USAID
FROM THE AMERICAN PEOPLE

Climate Change Adaptation in MOZAMBIQUE

Climate variability is already affecting Mozambique. Over the past two decades, the country has experienced increased droughts, flooding, and storms, which in some cases have had severe socio-economic implications for the country. Warmer temperatures, shifts in precipitation, and greater frequency and intensity of extreme weather events such as droughts are projected. These climate stresses may exacerbate both climate and non-climate stresses and affect development objectives, such as food security, natural resources management, public health, and economic growth. In recognition of the increasing climate-related challenges, the Government of Mozambique and the donor community have initiated activities to determine vulnerability and adaptation priorities, and to integrate this knowledge into development and sectoral planning. Nonetheless, a number of challenges remain, including developing adequate early warning systems, strengthening planning capacity at the national and local levels, and addressing capacity and financial constraints to carry out adaptation related activities.

Map of Mozambique. Source: Encyclopedia Britannica

CLIMATE IMPACTS AND VULNERABILITY

Historic Weather and Climate

Observations indicate:

- Temperatures have increased by 0.6°C from 1960-2006, at an average of 0.13° per decade.
- From 1960-2006, mean annual rainfall decreased at an average of 2.5 mm per decade, largely due to decrease in precipitation during the rainy season.
- From 1960-2005, rainy seasons commenced later, and dry spells lasted longer.
- Since the 1950s, the occurrence of extreme weather events, including drought, heavy rainfall events, hurricanes, and cyclones, has increased.

Projected Weather and Climate

Projections vary across models depending on assumptions; however, the majority of climate models suggest:

- Mean annual temperatures in Mozambique are likely to rise by 1.0-2.8°C by the 2060s and 1.4-4.6°C by the 2090s, from 1970-99 observed mean temperatures.
- Precipitation is anticipated to increase in most parts of the country, particularly during the rainy season.
- Droughts and floods may become more frequent, and cyclones more intense.
- Sea level rise in the region is projected to range from 0.18-0.59 m by the 2090s; however, sea levels may increase beyond this range.

KEY SECTOR VULNERABILITIES

Food Security

The agricultural sector accounts for over 24 percent of the country's gross domestic product (GDP), and provides employment for 70 percent of the workforce. Nearly all agricultural activity (99.7 percent) is small-scale and 95 percent of agricultural production is rainfed, making the sector highly vulnerable to precipitation variability. Non-climate stresses affecting agriculture and food security include slash and burn practices, excessive use of land, overgrazing, bush fires, industrial forestry, and increasing demands for food due to rapid population growth. Drought and increases in temperature pose a risk to Mozambique's crop yields as they facilitate the drying of soils and reduction of soil fertility, cause crop losses, and reduce grazing areas for livestock. Drought-induced crop shortages and failures can result in chronic food shortage and represent the most frequent risk to food security, agricultural production, and livelihoods. With 25 percent of all cultivated land located in low-lying areas, food production, particularly around river basins and coastal zones, is vulnerable to flooding and intense rainfall, which erodes land surfaces. Flooding, heavy rains, and droughts can contribute to losses in crop yields which may exacerbate the high chronic malnutrition level (44 percent) in Mozambique. Sea level rise also poses a threat to food production as it can lead to saline intrusion of agricultural lands along the coast.

Water Resources

Mozambique is likely to face increased droughts and floods that will have consequences for the nation's water resources. Every year it is estimated that the country loses 1.1 percent of its GDP due to the impacts of droughts and floods on economic resources and activity. Mozambique is particularly vulnerable to the flooding of water sources, as it is situated downstream of nine major river systems which are already affected by climate variability; climate change is likely to exacerbate this vulnerability. From 2000 to 2001 and in 2007, Mozambique experienced severe flooding in many river basins and dams mainly due to torrential rains in the country and the region. Non-climate stresses exacerbating flooding in Mozambique include poor dam management in the country and the region, particularly upstream. Water resources in Mozambique are affected by pollution from mining, industrial, agricultural, and household waste.

Health

Increased temperatures, droughts, and floods can result in direct and indirect impacts on health. The spread of malaria is of particular concern, with rising temperatures and increased flooding due to a rise in heavy rainfall events. Warmer temperatures and stagnant water following flooding increase mosquito breeding and the rate of mosquito development, which in turn can increase the spread of malaria. Cholera outbreaks also show a strong relationship to climate variability, which is likely to be exacerbated by climate change. As models show that the tendency for precipitation to fall in higher intensity events may increase, and intense precipitation events can overrun poorly placed latrines, an increase in prevalence of cholera and other enteric diseases is likely. Drier conditions can lead to increased use of low quality and contaminated water, leading to an increase of diarrhea and cholera. Urban and rural populations in Mozambique are also vulnerable to these diseases due to low access to improved safe water supply and sanitation facilities. Non-climate stresses that can exacerbate the impacts of climate change on public heath include inadequate health care facilities and providers, high poverty levels, poor water supply and sanitation, food insecurity, and poor nutrition. With 11.5 percent of the population affected by the HIV/AIDS epidemic, additional strain is placed on the health of the population. People affected may be unable to work effectively or earn as much income to care for their families. Farming families, for example, may find it more challenging to cope with climate change impacts such as drought or flooding when they are affected by HIV/AIDS.

KEY ECOSYSTEM VULNERABILITIES

Coastal and Marine

Coastal zones have already begun to, and will likely continue to, experience rises in sea level. Mozambique's 2,700 km of coastline is made up of low-lying areas characterized by a variety of ecosystems, such as estuaries, mangrove forests, dunes, inland lagoons, coastal lakes, reefs, and marine swamps, which represent habitats for a wide range of ecologically important and economically valuable species. Projected sea level rise is anticipated to increase the vulnerability to erosion and flooding of ecosystems and land. In freshwater ecosystems, saline intrusion due to sea level rise can lead to losses in fish populations. At the same time, storms can destroy fishing equipment and damage aquaculture operations. Given that fisheries contribute an estimated 4 percent of GDP, represent 28 percent of foreign exports, employ 95,000 people—with three to four times this number in support services – and provide 50 percent of all animal protein for the nation's diet, it is crucial to address climate change threats to fisheries. Provinces most vulnerable to rising sea levels are Zambezia, Nampula, Sofala, Beira, and Maputo, due to their low-lying topography and high populations; Beria and Maputo in particular are below sea level . Over 13 million people (60 percent of Mozambique's population) living within 50 km of the coastal zone and 1,433,994 people (6.5 percent of Mozambique's population) living less than 5 m above sea level will be vulnerable to the effects of rising sea levels. Transport infrastructure, homes, and buildings in coastal zones can be impacted by sea level rise and erosion, while water quality can be affected by salt water intrusion.

Forests

Forests comprise about 40 percent of Mozambique's land cover, with miombo and mopane forest the country's most extensive forest types. It is estimated that the forestry sector supplies 80 percent of the country's energy, contributes 4 percent to GDP, and sustains the livelihoods of about 11.9 million people. Forests serve as a source of timber for exports, medicinal and edible plants, bush meat, goods for subsistence and cultural purposes, and as habitats for wildlife. Along Mozambique's coastline, mangrove forests host a variety of rare species of flora, fauna, and animals. These critical resources are threatened by both climate and non-climate stresses. Droughts, decreases in annual rainfall, warmer temperatures, and increased heavy rainfall events can affect forest resources and biodiversity, worsening degradation of forest resources and loss of species biodiversity caused by non-climate stresses such as soil and land erosion. Warmer temperatures and droughts can also increase forests' vulnerability to forest fires, which affect 40 percent of the country every year, with up to 74 percent of the northwest and central parts of Mozambique burnt annually. Fires destroy natural vegetation and biodiversity and threaten the welfare of communities. Non-climate stresses affecting forests include illegal exploitation; large scale land-clearing for agriculture; and greater demand for timber, fuelwood, and wildlife products.

NATIONAL STRATEGIES, PLANS AND INSTITUTIONS RELEVANT TO CLIMATE CHANGE

National Strategies and Plans

- Initial National Communication (2003): Provides an inventory of greenhouse gas emissions, vulnerability and adaptation assessments, a mitigation and abatement analysis, plans for education and public awareness, and potential adaptation and mitigation projects.

- National Adaptation Programme of Action (NAPA) (2007): Aims to coordinate the elaboration and implementation of an action plan for adaptation to climate change for various economic and social development sectors, with an emphasis on disaster risk reduction, early warning systems, agriculture, fisheries, energy, water resources, ecosystems, and coastal zones.
- National Action Plan for Reducing Poverty (2011): A key development strategy that aims to increase agricultural productivity, promote employment, and foster human and social development.
- Strategic Plan for Agricultural Development (2010): Aims to increase agricultural production, food security, and incomes of agricultural producers.

Institutional Framework

- The Ministry for the Coordination of Environmental Affairs (MICOA) is the lead environmental management and coordination body, and the national focal point for the United Nations Framework Convention on Climate Change. MICOA is responsible for coordinating NAPA projects, and has formed a multidisciplinary advisory group on adaptation, made up of technicians from the National Directorates of Agriculture, Energy, Health and Environmental Management, Meteorology, Hydrography and Navigation, National Disaster Management Institute (INGC), Mozambique Red Cross, and the Environmental Working Group.
- The National Directorate of Forests, within the Ministry of Agriculture and Rural Development, focuses on expanding field-based and conservation activities, and strengthening the functional and operational capabilities.
- The National Meteorology Institute on New Early Warning Systems/Warning of Tropical Cyclones aims to reduce the negative effect of cyclone events by disseminating relevant information though educational campaigns, media, publications, and stakeholder collaboration.
- The Technical Secretariat for Food Security and Nutrition addresses climate change and food security challenges.

GOVERNMENT ADAPTATION PRIORITIES

Mozambique's NAPA identifies urgent projects and interventions for adaptation to climate change. Sectoral priorities identified are agriculture, fisheries, energy, environment, water, and coastal zones. Proposed projects include strengthening the capacities of farmers to deal with the adverse effects of climate change, reducing climate impacts in costal zones, and managing water resources under climate change. Due to safety considerations and the need for climate-related information for climate change planning, the NAPA stresses the importance of strengthening early warning systems. In addition, it emphasizes the need to improve inter-agency coordination, promote the mainstreaming of climate change adaptation into district-level planning, and foster climate change-related knowledge and skills at the local level.

KEY PLAYERS AND INITIATIVES

The few donor-supported, adaptation-specific activities that have been implemented to date in Mozambique have focused primarily on climate change impact and vulnerability assessments, adaptation strategy development, integrating adaptation into general development and sector initiatives, and raising awareness of climate change issues. Regionally, important stakeholders working on adaptation projects and programs include the European Union, Government of Japan, and United Nations Development Programme (UNDP).

Title	Lead Organization	Funding Source
Initiatives		
Pilot Program for Climate Resilience (with projects related to agricultural production, food security, land and water resource management, and coastal cities)	World Bank/MICOA/African Development Bank/ International Finance Corporation	Global Environment Facility (GEF): Special Climate Change Fund
Environment Mainstreaming and Adaptation to Climate Change—Mozambique	UNDP/ Food and Agriculture Organization (FAO)	Spain Millennium Development Goals Achievement Fund
German Agency for International Cooperation (GIZ) Factsheet—Adaptation to Climate Change in Mozambique: Early Warning and Education	GIZ	GIZ
Coping with Drought and Adaptation to Climate Change	UNDP	GEF/Government of Mozambique/ Samaritan's Purse
Africa Adaptation Programme: Climate change action and mainstreaming in Mozambique	INGC/MICOA/UNDP	Government of Japan
Increasing Resilience to Climate Change in Mozambique	Save the Children	United Kingdom Department for International Development
The sustainable development of the Govuro coastal zone through adaptation to climate change using a community-based integrated coastal zone management approach	Climate Change Adaptation and Development Initiative	Danish Ministry of Foreign Affairs

PRIORITY CHALLENGES AND CONSTRAINTS FOR ADDRESSING VULNERABILITY AND INCREASING RESILIENCE

Data, research, and capacity needs include:

- Location-specific climate monitoring and modeling.
- Coastal zone mapping and vulnerability baselines to support future environmental impact assessments and guide new developments.
- Vulnerability and risk assessments, particularly in the Limpopo basin.
- Research on future impacts of climate change on urban areas.
- Early warming and mapping for flood and coastal infrastructural risks, along with flood prediction and monitoring systems for rivers in the central region and major cities at risk from cyclones and storms surges.
- Coordination among national and local institutions to develop and implement adaptation strategies.
- Dissemination of climate change information, and increased awareness of climate change and adaptation.

In addition, existing information on climate change and adaptation needs to become more accessible to local and national institutions, government agencies, NGOs, urban and rural communities, and other stakeholders. Dissemination is vital in supporting and strengthening stakeholder efforts. Furthermore, policymakers need additional institutional support and training on local and global climate change science, impacts, and vulnerabilities to support decision and policy-making.

KEY SOURCES

Asante K. et al. Study on the Impact of Climate Change on Disaster Risk in Mozambique: Synthesis Report [Internet]. National Institute for Disaster Management, Maputo, Mozambique; 2009 [cited 2011 July 25]. Available from: http://www.undp.org.mz/waterswindsfires/content/download/2035/12104/file/INGC_Synthesis_Report_ClimateChange_Low.pdf.

Bambaige A. National Adaptation Strategies to Climate Change Impacts—A Case Study of Mozambique [Internet]. United Nations Development Programme; 2007 [cited 2011 July 24]. Available from: http://hdr.undp.org/en/reports/global/hdr2007-2008/papers/bambaige_albertina_mozambique.pdf.

Global Facility for Disaster Reduction and Recovery. Climate Risk and Adaptation Country Profile: Vulnerability, Risk Reduction, and Adaptation to Climate Change—Mozambique [Internet]. World Bank; 2011. Available from: http://sdwebx.worldbank.org/climateportalb/doc/GFDRRCountryProfiles/wb_gfdrr_climate_change_country_profile_for_MOZ.pdf.

Government of Mozambique. National Adaptation Plan of Action [Internet]. Maputo: Ministry for the Co-ordination of Environmental Affairs; 2007 [cited 2011 July 28]. Available from: http://unfccc.int/resource/docs/napa/moz01.pdf.

McSweeney C., New M., Lizcano G. UNDP Climate Change Country Profiles: Mozambique [Internet]. School of Geography and Environment—University of Oxford and Tyndall Centre for Climate Change Research; 2008 [cited 2011 Jun 25].

Available from: http://country-profiles.geog.ox.ac.uk.