancing their resilience.

Tuble 13. Fridrig Indestinent Areus ut Locut Level	Table 13:	Priority	Investment Areas	at Local Level
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Name of Local Council	Climate Change risks	Investments required				
		SWM	Urban drainage	Transport ation	Flood risk reduction	Environmental protection e.g., tree planting
Во	Heavy rainfall leading to floods. Rising temperature and low rainfall leading to drought. Extreme heat in urban areas.	•	•		•	•
Bonthe	Heavy rainfall leading to floods.	•	•		•	•
Freetown	Heavy rainfall leading to floods and landslides. Extreme heat in urban areas.	•	•	•	•	•
Makeni	Heavy rainfall leading to floods. Extreme heat in urban areas.	•			•	
Kenema	Heavy rainfall leading to floods, and landslides. Rising temperature and extreme heat in urban areas.	•	•		•	•
Koidu City	Heavy rainfall leading to floods.	•	•		•	•
Port Loko	Rising temperature and low rainfall leading to drought. Extreme heat in urban areas.	•	•		•	•
WARDC	Heavy rainfall leading to floods. Extreme heat in urban areas.	•	•		•	•

Source: Based on Data supplied by councils.

**Solid Waste Management (SWM) has been prioritized by all the cities as a significant sector that would enhance the adaptation capacity at community levels, especially to flooding.** As a sector, SWM is a major contributor to climate and disaster risk in Sierra Leone. It accounted for 29 percent of Freetown's total emissions in 2018. It is mostly a devolved function of local authorities but is in most cases unfunded which affects collection capacity, and the capacity of local governments to invest in end-pipe infrastructure. In the case of Free Town, only 46 percent of waste is collected, 25 percent is transported to dump sites while the remainder (more than 300 tons per day) is buried, burned, or dumped in waterways or drains. This dumping clogs an already insufficient stormwater drainage system exacerbating flood risks and the prevalence of vector-borne diseases.

**Recommendations to improve investments in SWM include:** (i) Build local community capacity to improve institutional effectiveness in waste management and raise public awareness. This should be backed up with information dissemination and educational campaigns via private sector partnerships to sensitize urban residents in major cities in Sierra Leone on waste management best practices. (ii) Enforce the implementation of waste management initiatives and environmental protection laws to ensure appropriate waste management practices. (iii) Formalize, support, and incorporate small scale informal waste collectors and recyclers to sort, collect and recycle waste, and expand their expertise in the sector through enhanced cooperation and partnerships between the private sector and the informal workforce in the sector.

## IMPLEMENTATION MATRIX OF PRIORITIZED POLICY ACTIONS

To support decision-makers in implementing the priority actions, a set of policy options is proposed according to priority level (given their potential impact to influence climate adaptation in urban areas in the country) and the tentative time horizon to actuate changes. The recommendations are summarized and presented in Table 14.

Key Priority Level: H-High, M-Medium, L-Low;

Time Horizon: Short term-next 12 months, Medium Term-next 3-5 years, Long Term-next 5 to 10 years

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Table 1 4.	Matrix of	Diamita	A ationa fo	on Climato	Adaptation	and Low	Canhon	mouth
<i>Tuble</i> 14:	WIGLELX OF	Priorituz	ACLIOHS H	or cumate.	Αααριατισπ	unu row	Carbon C	TOWLL

Recommendation	Priority Actions	Responsibility	Priority Level	Time Horizon
Actions to improve the ger	eration, dissemination, and use of climate information a	t national and urban levels		
Improve generation of, and access to, climate information	Enhance technical, personnel, and financial capacity of EPA and SLMet for generation and dissemination of quality and timely climate information	EPA and SLMeT	Н	L
towards preparation and implementation of climate-oriented development planning	Support LCs in the preparation and enforcement of development plans and spatial plans and zoning schemes backed by on climate information	LCs	Н	L
decisions at the city level	Introduce climate change, green technologies and built environment subjects into education curriculum of academic institutions.	Ministry of Education	М	L
	Develop a monitoring and community awareness program to prevent development in unsuitable areas.	MLHCP	Н	S
Support the establishment and strengthening of evidence informed Early Warning Systems,	Support the operationalization of the climate information, disaster management and early warning system designed to support better accuracy in mapping, prediction and responding to disasters, and enhance partnerships with LCs and communities	NDMA	Н	L
Actions for all types of climate risks and hazards at national and city levels	Enhance channels for the communication and dissemination of early warning information to communities and LCs	NDMA, LCs	н	L
Actions to build the technic programs	cal and financial capacity of national and urban level ins	titutions to develop and impl	ement climate cl	hange
Strengthen policies and regulatory frameworks, financing, tools and coordination mechanisms in climate adaptation and disaster preparedness policies at national level	Develop a national strategy on clean air (current and future trends in air pollution, required regulations and measures for reducing emissions by sector).	MoECC	Н	М
	Prepare a National Spatial Development Plan and National Human Settlement Plan	MLHCP	Н	М
	Create and sustain a coordination platform between national, provincial and LCs towards implementation and effective enforcement of climate change laws and regulations.	MoECC	Н	L
	Adopt a National Building Code which integrates elements of climate resilience elements	MLHCP	Н	S
	Review the TCPA to integrate climate change, and resilience aspects	MLHCP	Н	S
Enhance channels for financing climate	Improve local council's Own Source Revenue collection and administration systems and capacities	LCs, MLGRD, MoF	Н	L
resilience and climate- resilient infrastructure at the urban level	Build the capacity of local governments to access global climate financing facilities	LCs, MoECC	М	S
	Develop a Carbon Footprint for urban neighbourhoods to include capitalizing domestic climate fund to promote high volume climate low carbon growth and adaptation activities	LCs, MoECC.	Н	М
Enhance institutional and regulatory	Build LCs' staff capacity to prepare, implement and enforce spatial plans	LCs	Н	S
instruments that support Climate resilient land use planning and	Clarify spatial plan approval processes and set up planning committees	MLHCP	Н	S
development control at urban level	Prioritize considerations of climate change resilience actions in urban area spatial plans and development control instruments,	LCs	Н	S
	Clearly identify and map hazard zones and restrict development in such areas.	LCs, SLMeT, EPA	Н	S
	Develop design guidelines to enhance resilient public spaces in urban and coastal areas	LCs, MoE&CC	Н	S

Recommendation	Priority Actions	Responsibility	Priority Level	Time Horizon
Improve City-level Climate Resilience through Nature-based Solutions	Develop a program to replicate the sustainable reforestation program in Freetown in other major urban centres	LCs, MoECC	М	L
	Provide economic incentives and build awareness to citizens on local level climate action.	LCs	Н	S
	Strengthen the administrative and investment environment to attract investors on carbon credit registration.	MoECC	М	L
	Address illegal land invasion on forest catchment zones	MLHCP, LCs	Н	S
	Incentivize protection of forest reserves surrounding emerging urban areas through training and capacity support for LCs and communities	LCs	Н	S
Actions to improve local climate action by improving access to information and mobilization of communities to address climate change issues at the local levels.				
Enhance community resilience to disasters.	Establish Climate Action and DRM committees at council level to prioritize decision making and financing on these themes.	LCs, Ward committees, NDMA, SLMeT	Н	S
	Build capacity and equip community level structures in dissemination of climate related information and disaster emergency preparedness and response	LCs, Ward committees, SLMeT	Н	S
	Expand social protection programs to LCs to speed up reconstruction and recovery after disaster occurrence.	MoSW, LCs	Н	L

