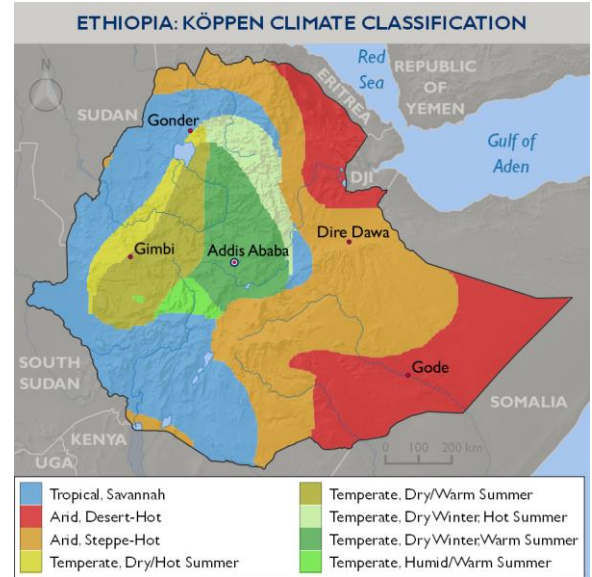


CLIMATE CHANGE RISK PROFILE

ETHIOPIA

COUNTRY OVERVIEW

Ethiopia, home to 90 million people, is one of the world's most drought-prone countries. The country faces numerous development challenges that exacerbate its vulnerability to climate change, including high levels of food insecurity and ongoing conflicts over natural resources. Chronic food insecurity affects 10 percent of the population, even in years with sufficient rains. Roughly two-thirds of the population earns less than \$2 per day and access to basic services is limited. Rainfed agriculture contributes nearly half of national GDP and is the mainstay of livelihoods for 85 percent of the population. These rural livelihood systems – crop cultivation, pastoralism and agro-pastoralism – are highly sensitive to climate. Food insecurity patterns are linked to seasonal rainfall patterns, with hunger trends declining significantly after the rainy seasons. Climate variability already negatively impacts livelihoods and this is likely to continue. Drought is the single most destructive climate-related natural hazard in Ethiopia. Estimates suggest climate change may reduce Ethiopia's GDP up to 10 percent by 2045, primarily through impacts on agricultural productivity. These changes also hamper economic activity and aggravate existing social and economic problems. (6, 8, 9, 11, 13)



CLIMATE PROJECTIONS



Projected increase in temperature of 1°C to 2°C by 2050



Erratic rainfall and increased unpredictability of seasonal rains



Increased incidence of drought and other extreme events

KEY CLIMATE IMPACTS

Agriculture



Reduced yields and/or crop failure
Reduced soil moisture availability; increased evapotranspiration and water stress

Livestock



Increased incidence of pests and diseases
Reduced feed and water sources
Increased livestock mortality

Water



Reduced water quality and quantity
Drying of wetlands and freshwater sources
Disruption of hydropower generation

Human Health



Changing ranges of vector-borne diseases
Increased risk from waterborne diseases

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CLIMATE SUMMARY

Ethiopia’s topography is characterized by large regional differences; it is considered an arid country, but precipitation trends exhibit high annual variability. Ethiopia has three rainy seasons: June–September (*kiremt*), October–January (*bega*), and February–May (*belg*). *Kiremt* rains account for 50–80 percent of the annual rainfall totals, and most severe droughts usually result from failure of the *kiremt*. The lowlands in the southeast and northeast are tropical, with average temperatures of 25°–30°C, while the central highlands are cooler, with average temperatures of 15°–20°C. Lowlands are vulnerable to rising temperatures and prolonged droughts, while highlands are prone to intense and irregular rainfall. (1, 7, 8, 14, 15)

HISTORICAL CLIMATE

Climate trends since 1960 include:

- Mean annual temperature has increased by 1°C, an average rate of 0.25°C per decade, most notably in July through September.
- The average number of "hot" nights (the hottest 10 percent of nights annually) increased by 37.5 percent between 1960 and 2003, while the average number of hot days per year increased by 20 percent.
- More intense precipitation during extreme weather events, although long-term rainfall trends are difficult to determine.
- The incidence of drought increased.
- *Belg* rains are increasingly unpredictable.

FUTURE CLIMATE

Future projections of temperature and rainfall patterns in Ethiopia exhibit a high degree of uncertainty, but most projections agree that:

- Mean annual temperature is projected to increase by between 1°–2°C by 2050.
- The frequency of hot days and nights will substantially increase. About 15–29 percent of days will be considered hot by 2060.
- It is uncertain whether rainfall will increase or decrease; projections range from -25 percent to +30 percent by the 2050s.
- Increases in the proportion of total rainfall that falls in “heavy” events with annual increases of up to 18 percent. (7, 11, 13, 14, 15)

SECTOR IMPACTS AND VULNERABILITIES

AGRICULTURE PRODUCTION

Crop agriculture is dominated by small-scale subsistence farmers who remain heavily dependent on rain (only 1 percent of cultivated land is irrigated), employ low-intensive technologies and lack access to services. This leaves the sector highly vulnerable to changing rainfall and other climate patterns. Limited water storage capacity further increases vulnerability to climate risks. Many farmers grow slow-maturing, high-yield “long cycle” crops that depend on two rainy seasons to reach harvest and are thus highly vulnerable to changes in seasonal rainfall. Most plots are less than 0.5 hectares and are insufficient to sustain household food security, much less generate adequate income, limiting household capacity to invest in improved farming practices that could increase climate resilience. Recurring drought and increasing desertification resulting from land use pressures have resulted in significant losses of arable land and rendered the country increasingly dependent on food aid. Crop productivity may increase in the short term due to warmer temperatures, but continued high

temperatures will result in heat stress and crop failure. By one estimate, Ethiopia will forgo more than 6 percent of each year’s agricultural output if the current decline in average annual rainfall levels continues in the medium term. (2, 7, 8, 14, 15)

Climate Risks and Potential Impacts AGRICULTURE PRODUCTION	
Climate Risk	Potential Impacts
Increased minimum and maximum temperatures	Increased heat stress, evapotranspiration and reduced soil moisture content, negatively impacting crop yields
	Loss of arable land due to shifting agro-ecological zones
Increased intensity of precipitation events	Increased incidence of floods and landslides, damaging crops and increasing soil erosion
	Altered growing cycles (delayed planting and early harvests)
Drought and erratic rainfall	Increased incidence of pests and diseases such as maize lethal necrosis, wheat rust and Faba bean leaf and stem gall

LIVESTOCK

Ethiopia's livestock sector, the largest in Africa, relies heavily on climate-sensitive resources. The customary rangeland management practiced by the country's 10–15 million pastoralists in over 60 percent of the country is dependent on limited water and forage availability that is increasingly affected by drought and degradation of land. Limited resources and higher temperatures directly impact livestock's health and productivity, and indirectly can magnify existing tensions over land and water. Loss of livelihoods and forced migration are also concerns, as crop and livestock mortality are expected to decrease incomes by 19–30 percent. (4, 5, 7, 8)

WATER RESOURCES

Ethiopia's abundant water resources include 12 river basins, but these are unevenly distributed. Projected increases in the frequency of droughts, increased evaporation and evapotranspiration and potential changes in rainfall patterns and runoff may further reduce availability in water-scarce regions. Rainfall and evaporation changes also translate to changes in surface water infiltration and recharge rates for groundwater. Low water storage capacity increases the country's dependence on unreliable rainfall patterns. Hydropower could increase energy access but is subject to the changing dynamics of rainfall, which can reduce river flow volume. Projections suggest a 30 percent decrease in flow volume on several Nile tributaries by 2050. (7, 12, 14)

HUMAN HEALTH

Ethiopia has a high incidence of climate-sensitive diseases. Roughly 70 percent of the population lives in malaria-endemic areas and outbreaks that occur every 5 to 8 years account for up to 20 percent of deaths for children under the age of 5. Increased temperatures will likely expand the range of malaria to highland areas and increased flooding will facilitate the spread of waterborne diseases like diarrhea. More than 70,000 deaths annually are tied to indoor and outdoor air pollutants, which a hotter, more drought-prone climate will aggravate. The link between drought and health is a major concern. Evidence suggests that children born during a drought are 36 percent more vulnerable to diseases and malnourishment. At present, one of the worst El Niño droughts in 50 years has left 10 million Ethiopians in need of emergency food aid and 5.8 million without access to water, sanitation and hygiene services. (1, 7, 9, 11, 14, 16, 17)

Climate Risks and Potential Impacts LIVESTOCK	
Climate Risk	Potential Impacts
Increased temperatures	Reduction of water and feed resources for livestock, leading to lower productivity and higher susceptibility to diseases
Increased unreliability of rains, especially the <i>belg</i>	Increased incidence of heat stress; higher mortality rates
	Increased conflicts over limited water and feed resources
Recurrent drought	Loss of grazing lands
	Loss of livestock-dependent livelihoods; forced migration

Climate Risks and Potential Impacts WATER RESOURCES	
Climate Risk	Potential Impacts
Increased temperatures	Reduced runoff and river flows, reducing water availability
	Drying of wetlands, impacting key bird species
Increased intensity of precipitation	Damage and/or destruction of supply and storage infrastructure
Increased unreliability of rains, especially the <i>belg</i>	Increased conflict over usage of scarce water resources in arid regions
	Increased pressure on groundwater supplies; decreased reliability of groundwater sources
Recurrent drought	Disruption of hydropower generation; increased energy costs

Climate Risks and Potential Impacts HUMAN HEALTH	
Climate Risk	Potential Impacts
Increased temperatures	Expansion of range of malaria to highland areas
Increased intensity of precipitation	Increased incidence of waterborne illnesses, such as diarrhea, cholera and dysentery
Increased variability of rains, especially the <i>belg</i>	Aggravation of respiratory diseases caused by allergens and air pollution
Recurrent drought	Increased malnutrition, exacerbating vulnerability to diseases

POLICY CONTEXT

Ethiopia prepared its Second National Communication to the U.N. Framework Convention on Climate Change in 2015 and a National Action Plan for Adaptation (NAPA) in 2007. The NAPA identified key climate impacts and described 11 priority projects needed to address these impacts. The 2010 Ethiopian Programme of Adaptation to Climate Change (EPACC) updated and built upon priority areas identified in the NAPA, while the National Adaptation Plan is currently being drafted to reflect recent learning and policy developments.

INSTITUTIONAL FRAMEWORK

Ethiopia's five-year economic growth plan, the Growth and Transformation Plan (GTP II) (2015–2020), mainstreams the country's Climate Resilient Green Economy (CRGE) strategy. The CRGE, which predates GTP II, provides a blueprint for achieving lower middle-income status by 2025 with no net increases in greenhouse gas emissions relative to 2010 levels.

The CRGE Secretariat, with both a technical and financial unit at the Ministry of Environment, Forest and Climate Change and the Ministry of Finance and Economic Cooperation (MoFEC), respectively, develops standardized guidance and provides ad-hoc, sector-specific support to seven CRGE line ministries that implement the strategy. Within MoFEC, the CRGE Facility manages climate finance flows from international and domestic public sources and channels funding to CRGE line ministries to implement the strategy. (CRGE line ministries include the Ministry of Agriculture and Natural Resources, Ministry of Industry, Ministry of Livestock and Fisheries, Ministry of Mines, Petroleum and Natural Gas,

Ministry of Transport, Ministry of Urban Development, Housing and Construction, and Ministry of Water, Irrigation and Electricity.)

In 2011, Ethiopia entered a strategic partnership with Norway and the UK to promote collaboration on climate change policy, focusing on preventing deforestation, strengthening adaptation capacity in agricultural and pastoral communities and supporting disaster risk management. This partnership, reaffirmed in the Lima Declaration, now includes Denmark, the EU, France, Germany, Sweden and the US. (6, 8)

NATIONAL STRATEGIES AND PLANS

- [Second National Communications](#) (2015)
- [Climate Resilient Green Economy Strategy](#) (2011)
- Ethiopian Program of Adaptation to Climate Change (2010)
- Growth and Transformation Plan II (2015)
- [Intended Nationally Determined Contribution](#) (2015)

KEY RESOURCES

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- 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
Climate Services for Resilient Development [Ethiopia pilot]	\$34 million (financial and in-kind)	Public-private partnership	2015–2016	USAID, UK government, others
Promoting Autonomous Adaptation at the Community Level in Ethiopia	\$30.13 million	GEF, UNDP	2011–2016	Federal Environment Protection Agency
Strengthening Climate Information Systems and Early Warning Systems to Support Climate Resilient Development and Adaptation to Climate Change	\$38.34 million	GEF, UNDP	2013–2017	National Meteorological Agency
Implementing Climate Resilient and Green Climate Plans in Highland Areas in Ethiopia	\$16.83 million	GEF, UNDP	2015–2010	Not listed
Rural Resilience Enhancement Project	Not listed	Japanese International Cooperation Agency	2012–2015	Ministry of Agriculture, Natural Resource Management Directorate
Resilience through Enhanced Adaptation, Action Learning and Partnerships	~\$5.5 million	USAID/OFDA/ Feed the Future	2014–2017	Catholic Relief Services, others
Restoring Vibrant Villages and Environments	~\$5.5 million	USAID/OFDA/ Feed the Future	2014–2016	Project Concern International, others
Adaptation and Disaster Risk Reduction in Africa	56.8 million NOK	Norwegian Agency for Development Cooperation	2011–2016	World Meteorological Organization
Agricultural Climate Resilience Enhancement Initiative (ACREI)	\$5 million	Adaptation Fund, FAO, IGAD	Planned	World Meteorological Organization