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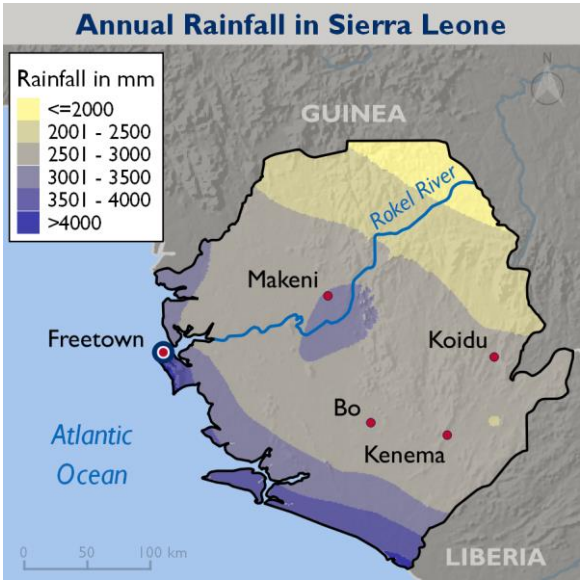
FACT SHEET

CLIMATE CHANGE RISK PROFILE
SIERRA LEONE

COUNTRY OVERVIEW

Sierra Leone, one of the poorest countries in the world, faces multiple risks from climate change that threaten key economic sectors and increase the potential for wider environmental degradation. The socioeconomic progress made after the end of civil war in 2002 was undermined by a recent Ebola outbreak and a contraction of mining activities, leaving the country in a weakened position to address the impacts of climate change. The climate-sensitive agriculture sector provides livelihoods for 75 percent of the population and contributes more than 50 percent of GDP. Sierra Leone boasts extensive natural resources, but these are under pressure from population growth, dependence on biomass for energy needs, water pollution, and environmentelly unsound mining activities, leading to high rates of deforestation, increased rates of soil erosion, and occurrence of landslides. High dependence on agriculture and natural resources, coupled with high rates of poverty, unemployment and environmental degradation, leave Sierra Leone vulnerable to climate change impacts. (11, 12)



CLIMATE PROJECTIONS

1–2.5°C increase in average temperatures by 2060

More extreme weather, including more intense precipitation

Rising sea levels

KEY CLIMATE IMPACTS

Agriculture
Increased crop loss/failure
More pests, weeds, pathogens
Reduced food security

Water Resources
Increased sedimentation and runoff due to more intense rainfall
Decline in water quality

Human Health
Increased range for vector-borne diseases
Increased breeding sites for water pathogens and illnesses

Disasters
Damage to coastal infrastructure and production zones
Loss of life and productive assets

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This document was prepared under the Climate Change Adaptation, Thought Leadership and Assessments (ATLAS) Task Order No. AID-OAA-I-14-00013 and is meant to provide a brief overview of climate risk issues. The key resources at the end of the document provide more in-depth country and sectoral analysis. The contents of this report do not necessarily reflect the views of USAID.

CLIMATE SUMMARY

Located at the northern limit of the equatorial rainforest zone, Sierra Leone has a predominantly hot and humid tropical climate that shows a distinct coast-interior gradient, a function of the country's varied topography. The wet season, from May to October, has an average rainfall of 3000 mm, with coastal and southern areas receiving up to 5000 mm annually and inland areas between 2000–2500 mm. The dry season, November to April, is prone to dusty and hot Harmattan winds and drought conditions. Average temperatures range from 25–27°C, with slightly lower temperatures (22–25°C) during the wet season. (9)

HISTORICAL CLIMATE

Key climate changes trends since 1960 include:

- Higher temperatures (+0.8°C), an average increase of 0.18°C per decade.
- Increased nighttime temperatures.1
- Reduced annual precipitation overall, with significant decadal variability (1960s–1970s show increased rainfall while 1980s show drier conditions).
- Increased variability in the rainy season, with some observations suggesting a later onset/shorter duration and increased intensity of single rainfall events. (9)

FUTURE CLIMATE

Projected changes include:

- Increase in temperatures of 1.0–2.5°C by 2060, with more rapid warming inland.
- Although rainfall projections are less certain, the trend will be toward an overall increase, particularly between July–December.
- The intensity of single rainfall events will continue to increase.
- The level of the Atlantic Ocean will rise (0.1–0.56 m by 2100, relative to 1980–1999 levels), coupled with an increasing risk of storm surges from June to September. (9)

SECTOR IMPACTS AND VULNERABILITIES

AGRICULTURE PRODUCTION

Two of Sierra Leone's primary food sources – rice and fish – are particularly vulnerable to climate change impacts. The country has rich soils, good rainfall and abundant water resources, yet remains a net food importer. Only 12 percent of arable land is cultivated – often using low-productivity techniques. Rice, accounting for the largest share of agricultural GDP and 42 percent of the average person's caloric intake, is highly sensitive to increased humidity and rainfall intensity and is vulnerable to pests that thrive in higher temperatures. Fish account for more than 75 percent of animal protein intake, and are vulnerable to rising temperatures, which alter nutrient dynamics and water quality in inland fish farms and the Atlantic Ocean. Other staple crops such as cassava are more resilient to climate changes and may provide an alternative food source in an increasingly variable climate. (3, 5)

Climate Stressors and Climate Risks AGRICULTURE PRODUCTION

Stressors	Risks
Increased intensity of single rainfall events	Reduced productivity of fisheries due to reduced water quality and increased temperatures
	Soil erosion and loss of productive topsoil in steep mountain agricultural areas due to intense rains
Rising temperatures	Changes in the abundance, productivity, community composition, distribution and migration of aquatic species
	Increased disease incidence in staple crops such as rice, beans and cassava
Sea level rise	Yield reductions and crop failure due to waterlogging and floods
	Post-harvest losses due to infrastructure damage, landslides and road flooding

[1] A 'hot' night is defined by having the temperature exceeded on 10 percent of days or nights in the current climate of that region and season.

WATER RESOURCES

Climate variability and change pose significant challenges to the availability and quality of Sierra Leone's extensive water resources, which comprise surface waters connected through a network of river basins. An estimated 80 percent of the country's rural population obtains its water from these sources. Seasonal variations in river flows are significant, with minimal discharges occurring during the dry season, affecting water availability: an estimated 40 percent of the country's protected water points suffer water shortages in the dry season. Increased intensity of rainfall events increases runoff and sediment loads in rivers, affecting water quality. Increased temperatures can also negatively affect water quality by increasing algal growth and providing more conducive breeding grounds for disease vectors. (4, 6)

Climate Stressors and Climate Risks
WATER RESOURCES

Stressors	Risks
Increased temperatures **Increased frequency of intense precipitation**	Reduced water quality and increased solubility of toxic compounds released from mining operations
	Increased temperatures, promoting algal growth and offering breeding grounds for waterborne disease vectors
	Flooding, leading to increased sedimentation and runoff and negatively affecting water quality
	Reduced water availability during critical periods (dry season)
	Existing drainage networks in urban centers overwhelmed by flash floods

HUMAN HEALTH

Sierra Leone has one of the highest malnutrition and child mortality rates in the world, making the country's population extremely vulnerable to climate shocks. Recurrent flooding increases exposure to waterborne diseases. More intense dry seasons (with increased temperatures) in the north and west have been linked to reduced water quality and disease outbreaks. Cholera is epidemic, with the last major outbreak in 2012 causing 300 deaths and affecting more than 20,000 people. Additionally, a warmer Atlantic Ocean poses a health risk as increased sea surface temperatures contribute to toxic algae blooms and food poisoning from consumption of shellfish and reef fish (the latter reported in Freetown in 2011 and 2012). The Ebola outbreak revealed a deficient health system, including understaffed, unavailable or unaffordable healthcare that will be further stressed by climate change impacts. (8)

Climate Stressors and Climate Risks
HUMAN HEALTH

Stressors	Risks
Increased temperatures **Increased frequency of intense precipitation**	Reduced quality and quantity of drinking water, leading to an increased risk of waterborne illnesses such as cholera and diarrheal disease
	Expanded breeding sites for vector-borne diseases, e.g., malaria and dengue
	Increased incidence of heat stress, leading to a host of heat exposure-related illnesses
	More toxic algae blooms, potentially causing food poisoning from consumption of contaminated fish

DISASTERS

Projected increases in the intensity of rainfall events will exacerbate the existing impacts of floods, which include loss of life and property as well as damage to critical service and transport infrastructure. Floods account for 85 percent of disaster-related mortality in the country, followed by landslides and storms. Recurrent flash flooding in urban areas and coastal flooding are common and occur every year during the rainy season. Rising sea levels can also impact the low-lying coastal plains, where much of the country's industries are located. (7, 10)

Climate Stressors and Climate Risks
DISASTERS

Stressors	Risks
Increased intensity of rainfall **Rising sea levels**	Damage to transport infrastructure as well as mining and productive operations
	Damage to coastal infrastructure and production zones
	Loss of life, crops and livestock

POLICY CONTEXT

INSTITUTIONAL FRAMEWORK

Housed in the President's office, the Environmental Protection Agency (EPA) was established in 2008 and is responsible for all issues concerning environment and climate change. In 2012, the EPA established the National Secretariat for Climate Change (NSCC). It hosts a committee drawn from government, NGOs, and universities that meets quarterly to provide guidance on national climate change issues to the Secretariat. This committee has the potential and mandate to build institutional links between various agencies on the cross-cutting issues of climate change adaptation, including disaster management, agricultural development and infrastructure design and planning. (1)

Sierra Leone's meteorological service is responsible for the collection, analysis, dissemination and storage of national data, but its capabilities were greatly affected by the war due to destruction of weather stations. Limited observational stations exist across the country.

NATIONAL STRATEGIES AND PLANS

In addition to submitting national communications and an Intended Nationally Determined Contribution (INDC) to the United Nations Framework Convention on Climate Change (UNFCC), Sierra Leone has developed several national climate change strategies that identify a range of adaptation priorities. They include: rehabilitation of degraded coastal habitats, integration of climate change adaptation into the health and mining/extractive sectors, promotion of integrated crop/livestock management, monitoring of groundwater resources, and enhanced use of climate services. Climate change is also mentioned in the National Sustainable Agriculture Development Plan, with reference to changing practices due to erratic rainfall.

The following strategies and plans are available:

- First National Communication (2007) and Second National Communication (2012); UNFCCC
- Intended Nationally Determined Contribution (INDC) (2015); EPA
- National Adaptation Programme of Action (2007); Ministry of Transport and Aviation
- References to the following, but no documents available online: a National Climate Change Policy (NCCP) and a National Climate Change Strategy and Action Plan (NCS&AP). (2)

KEY RESOURCES

1. Environmental Protection Agency. 2014. National Secretariat for Climate Change.
2. Environmental Protection Agency. 2015. Sierra Leone's Intended Nationally Determined Contributions.
3. Food and Agriculture Organization. n.d. Country Pasture/Forage Resource Profile.
4. Food and Agriculture Organization. 2005. Aquastat Country Profile, Sierra Leone.
5. Jarvis, A., et al. 2012. Is Cassava the answer to African climate change adaptation?
6. Oates, N., et al. 2014. Adaptation to Climate Change in Water Sanitation and Hygiene.
7. Prevention Web. n.d. Sierra Leone Disaster & Risk Profile.
8. ReliefWeb. 2015. Sierra Leone: Risks.
9. Republic of Sierra Leone. 2012. Second National Communication on Climate Change.
10. Tarawalli, P. 2012. Diagnostic Analysis of Climate Change and Disaster Management in Relation to the PRSP III in Sierra Leone.
11. United Nations Development Programme. Sierra Leone: Country Profile.
12. World Bank. n.d. Data: Sierra Leone.

Map Source: Hijmans, R.J., et al. 2005. Very high resolution interpolated climate surfaces for global land areas. *International Journal of Climatology* 25: 1965-1978.

SELECTED ONGOING EXPERIENCES

Selected Program	Amount	Donor	Year	Implementer
West Africa Biodiversity and Climate Change (WABiCC)	$49 million	USAID	2015–2020	Tetra Tech
Building the Adaptive Capacity of Water Supply Services to Climate Change	$3 million	GEF	2012–2018	UNDP
Wetlands Conservation Project	$1.8 million	GEF	2011–2016	World Bank
Sustainable & Thriving Environments for West Africa Regional Development Phase III (STEWARD)	$18 million	USAID/USFS	2011–2016	CARE; Bioclimate; PCI-Media Impact; Thomson Reuters; AUDER; and Fauna and Flora International
Environmental Governance and Mainstreaming Project		EU	2012–2016	Sierra Leone Environmental Protection Agency
Emergency agricultural support to flood-affected households	$500,000	FAO	2015–2016	FAO
Support for sustainable climate change adaptation in marine artisanal fisheries communities in West Africa	$300,000	FAO	2013–2015	FAO
Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone	$5.5 million	GEF	N/A	IFAD
Preparation of a National Programme of Action for Adaptation to Climate Change	$200,000	GEF	N/A	UNDP
FEWS NET Country Program		USAID	Ongoing	Chemonics
Building Resilience to Climate Change in the Water and Sanitation Sector	$33 million	GEF (LCDF)	Approved	African Development Bank
Strengthening Climate Information and Early Warning Systems in Africa for Climate Resilient Development and Adaptation to Climate Change	$24.4 million	GEF (LCDF)	Approved	UNDP
Adapting to Climate Change Induced Coastal Risk Management	$40.1 million	GEF (LCDF)	Approved	UNDP