



Climate Change Adaptation in UGANDA

Severe weather events, such as droughts and floods, have historically imposed heavy costs in Uganda. The projected impacts of climate change are likely to add to the toll, potentially undermining further advancements in critical development areas such as food security, water resources management, health, and economic growth. In recognition of this, the Government of Uganda and donor community have initiated activities to determine vulnerability and adaptation priorities, and integrate adaptation considerations into development and sectoral planning. However, adaptation challenges remain, including mainstreaming adaptation into the country's medium-term development framework. Accomplishing these will require addressing challenges regarding data availability and accessibility, as well as a need for strengthened capacity to predict future climate change and measure sector impacts.

CLIMATE IMPACTS AND VULNERABILITY

Historic Weather and Climate

Observations indicate the following:

- Rise in average temperatures of about 1.3°C since 1960, with the greatest increases in January and February.
- Decrease in annual rainfall at a rate of about 3.5 percent per decade, with greater reductions in the wet months (March-May).
- Increase in the frequency and intensity of droughts and floods (see exhibit at right).

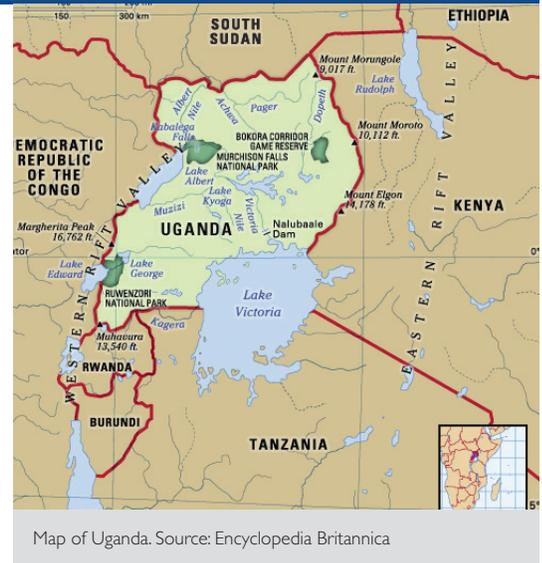
Extreme events can exact a high cost. The 1997-98 El Niño-associated floods led to:

- Cholera triggered by the floods led to 525 deaths, and hospitalization and treatment of over 11,000 individuals.
- An estimated 1,000 people were reported to have died in flood-related accidents; about 150,000 displaced.
- Damage to trunk and rural roads infrastructure was estimated at \$400 million.
- Approximately 300 hectares of wheat, a key staple, were destroyed in Kapchorwa district.
- Coffee exports dropped by 60 percent in October and November due to disrupted transport systems.
- Water sources were contaminated, and some pumping stations were flooded.

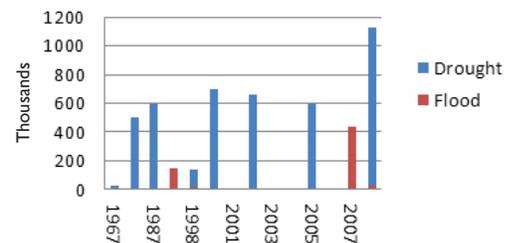
Projected Weather and Climate

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

- Without significant reductions in greenhouse gas emissions, average temperatures in Uganda for the 2030s may be 1°C hotter than the 1970-1999 average. This warming trend is expected to continue beyond the 2030s.
- Rainfall by the 2030s may fall as much as 7 percent below or increase by up to 14 percent above the 1970-99 observed average. Rather than precluding the possibility of change, these results underscore the uncertainty regarding the nature and timing of these changes.
- The percentage of rainfall coming in the form of heavy precipitation events is anticipated to rise, increasing the risk of disasters such as floods and landslides. This can lead to greater human mortality, water contamination, crop loss, and damaged or destroyed homes and infrastructure. Droughts can affect water quality and quantity, with significant food security consequences such as livestock loss, reduced milk production, and higher food prices.



People affected by severe weather events by year (thousands)



KEY SECTOR VULNERABILITIES

Agriculture and Food Security

Climate impacts of greatest significance for agriculture and food security are likely to be temperature rises and more frequent occurrence of drought. Although there is disagreement across models, climate change may affect crop yields, and consequently, hunger and nutrition, through impacts such as those in the table below.

Climate Change Impacts on Food Security

Change in Climate	Potential impacts on food security
Warmer Temperatures	<ul style="list-style-type: none"> Diminish soil moisture and accelerate soil erosion, affecting arability and reducing the extent of agricultural land. Reduce the number of days in which conditions are conducive to growth, resulting in shorter growing seasons. Alter occurrence and distribution of pests that may harm or ruin crops and livestock. For instance, the 1990s epidemic of cassava mosaic virus resulted in yearly losses of 600,000 tons (estimated at \$60 million) of cassava, a staple crop that accounts for approximately 13 percent of daily caloric intake.
Increase in extreme droughts and floods	<ul style="list-style-type: none"> Increase stress on crops due to greater incidence of temperature extremes, decreasing yields of key crops such as wheat and groundnuts. Cause ecosystem shifts and land degradation resulting in species loss, with highland and semi-arid ecosystems at greatest risk. Climate change may exacerbate these impacts. Decrease in the quantity and quality of grazing areas and water resources as a result of droughts. This can result in the loss of livestock, as occurred during the 2004-2005 drought.

Health

Current climate variability also affects health in Uganda, and climate change is likely to impose new stresses, resulting in a number of direct and indirect impacts, summarized below.

Potential Impacts and Consequences of Climate Change for Health

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, as well as changes in nutritional content. Impacts on the quantity and quality of fresh water available and accessible. 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 shift potential malaria risk areas from the traditional tropical zones to new higher elevation risk areas. 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).

Water Resources

While uncertainty remains regarding projected impacts of climate change for water resources in East Africa, the region is expected to experience a potential reduction in water stress, although there may be variability within the region. For example, as a consequence of greater rainfall, the Nzoia catchment in the Lake Victoria basin is predicted to experience a rise in streamflow. For Uganda, a recent study indicates that warmer temperatures may increase the rate at which moisture evaporates from the ground surface, which may reduce and alter the seasonality of groundwater contributions to river discharge. This in turn may change the seasonal distribution of river flow, affecting local and regional groundwater resources, with implications for the availability of water for domestic and agricultural use.

Extreme events also are likely to play an important role in determining water quantity and quality. Extended and/or severe droughts can cause:

- Decreased water levels in rivers, and underground aquifers and reservoirs, affecting a number of critical development sectors.
- An increased intensity of water scarcity and water shortages in the drylands.
- A decline in power generation necessitating power rationing and interrupting economic activities.

KEY SECTOR VULNERABILITIES

Wetlands

Wetlands currently account for an estimated 13 percent of Uganda's total area. They are important contributors to Gross Domestic Product (GDP) and employment by providing water, fishing, recreational opportunities, and ecological services. They also serve as important habitats for fauna and flora. Wetlands have experienced significant degradation due to non-climate stressors, including drainage for agriculture, sand and clay mining, over-harvesting of biomass, and pollution due to both human and industrial waste. These have resulted in higher incidence of floods, diminished fish productivity, declines in water quantity and quality, decreased ground water recharge, and decreases in the water table as exemplified by the reduction of water springs. Climate change may exacerbate these impacts.

Forests

With a total economic value of approximately 5 percent of GDP, forests in Uganda provide resources and services critical for the health and livelihoods of the communities that depend on them as well as for the greater economy. However, the extent of these ecosystems is reported to have shrunk from 20 percent to 14 percent of Uganda's land area between 1990 and 2005 due to degradation and deforestation. Climate change may exacerbate these non-climate stressors. Potential impacts include:

- Extensive tree loss, as in Bwindi Impenetrable National Park, due to extreme events (e.g., windstorms and flooding).
- Increased occurrence, intensity, and extent of fires, affecting native forest species and possibly accelerating the spread of invasive species.
- Changes in growth rates, species composition, and regeneration.
- Vulnerability of wildlife species with highly specialized habitat and food requirements, and flora with narrow habitat ranges. While some species can migrate or spread to new habitats, for others, suitable habitats may be eliminated, resulting in loss of these species in the wild.
- Shifts in the reproductive and behavioral traits of flora and fauna, as a result of changes in temperature and seasonal patterns.

NATIONAL STRATEGIES, PLANS AND INSTITUTIONS RELEVANT TO CLIMATE CHANGE

National Strategies and Plans

- Initial National Communication (INC) (2002): 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) (2007): Uses a participatory rural appraisal approach to assess key vulnerabilities and lay out priority adaptation projects.
- Vision 2025, "Prosperous People, Harmonious Nation, Beautiful Country": Uganda's medium-term development framework and a key development strategy that informed the Poverty Eradication Action Plan (PEAP).

Institutional Framework

- Department of Meteorology (Ministry of Water, Lands, and Environment (MOWLE)): Coordinates NAPA project implementation with other line ministries; supported by the National Climate Change Steering Committee Secretariat (NCSSC).
- MOWLE: Sets national policies and standards, manages and regulates water resources, determines priorities for water development and management, and monitors and evaluates sector development programs.
- NCCSC: Multi-sectoral, multi-disciplinary committee whose purpose is to advise MOWLE on Clean Development Mechanism projects and climate change policy issues.
- Other relevant institutions: National Environment Management Authority (promotes the consideration of environmental factors by other government agencies; does not currently have any climate change specific initiatives); Commission on Disaster Management and Refugees (responsible for coordinating response to climate related disasters including droughts and floods).

Government Adaptation Priorities

The NAPA identifies the sectors that face the most critical vulnerabilities from climate change (see box on the next page). Although many of these projects have been incorporated into sectoral plans, progress on implementation has been limited, and a number of priorities remain to be met. They include:

- Developing a methodology and format for assessing the vulnerability of the five pillars of the PEAP (economic management; production, competitiveness and incomes; security, conflict resolution, and disaster management; good governance; and human development).

- Strengthening the government's capacity to conduct assessments for future iterations of the PEAP.
- Deepening understanding of climate change impacts in Uganda for specific sectors such as agriculture, especially at finer scales, so that sub regional vulnerability can be mapped to facilitate targeting of scarce resources.

Key Players and Initiatives

The few donor-supported, adaptation-specific projects in Uganda focus primarily on strategies, plans, or assessments; on integrating adaptation into general development and sector initiatives; or on raising awareness of climate change issues.

- Danish International Development Assistance (DANIDA): The climate change screening of their assistance to Uganda highlights government interest in adopting a mainstreaming approach to climate change. This may include integrating climate vulnerability issues into annual budgeting procedures.
- Climate Change Adaptation and Development Initiative (CC DARE) (UNEP/UNDP): Uganda receives technical and financial support to facilitate integrating adaptation into national development planning and decision-making frameworks. (See box at right for relevant reports.)

Priority Challenges and Constraints for Addressing Vulnerability and Increasing Resilience

A number of critical challenges and constraints, pertaining in particular to data and capacity, must be addressed to enable Uganda to move effectively beyond strategies and plans and into implementation. They include:

- Gaps in climate and sectoral data, such as the need for better coverage and quality of temperature and precipitation data to conduct hydrological and other water sector modeling.
- Limited accessibility of data needed to assess climate change impacts and vulnerabilities. For instance, although most rainfall data has been digitized, the bulk of other weather data/climate records have not.
- Weak scientific and technical capacity to evaluate climate variability and project future climate change.
- Limited expertise to conduct integrated assessments of climate impacts for specific sectors, such as food security and water, and identify appropriate responses.
- Translation of impact analyses into terms that resonate with policymakers and community leaders, to ensure that climate data and impact analyses can be easily understood and acted upon.

Filling these data and capacity deficits is essential to enable Uganda to better respond to existing and anticipated climate variability and change, ultimately to achieve the country's sustainable development objectives.

Ranked adaptation priorities in NAPA

1. Land cover and land use
2. Farm forestry
3. Water resources
4. Health
5. Weather and climate information
6. Indigenous knowledge documentation and awareness creation

Reports

- The System for Analysis, Research and Training's 2006 "Assessing the impacts of climate change and variability on water resources in Uganda: developing an integrated approach at the sub-regional scale"
- "Integrating Vulnerability and Adaptation to Climate Change into Sustainable Development Policy Planning and Implementation in Southern and Eastern Africa" report, funded in part by the GEF Trust Fund
- "Consultation on ACCRA's Adaptive Capacity Framework," led by the Adaptation Knowledge Platform and funded by SDC

KEY SOURCES

Conway, G. The Science of Climate Change in Africa: Impacts and Adaptation. Grantham Institute for Climate Change Discussion paper No. 1. 2009.

Food and Agriculture Organization Food Balance Sheet. [Cited June 20, 2011]. Available from: <http://faostat.fao.org>.

McSweeney, C., New, M., and Lizcano, G. UNDP Country Climate Profiles: Uganda [Internet]. 2008 [cited June 20, 2011]; Available from: http://country-profiles.geog.ox.ac.uk/UNDP_reports/Uganda/Uganda.hires.report.pdf.

Moweni and Yaron. The Role of the Environment in Increasing Growth and Reducing Poverty in Uganda. report for United Kingdom Department for International Development and Government of Uganda. 2004. As cited in Natural Resources and Pro-Poor Growth: The Economics and Politics. Organisation for Economic Co-operation and Development. 2008.

Uganda Department of Meteorology, Ministry of Water, Lands, and Environment. Uganda National Adaptation Programme of Action. 2007.