



Climate Change Adaptation in RWANDA

Severe weather events, particularly droughts, have historically imposed heavy costs in Rwanda. The projected impacts of climate change may increase the frequency and compound the ramifications of these events, potentially undermining food security, health, and economic growth. In recognition of this fact, the Government of Rwanda and the donor community have initiated activities to determine vulnerability and adaptation priorities. However, a number of adaptation needs remain, including mainstreaming adaptation into the country's long-term development framework, vulnerability assessments for critical sectors, and development of a national climate change strategy that clearly identifies priority sector and ecosystem vulnerabilities and means for addressing them. Accomplishing these challenges requires overcoming and addressing existing barriers regarding data availability and accessibility, as well as the limited capacity to conduct meteorological and hydrological analysis and forecasting.



Map of Rwanda. Source: Encyclopedia Britannica

CLIMATE IMPACTS AND VULNERABILITY

Historic Weather and Climate

- Observations indicate a rise in average annual temperatures of about 0.7-0.9°C since 1950.
- Shifts in the timing of precipitation, which have important implications for agriculture, have been reported in certain regions.
- Extreme events associated with El Niño and La Niña episodes have intensified.
 - Droughts in eastern and southern regions have resulted in a series of severe famines.
 - Heavy rainfall in northern and western regions has led to erosion, flooding, and landslides.

Projected Weather and Climate

While projections for Rwanda vary, the majority of climate models suggest:

- Increases in average maximum and minimum monthly temperatures ranging from 1.5-2.7°C and 1.7-2.8°C, respectively. Warmer conditions in the highlands may result in longer growing seasons and benefit certain crops.
- Greater average annual rainfall, with seasonal variability, although there are significant discrepancies between model predictions.
- Intensification of heavy rainfall, meaning that more rainfall will occur during only a few storms, thus increasing the risk of disasters such as floods and landslides. These can lead to greater human mortality, contamination of water sources, loss of crops, and damage and destruction to homes and critical infrastructure.

KEY SECTOR VULNERABILITIES

Agriculture and Food Security

Climate impacts of significance for agriculture and food security are likely to be temperature increases and more frequent droughts, with the nature and timing of impacts varying across regions. Climate impacts may alter the extent of areas suitable for agriculture and the length of growing seasons, affecting crop yields as well as hunger and nutrition. In addition, climate change may alter the occurrence and distribution of pests that may harm or ruin crops and livestock.

Climate Change Impacts on Agriculture and Food Security

Change in Climate	Potential impacts on agriculture and food security
Warmer temperatures, prolonged droughts, and higher evapotranspiration	<ul style="list-style-type: none"> • Reduced production of maize and beans, livestock losses, and greater conditions conducive to famines.

* Chart continues on following page

Change in Climate	Potential impacts on agriculture and food security
Greater incidence of temperature extremes	<ul style="list-style-type: none"> Increased stress on crops, which may in turn decrease yields of crops such as wheat, fruit, and groundnuts.
Changes in rainfall timing and amount	<ul style="list-style-type: none"> Increased flood and landslide frequency contributing to erosion, which can hamper agricultural production and destroy crops.

Water Resources

In recent years, higher temperatures, prolonged droughts, and elevated rates of evapotranspiration have led to disturbances in the hydrologic cycle and altered river flows. Climate change-associated temperature increases and precipitation variability may exacerbate negative impacts on lakes, rivers, and other important sources of water. This can have implications on the availability of water for hydropower and for distribution by utilities, such as those serving Kigali, which are already struggling to meet user needs. Other factors, such as the dearth of man-made storage, collection, and catchment systems, and changes in land use and cover associated with population and socio-economic growth, will also play an important role in shaping shifts in water resources.

Health

Current climate variability affects health in Rwanda, and climate change is likely to impose new stresses, summarized in the following table. Climate change may influence the occurrence and distribution of vector-borne diseases, such as malaria. Malaria prevalence may increase in highland areas, where prevalence of the disease has previously been low. The communities in these regions are likely to have a greater sensitivity to malaria due to their relative lack of previous exposure and limited immunity.

Potential Impacts and Consequences of Climate Change for Health and Society

Impact Mode	Impacts	Consequences
Direct	<ul style="list-style-type: none"> Exposure to thermal extremes, especially heat waves. Altered frequency and/or intensity of other extreme weather conditions (droughts, floods, storms, etc.). 	<ul style="list-style-type: none"> Altered rates of heat and cold-related illness, especially cardiovascular and respiratory diseases. Deaths, injuries, and damage to public health infrastructure.
Indirect (due to disturbances of ecological systems)	<ul style="list-style-type: none"> Effects on ranges and activity of vectors and parasites. Altered local ecology of water- and food-borne infective agents. Altered food (especially crop) productivity due to changes in climate, weather, and associated pests and diseases. Shifts in the quantity, quality, and distribution of fresh water. Extreme events such as floods, droughts, and landslides, with population displacement and damage to infrastructure. Increased levels and biological impacts of air pollution including pollens and spores. Social, economic, and demographic dislocations due to adverse climate change impacts on the economy, infrastructure, and resource supply. 	<ul style="list-style-type: none"> Change in geographic ranges and incidence of vector borne diseases. For instance, an increase in temperature of 1-2°C can expand potential malaria risk zones to previously unaffected higher altitude regions. Changed incidences of diarrhea and infectious diseases. Regional malnutrition and hunger with consequent impairment of child growth and development, especially in vulnerable communities. Injuries, increased risk of various infectious diseases (due to migration, overcrowding, contamination of drinking water). Asthma and allergic disorders, other acute and chronic respiratory disorders and deaths. Wide range of consequences affecting public health (e.g. mental health, nutritional impairment, infectious diseases, civil strife).

Ecosystems

In Rwanda, 90 percent of the population depends on the land for survival and prosperity. The country is comprised of five ecosystems: cropland and natural vegetation (47 percent); scrublands, savanna, and grasslands (32 percent); forests (12 percent); wetlands and water bodies (8 percent) and sparse or barren vegetation (1 percent). The services and products supported by ecosystems are critical for the health and economic well-being of communities, as well as for the greater economy of Rwanda. These ecosystems are highly exposed and sensitive to climate variability, and climate change may increase the future degree of exposure and sensitivity of these ecosystems. Potential impacts include changes in species composition and shifts in ranges, which may have implications for Rwanda's network of protected areas and the ecosystem services they provide to local communities.

A wide range of non-climate stressors, such as erosion, invasive species, population growth, and overexploitation and poaching of natural resources, also affects these ecosystems, and may be exacerbated by climate change. Furthermore, demographic pressures on ecosystems exacerbate climate change stresses by, for example, accelerating overuse of natural resources as other resources diminish, which in turn can increase habitat degradation and decrease biodiversity and species abundance.

NATIONAL STRATEGIES, PLANS AND INSTITUTIONS RELEVANT TO CLIMATE CHANGE

National Strategies and Plans

- Initial National Communication (INC) (2005): Considers mitigation and adaptation and includes information on greenhouse gas emissions, potential mitigation options, vulnerability assessments of key sectors, possible adaptation measures, and the policy and institutional context for responding to climate change.
- National Adaptation Programme of Action (NAPA) (2006): Contains information to guide national policy-makers and planners on priority vulnerabilities and adaptations in important economic sectors. (Other relevant plans are listed in the box at right.)

Adaptation Relevant Strategies, Plans, and Policies

- Vision 2020
- Economic Development and Poverty Reduction Strategy (EDPRS)
- National Environmental Policy
- National Land Policy
- National Agriculture Policy
- National Forestry Policy
- National Energy Policy
- National Strategy and Action Plan for the Conservation of Biodiversity
- National Strategy and Action Plan to Right against Desertification

Institutional Framework

The Rwanda Environment Management Authority is the National Focal Point for the United Nations Framework Convention on Climate Change (UNFCCC). The National Committee on Climate Change, together with the NAPA Team, was responsible for the study, coordination, and consultation undertaken to develop the NAPA. Other relevant government entities include the ministries of Local Administration, Community Development and Social Affairs, Agriculture and Resources, Natural Resources, and Health, as well as the Rwanda Office of Tourism and National Parks, and the National Body of Disaster Risk Management.

Government Adaptation Priorities

Both the INC and the NAPA identify a set of priority sectors for the Government of Rwanda:

INC	NAPA
<ul style="list-style-type: none"> • Human settlements • Energy (hydropower infrastructure) • Industry • Food security • Freshwater and land ecosystems 	<ul style="list-style-type: none"> • Water resources • Agriculture • Food security • Health • Hydroelectric and wood energy • Infrastructure • Ecosystems

While adaptation mainstreaming activities in water and other environmental and natural resources sectors have been undertaken, there has been limited progress on the integration of adaptation considerations into development and other sector strategies, plans, and processes. There is no current discussion of climate impacts on many sectors of the economy or a clear articulation of how to enable progress on adaptation, including the implementation of the NAPA projects.

Key Players and Initiatives

Only a few donor-supported adaptation activities have been implemented in Rwanda to date. These have supported the INC and NAPA, provided targeted budget support and project funding for initiatives focused on reducing vulnerability in specific communities or sectors, or supported the integration of adaptation considerations into national development processes.

Significant donors in Rwanda include the European Union (EU) and Government of Japan. The EU's Global Campaign for Climate Action (GCCA) seeks to help the most vulnerable developing countries increase their capacity to adapt to the effects of climate change in support of the Millennium Development Goals. The Government of Japan established the African Adaptation Programme, which is implemented by the United Nations Development Programme (UNDP) and seeks to promote the integration of climate change into national development processes in 21 countries, including Rwanda.

NAPA Projects

1. Conserving and protecting lands against erosion and floods at district level in regions vulnerable to climate change
2. Mastering hydro-meteorological information and early warning systems to control extreme phenomena due to climate change; Installing and rehabilitating hydrological and meteorological stations
3. Developing irrigated areas by gravity water systems from perennial streams and rivers in zones often vulnerable to prolonged droughts
4. Supporting districts of vulnerable regions in planning and implementing measures and techniques related to land conservation, water harvesting, and intensive agriculture, and promoting existing and new resistant varieties of crops adapted to different bioclimatic soil
5. Increasing adaptive capacity of grouped settlement "Imidugudu" located in vulnerable regions by improving potable water, sanitation and alternative energy services, and promoting non-agricultural jobs
6. Increasing modes of distributing food and medicine to respond to extreme climate change, and sensitizing to stocking and conservation of agriculture products
7. Preparing and implementing a woody combustible substitution national strategy to combat deforestation and erosion

Other key initiatives include:

Title	Lead Organization	Funding Source
Submissions under UNFCCC		
NAPA (2006)	United Nations Environment Programme (UNEP)	Global Environment Fund (GEF): Least Developed Countries Fund (LDCF)
INC (2005)	UNEP	N/A
Initiatives		
Budget Support for Environment and Natural Resources in Rwanda: Ensuring Food Security through Land Tenure Reform	GCCA	EU
Reducing Vulnerability to Climate Change by Establishing Early Warning and Disaster Preparedness Systems and Support for Integrated Watershed Management in Flood Prone Areas	UNEP	GEF: LDCF
Adapting to Climate Change through Land and Biodiversity Conservation in Gishwati Area in the Nyabihu District	UNDP, Climate Change Adaptation and Development Initiative (CC DARE), Rwanda Environmental NGOs Forum	
Enhancing Capacity Building and Raising Awareness of a Sensitive Community in Rwanda on Climate Change Adaptation	CC DARE	Danish Ministry of Foreign Affairs, UNEP RISOE Centre
Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa – Building a comprehensive national approach in Rwanda	Africa Adaptation Programme	Government of Japan

Priority Challenges and Constraints for Addressing Vulnerability and Increasing Resilience

Rwanda has initiated important steps to determine vulnerability and adaptation priorities. However, a number of critical adaptation needs remain. They include:

- Mainstreaming adaptation into the country's planning frameworks.
- Conducting vulnerability assessments for critical sectors to enhance understanding of the potential impacts of climate change, which can then inform identification of possible promising adaptation measures.
- Developing a national climate change strategy that clearly lays out priority sector and ecosystem vulnerabilities and means for addressing them.

Filling these data, capacity, and resource deficits and addressing the adaptation priorities discussed above will be essential for enabling Rwanda to better respond to existing and anticipated climate variability and change. This in turn will allow the country to increase its resilience to climate change, so that it can continue to achieve economic growth, food security, health, and sustainable natural resources

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