

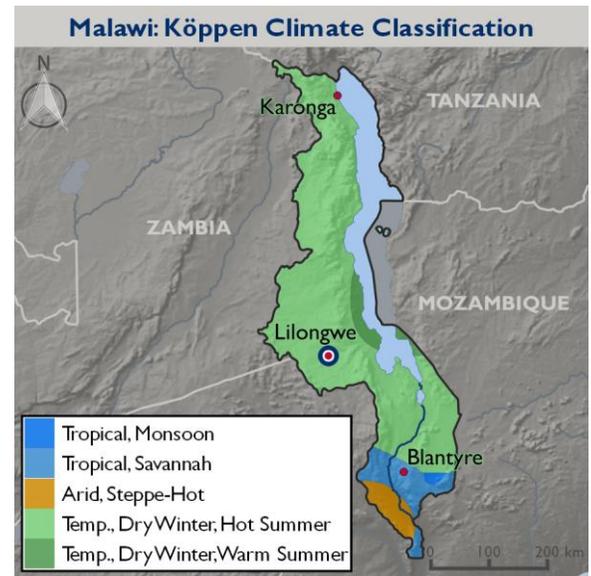


CLIMATE CHANGE RISK PROFILE MALAWI

COUNTRY OVERVIEW

Malawi is a low-income country facing a number of challenges that increase its vulnerability to a changing climate, including high population growth, dependence on rainfed agriculture, high rates of malnutrition and HIV/AIDS and inadequate power supply. Poverty rates are high and on the rise in rural areas, home to 85 percent of the population. Agriculture is central to Malawi's economy, contributing nearly 40 percent of GDP and roughly 90 percent of the country's export earnings. Improving agricultural production is key to poverty reduction, but the increased frequency and intensity of drought and flood events hinder progress. For example, in 2015 maize production fell by 30 percent due to floods in the south, followed by a countrywide drought that put 17 percent of the population at risk of food insecurity and depressed macroeconomic growth. The majority of agriculture production is rainfed and focused on maize.

Erratic rainfall poses a challenge to maize productivity, as do higher temperatures and droughts, as well as dry spells during the rainy season. The increased frequency of droughts and floods, along with higher temperatures, also negatively impact fisheries, wildlife and forests, which provide food, income, fuel and other environmental services to vulnerable populations. (3, 4, 5, 16, 17)



CLIMATE PROJECTIONS



1–3°C increase in temperatures by 2050



Increased frequency and intensity of heavy rainfall events



Increased incidence of droughts and floods

KEY CLIMATE IMPACTS

Agriculture



Reduced yields of rainfed crops
Shift in timing of planting/growing
Food shortages

Water Resources



Reduced water supply
Decline in water quality
Reduced hydropower production

Fisheries



Reduced productivity
Migration of fish to cooler waters
Damage to fish habitat

Ecosystems



Drying of wetlands; loss of biodiversity
Reduced forest productivity; forest fires
Loss of ecosystem-dependent livelihoods

Human Health



Increased risk of diarrheal disease
Expanded range of malaria to highlands
Increased food insecurity

January 2017

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

Malawi’s landscape is dominated by the Great Rift Valley, which runs north to south and contains Lake Malawi and the Shire River Valley. To the west are the central plateaus, highlands (Nyika and Viphya in the north and Shire in the south) and isolated mountains (Mulanje and Zomba). The majority of the country lies at an elevation above 800 meters and experiences a cool tropical continental climate, characterized by two distinct seasons: a rainy season from November to April and a dry season from May to October. Average daily temperatures vary with seasons and elevation, with the coldest temperatures (12–15°C) in July in the highlands and the hottest (25–26°C) in October in the Lower Shire Valley. Annual rainfall ranges from 500 mm in low-lying areas such as the Shire Valley to above 3,000 mm in the northern highlands. Overall rainfall exhibits high interannual variability and is highly influenced by the El Niño Southern Oscillation. (3, 10, 13, 16)

HISTORICAL CLIMATE

Observations since 1960 indicate:

- Temperature increases of approximately 0.9°C, with the most rapid increase in summer months (Dec–Feb), between 1960 and 2006.
- Increase in the number of days (+30 days) and nights (+41 days) considered “hot.”
- Highly variable year-to-year rainfall totals with no statistically significant trends.
- Increased length of dry spells during the rainy season.
- Increased intensity, frequency and magnitude of floods and droughts.

FUTURE CLIMATE

Projected changes include:

- Higher average temperatures of 1–3°C by 2050, with largest increases in early summer months.
- Increase in the number of days and nights considered “hot” by 2060.
- Overall increases or decreases in rainfall difficult to project.
- Later onset/earlier cessation of rainy season.
- Increase in average monthly rainfall from Dec–Jan and a decrease from Feb–April.
- Increases in the proportion of rainfall during extreme events of up to 19 percent annually by 2090.

SECTOR IMPACTS AND VULNERABILITIES

AGRICULTURE

Malawi’s agriculture sector is vulnerable to climate change due to its high reliance (95 percent) on rainfed crops. Production is already constrained by limited landholdings (average of 1.2 hectares per household), declining soil fertility and limited use and uptake of improved inputs and sustainable land practices. Maize is Malawi’s key staple crop, grown by nearly 97 percent of farmers and accounting for 60 percent of caloric intake. However, maize is sensitive to changes in temperatures and rainfall. Over the last two decades, maize production suffered from frequent droughts (maize yields were 30 percent lower in 2015 due to drought), resulting in food shortages every two to three years. Floods also disrupt food production and cause heavy losses, particularly in the south. Groundnuts, an important export crop, are also vulnerable to climate change; higher temperatures and erratic precipitation are likely to decrease productivity, while heavy rains could result in increased incidence of aflatoxins, reducing groundnuts’ export potential. Other crops emerging as an alternative to maize,

Climate Stressors and Climate Risks AGRICULTURE	
Stressors	Risks
Rising temperatures	Decreased yield of rainfed crops (including maize, groundnuts, pigeon peas, and cowpeas)
	Increased risk of aflatoxin contamination in groundnuts, limiting export opportunities
Increased intensity and frequency of heavy rainfall events	Further degradation of soil quality and productivity
	Shift in the timing of planting and growing seasons
Increased drought conditions and dry spell length	Destruction of agricultural infrastructure and crop losses due to flooding
	Food shortages, leading to increases in grain prices and imports

such as soy and pigeon peas, are more resilient to higher temperatures but are still at risk from extreme events such as floods and droughts.

(1, 4, 5, 7, 11, 12, 14, 16, 17)

WATER RESOURCES

Malawi's surface water resources are derived from rivers and inland lakes such as Lake Malawi. Erratic rains, extended dry periods and increased evaporation rates (combined with population growth and increased water demand) already affect water availability. Increased drought conditions are expected to continue to lower water levels in Lake Malawi and the Shire River, further reducing hydropower production (which currently supplies 95 percent of Malawi's electricity). Low water levels have already decreased energy production by 66 percent in plants along the Shire River and electricity is often rationed near the end of the dry season (October). Floods often damage water infrastructure and contaminate ground and surface water sources; for example, the 2012/13 floods in Karonga damaged water pipe networks and boreholes.

FISHERIES

Small-scale inland fisheries account for 95 percent of fish production and contribute significantly to Malawians' health and livelihoods. Fish constitute 28 percent of animal protein intake (mainly chambo) and support the livelihood of 10 percent of the population. In addition to unsustainable fishing practices, this critical resource is also under pressure from climate change, which impacts fish biology, reproduction, productivity and habitats. Lake Chilwa, which provides a quarter of the country's fish production, is just 5 meters deep, and surface area and water levels fluctuate with regional rainfall (the lake dried up completely in 1968 and 1995 due to drought). These fluctuations are correlated with production: years with low water levels correspond to lower fish catches. (2, 9, 14, 15)

ECOSYSTEMS

Climate change will have serious implications for Malawi's ecosystems. Forest cover has declined significantly since the 1970s mainly due to charcoal production and agricultural expansion. The remaining forests are under stress from high temperatures and drought that reduce vegetation and increase risk of forest fires. Wildlife is under threat from poaching in addition to climate factors such as drought, as evidenced by recurring droughts in Lengwe National Park that resulted in migration and increased mortality of animals. Lake Chilwa, a notable wetland area, is home to 5,000 plant and animal species and is increasingly vulnerable to droughts that can result in complete drying of the lake. (3, 7)

Climate Stressors and Climate Risks WATER RESOURCES	
Stressors	Risks
Rising temperatures	Reduced availability of surface water from evaporation and declining river flows; increased strain on limited groundwater sources
Increased intensity and frequency of heavy rainfall events	Reduced hydropower production; disruption of energy services; increased reliance on biomass
Increased drought conditions and dry spell length	Increased demand for irrigation
	Increased contamination of surface waters from floods and droughts

Higher temperatures and variable rainfall are projected to alter future water balances, leaving less available supplies overall. (3, 6, 12, 14, 17)

Climate Stressors and Climate Risks FISHERIES	
Stressors	Risks
Increased surface water temperatures	Reduced upwelling of nutrients for fish, reducing productivity
Increased intensity and frequency of heavy rainfall events	Reduced levels of dissolved oxygen, impacting fish reproduction and mortality rates
Increased drought conditions	High rates of soil erosion, runoff and siltation, degrading habitats and leaving fish unable to fertilize eggs or protect nests
	High evaporation rates and lower water levels in key production lakes (Malawi and Chilwa), reducing fish stock

Climate Stressors and Climate Risks Ecosystems	
Stressors	Risks
Rising temperatures	Decline in forest productivity and associated ecological services (regulating runoff and soil erosion, habitat provision, etc.)
Erratic rainfall	Intense and frequent forest fires
Increased drought conditions	Altered animal reproductive systems and increased animal mortality in extreme droughts
	Drying of wetlands, destroying important habitats
	Loss of livelihoods dependent on forests and wetlands, resulting in shift to poaching and charcoal production for economic support

HEALTH

Climate change is likely to exacerbate the generally poor health conditions in Malawi, which include high rates of infant and maternal mortality, malaria, diarrheal diseases, HIV/AIDS and malnutrition. As temperatures increase, the incidence of malaria is expected to increase and spread into higher altitudes, as already evidenced by the increase in mosquito populations in places like Mzuzu on the Viphya Plateau, which lies at 1,200 m elevation. Recurring floods in the south put already vulnerable, displaced communities without access to clean water or sanitation at greater risk of cholera and other diarrheal diseases. Recent droughts also increased the incidence of cholera near Lake Chilwa, as lower water levels concentrate bacteria; since January 2016, 1,300 people have contracted cholera in that area. Climate change is also likely to

POLICY CONTEXT

INSTITUTIONAL FRAMEWORK

The Ministry of Environment and Climate Change is mandated to protect and foster the management, development and sustainable use of natural resources and the environment. Within the ministry, the Environmental Affairs Department (EAD) is the mandated government body responsible for coordinating National Adaptation Plan of Action projects, with line ministries implementing specific projects. EAD also acts as the lead climate change planning organization. The National Council for the Environment is a government watchdog that ensures coordination with various stakeholders, promotes compliance with environmental regulation and monitors development projects to ensure the incorporation of environmental concerns. (4, 5, 14)

KEY RESOURCES

1. ActionAid International. 2006. [Climate Change and Smallholder Farmers in Malawi](#).
2. FAO. 2005. [Fisheries Profile, Malawi](#).
3. Government of Malawi. 2011. [Second National Communications to the UNFCCC](#).
4. Government of Malawi. 2013. [Draft National Climate Change Policy](#).
5. Government of Malawi. 2013. [National Climate Change Investment Plan for 2013–2018](#).
6. Grist, N. 2015. [Case Study: Malawi's Agriculture, Climate Change and Food Security Country Analysis](#). DFID.
7. IFPRI. 2013. [Southern African agriculture and climate change: A comprehensive analysis](#).
8. IFRC. 2015. [Cholera outbreak challenges relief efforts in Malawi's flood-affected communities](#).
9. Jamu, D. n.d. World Fish Center.
10. Mitchell, J. et al. 2016. [Malawi](#). Encyclopedia Britannica.

Climate Stressors and Climate Risks HEALTH

Stressors	Risks
Rising temperatures	Increased incidence and range of malaria, particularly at higher altitudes
Increased heavy rainfall events	Increased incidence of diarrheal diseases (particularly cholera)
Increased drought conditions	Increased malnutrition rates due to crop failure
	Increased stress on health of HIV/AIDS population

worsen malnutrition, particularly in children, as agricultural productivity is already compromised by dry periods and drought, both of which are projected to worsen. These disease outbreaks and food shortages will disproportionately affect Malawi's vulnerable HIV/AIDS population. (4, 5, 8, 14, 17)

NATIONAL STRATEGIES AND PLANS

- [Initial National Communication to the UNFCCC](#) (2002)
- [Second National Communication to the UNFCCC](#) (2011)
- [National Adaptation Plan of Action](#) (2006)
- [Malawi National Climate Change Policy](#) (2013)
- [National Climate Change Investment Plan \(NCCIP\)](#) (2013–2018)
- [Intended Nationally Determined Contribution](#) (2015)

11. Stevens, T. and K. Madani. 2016. [Future impacts on maize farming and food security in Malawi](#). Scientific Reports 6: 36241.
 12. Trocaire. 2015. [Malawi Climate Change Case Study](#)
 13. UNDP. 2012. [Malawi Climate Change Profile](#).
 14. USAID. 2013. [Malawi Climate Change Vulnerability Assessment](#).
 15. USAID. 2015. [The Importance of Wild Fisheries for Local Food Security: Malawi](#).
 16. World Bank. 2016. [Climate Change Knowledge Portal-Malawi](#).
 17. World Bank and GFDRR. 2011. [Malawi Climate Risk and Adaptation Profile](#).
- Map Source: adapted from Peel, M.C. et al. 2007. [Updated world map of the Köppen-Geiger climate classification](#); data accessed from [SDAT](#).

SELECTED ONGOING EXPERIENCES

Selected Program	Amount	Donor	Year	Implementer
Building Climate Change Resilience in the Fisheries Sector in Malawi	\$5.4 million	GEF/ LDCF, FAO	2016– 2019	Department of Fisheries
Implementing Urgent Adaptation Priorities Through Strengthened Decentralized and National Development Plans	\$4.5 million	GEF, UNDP	2014– 2019	Ministry of Development Planning and Cooperation
Strengthening Climate Information and Early Warning Systems in Malawi to Support Climate Resilient Development and Adaptation to Climate Change	\$4 million	GEF, UNDP	2013– 2016	Department of Disaster Management Affairs, Office of the President and Cabinet
Climate Proofing Local Development Gains in Rural and Urban Areas of Machinga and Mangochi Districts	\$5.3 million	GEF, UNDP	2014– Ongoing	Ministries of Agriculture, Development Planning, and Public Works
Mainstreaming Climate-Smart Agriculture in Solar Irrigation Schemes for Sustainable Local Business Development in Malawi	€0.6 million	Nordic Development Fund	2013– 2015	Churches Action in Relief and Development, Christian Service Committee of the Churches in Malawi and Kusamala Institute of Agriculture & Ecology
Fisheries Integration of Society and Habitats Project (FISH)	\$15 million	USAID	2014– 2019	PACT, University of Rhode Island Coastal Resources Center
Protecting Ecosystems and Restoring Forests in Malawi (PERFORM)	\$15 million	USAID	2014– 2019	Tetra Tech ARD
Moving into the Future with the Youth	\$6 million	USAID	2016– 2020	GOAL
Africa Research in Sustainable Intensification for the Next Generation	\$2 million	USAID	2016– 2018	IITA
Feed the Future Malawi Agriculture Diversification Activity	\$48 million	USAID	2016– 2021	Palladium
Shire River Basin Management Program	\$136 million	World Bank	2012– 2018	Ministry of Water Development and Irrigation
Scaling up of Modernized Climate Information and Early Warning Systems in Malawi	\$16 million	Green Climate Fund	2016– 2022	Department of Disaster Management Authority