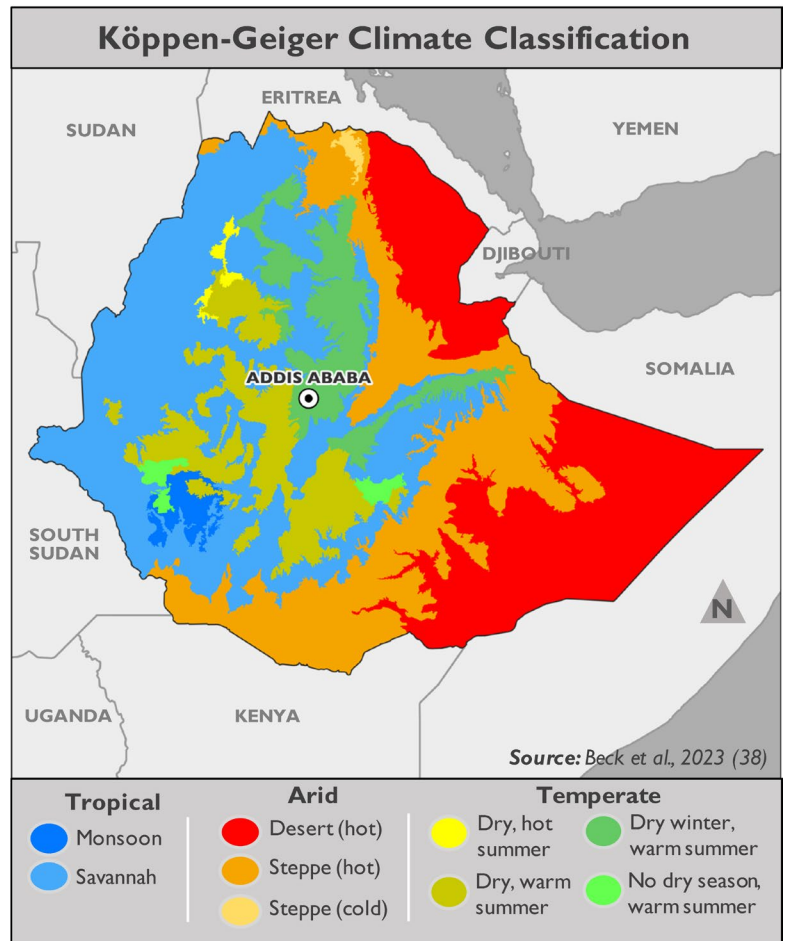





COUNTRY OVERVIEW

Ethiopia is the second most populous country in Africa, with approximately 123 million residents in 2022. The country is already experiencing a variety of climate stressors, including drought, temperature increases, flooding, and landslides. Though it is one of the fastest-growing economies in sub-Saharan Africa as of 2022 with estimated 6.4 percent gross domestic product (GDP) growth, Ethiopia faces numerous development and humanitarian challenges that exacerbate its vulnerability to climate change—including high levels of poverty, food insecurity, and ongoing conflicts. Climate projections indicate that Ethiopia will likely experience further warming and shifts in rainfall patterns. This is likely to lead to more frequent and severe droughts, erratic precipitation patterns, and flooding events. These changes pose challenges for food and water security, particularly given the country's reliance on rain-fed agriculture.





Ethiopia exhibits a range of climate conditions from the tropical savannah of the west to the desert and semi-arid north and east. There are various warm, temperate, and humid climates driven by the diverse topography and elevation profiles of the highlands. Development patterns are shifting, but agriculture remains the largest sector, employing 70 percent of Ethiopians—most of whom are smallholder farmers.



CLIMATE PROJECTIONS

-  Projected increase in temperature of 1.8°C by 2050
-  Erratic rainfall, increased unpredictability of seasonal rains, more frequent heavy precipitation events
-  More frequent and severe dry spells and drought events

KEY CLIMATE IMPACTS

-  **Water Resources**
 - Reduced water supply
 - Reduced drinking water quality
 - Reduced hydropower production
-  **Livestock**
 - Reduced water, fodder, and pasture availability
 - Reduced animal productivity
 - Increased livestock disease
-  **Crop Production**
 - Reduced yields of rainfed crops
 - Shifting of arable land, growing seasons
 - Increased risk of pests and disease
-  **Human Health**
 - Expanded range of malaria to highlands
 - Increases in waterborne diseases
 - Increased food insecurity

These rural livelihood systems—including crop cultivation, pastoralism, and agro-pastoralism—are highly sensitive to climate variability and change. Climate change stressors, including flooding and water scarcity, also threaten Ethiopia’s rapidly urbanizing areas, which already face increasing pressure on existing infrastructure, services, and scarce land and natural resources.

In 2022, a combination of conflicts and consecutive droughts in the south and northeast led to a significant rise in food insecurity and humanitarian needs. With an expected rise in the severity and frequency of droughts and floods, water and land conflicts may increase as pastoralists and farmers compete for waning resources. Additionally, these multifaceted climate stressors and shocks exacerbate human rights challenges and struggles around land rights, freedom of expression, and the rights of women, groups with disabilities, and ethnic minorities in the country. (1, 2, 3, 4, 5, 6)

CLIMATE SUMMARY¹

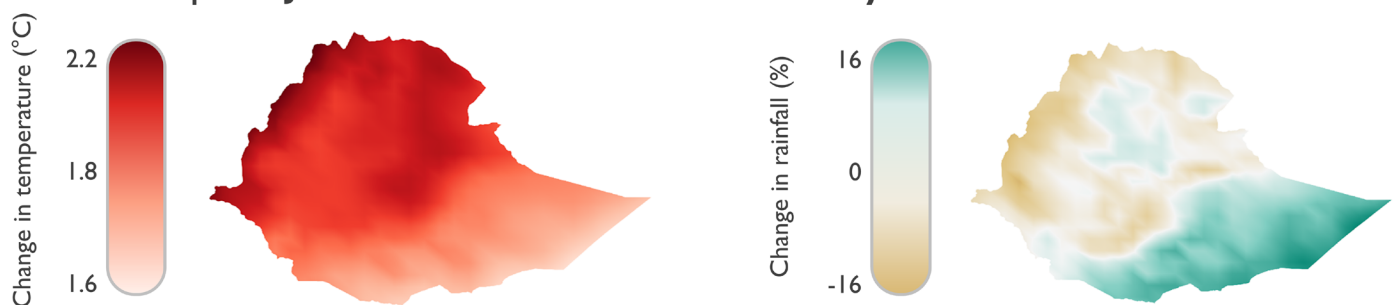
Ethiopia’s diverse topography and geography means that the climate—and impacts of climate stressors—vary greatly across the country. Precipitation and water availability strongly depend upon elevation. Precipitation can range from 1900 mm per year in highland areas to around 100 mm per year in lowland areas.

Ethiopia experiences three main seasons. The primary rainy season, Kiremt, occurs between June and September and accounts for 50-80 percent of annual rainfall. Central and northern regions experience a second wet season from February to May called Belg, with significantly less, sporadic rainfall. The Belg season is crucial for "short cycle" crops, including barley and wheat, while also preparing the soil for the main rainy season, while Kiremt rains are more consistent and heavier compared to the Belg rains and are crucial for the cultivation of staple crops like teff, maize, sorghum, and millet. The country is generally dry from October to January during the third season, called Bega.

Drought has been and continues to be the most damaging climate stressor in the country. Incidents of drought in modern times are often linked closely with El Niño events including in 2002-2003, 2010-2012, 2015-2016, and 2023 onward. Beyond El Niño years, repeated droughts from 2020-2023 left nearly 11 million severely food-insecure people across the country and caused considerable migration and displacement of populations across the whole Horn of Africa. In contrast, La Niña events typically bring increased rainfall to Ethiopia, elevating the potential for flooding. In 2020, floods affected an estimated 1 million Ethiopians. Increased rainfall may also contribute to greater risk of vector-borne diseases like malaria. In urban areas, poor drainage systems and inadequate planning can exacerbate the impacts of heavy rainfall, leading to flooding. Landslides, often linked to heavy rainfall, can pose serious threats to communities residing in hilly and mountainous regions. (6, 7, 8, 9, 10, 35)

Climate models have varying degrees of uncertainty, but most agree that under a medium/high emissions scenario projected changes in climate in Ethiopia include increased average temperatures, increased frequency of hot days and nights, increased precipitation variability, and an increase in heavy rainfall events, with significant impacts felt by the 2030s.² The maps, table and sections below include further details on associated observed and potential impacts. (6)

ETHIOPIA | PROJECTED CHANGES IN CLIMATE by 2041-2060*



*Scenario (SSP 5 – 8.5) assumes that global greenhouse gas emissions continue unabated (i.e., emissions triple by 2075 and an estimated average increase in global temperature of 2.4°C occurs by 2060). Maps denote change compared to the 1980-2014 baseline. Source: IPCC AR6 (2021)

¹ All projections include a certain amount of uncertainty. Uncertainty, though, is common. For example, humans plan for the future knowing things will change, and many public policy and other decisions are made on sources of information (e.g. economic models) with even greater levels of uncertainty. To ensure successful activity outcomes and development impact, planning under uncertainty should 1) consider the range of projected outcomes, 2) provide flexibility so that plans can be adjusted to manage risks and capitalize on emerging opportunities, and 3) consider and plan for the most disruptive impacts.

² The Ethiopia Climate Risk Profile uses the The Intergovernmental Panel On Climate Change Sixth Assessment Report’s high-end Shared Socioeconomic Pathway (SSP) emissions scenario (SSP5-8.5). Most other climate risk profiles in the 2024 update series use the moderate (SSP2-4.5) emissions scenario.

HISTORICAL CLIMATE

Climate trends since 1960 include:

- Annual average temperature increased by 1.7°C (1960-2020), a 0.28°C average increase per decade, with most noticeable increases in the months of July through September. (39)
- 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 very hot days with temperatures over 35°C per year increased by 20 percent. (2)
- The incidence and length of droughts has increased, especially in lowland areas. (10)
- Belg (Feb-May) rains are increasingly unpredictable. (11)
- There is an overall decline in precipitation levels in the last three to four decades, with regional variability and significant year-to-year volatility. (12)
- Southern and western Ethiopia experienced the most significant precipitation decline. The Gambela Region saw an average annual precipitation decrease of over 130mm/decade (approx. 10 percent) from 1971-2020. (39)
- Rising sea surface temperatures in the Indian Ocean have increased variability in the timing and duration of rainy seasons, altering traditional rainfall patterns and causing more frequent drought events. (13)

FUTURE CLIMATE

Climate projections for Ethiopia have varying degrees of uncertainty, but most agree that:

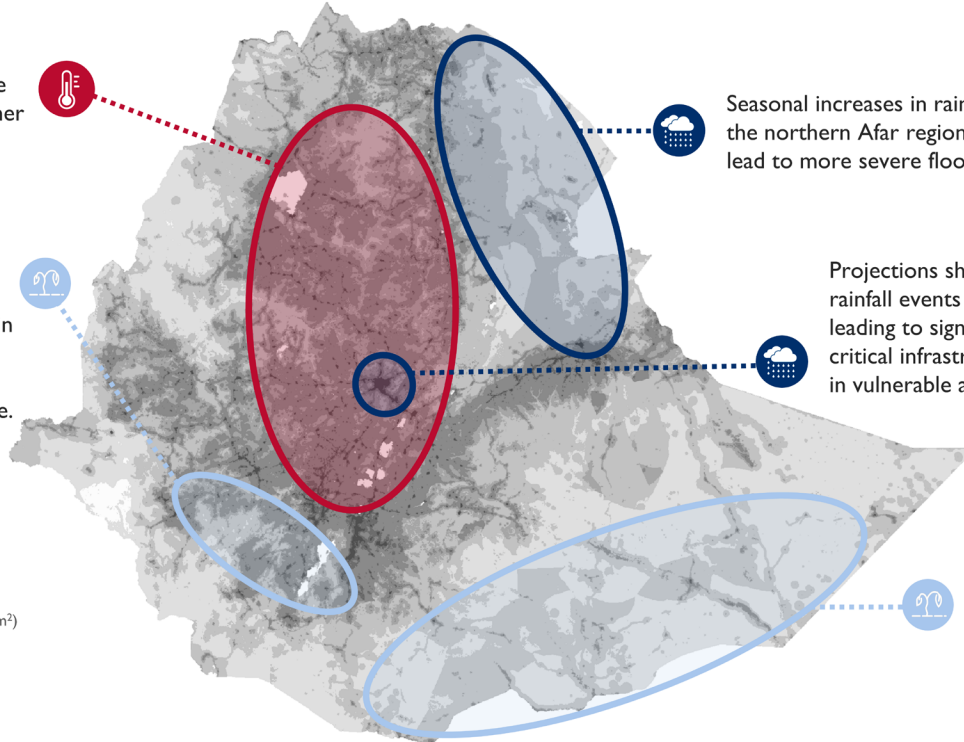
- Under a medium/high emissions scenario, projected mean temperature changes will rise by 1.5°C by 2030, 1.8°C by the 2050s, and up to 3.7°C by the 2080s, with higher temperature increases concentrated in eastern Ethiopia. (6)
- The frequency of hot days and nights will increase. Ethiopia may experience an additional 18 hot days per year by 2030 compared to 2000. (6) About 70-145 days per year will be considered hot by the 2060s, increasing to 95-250 days per year by the 2090s. (2)
- Rainfall projections across Ethiopia vary significantly with climate models having high levels of uncertainty. Some scenarios show an overall decline in precipitation and others suggest a minor increase by 2080. (6, 2) However, with increased heat, evapotranspiration would likely claim any minimal gains in precipitation. (2)
- Projections show heavy rainfall events are likely to increase by 20 percent by the end of the century and may account for a greater proportion of total precipitation. (2)

ETHIOPIA

ILLUSTRATIVE CLIMATE IMPACTS DUE TO CHANGING CLIMATE CONDITIONS

In the highlands, rising temperatures could increase the range of malaria and other vector-borne diseases.

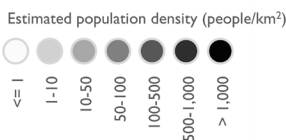
Climate models indicate a northwestward shift of the belg rains, which are critical for crop production. Areas in southern Ethiopia may no longer receive sufficient rainfall for rainfed agriculture.



Seasonal increases in rainfall in the northern Afar region could lead to more severe floods.

Projections show more extreme rainfall events near Addis Ababa, leading to significant damage to critical infrastructure and housing in vulnerable areas.

Projections indicate a reduction in rainfall in the southern regions of Ethiopia, which could lead to more frequent droughts and threaten livestock rearing.

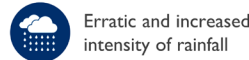


Sources:
Population density basemap from WorldPop (2020)
Climate projections from IPCC AR6 (2021)

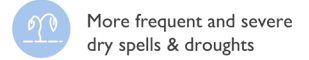
Key shifts in climate conditions by 2041-2060



Temperature increases



Erratic and increased intensity of rainfall



More frequent and severe dry spells & droughts

POLICY, GOVERNANCE & FINANCE CONTEXT

NATIONAL CLIMATE STRATEGIES AND PLANS

Ethiopia has Africa's sixth-largest economy. The Climate-Resilient Green Economy (CRGE) Strategy outlines Ethiopia's steps towards achieving middle-income status. The Strategy establishes a policy landscape that integrates economic development with climate action. Ethiopia ratified the Paris Agreement in March 2017 and underpinned commitments toward implementing the CRGE in the country's National Adaptation Plan (NAP) from 2019 and Nationally Determined Contribution (NDC) from 2021. Both documents reiterate the need to invest in climate adaptation solutions across sectors including agriculture, forestry, health, transport, energy, industry, water security and urban settlements.

Legal frameworks and documents guiding climate action in Ethiopia include:

- [Third National Communication to the UNFCCC \(2023\)](#)
- [Nationally Determined Contribution \(2021\)](#)
- [Ethiopia's National Adaptation Plan \(2019\)](#)
- [Ten Years Development Perspective Plan \(2021-2030\)](#)
- [Ethiopia's Climate-Resilient Green Economy Strategy \(2011-2025\)](#)

A Facility comprising a technical unit managed by the Environment, Forest, and Climate Change Division under the Environmental Protection Authority implements the CRGE strategy in Ethiopia, along with a financial arm managed by the Ministry of Finance and Economic Development. This CRGE Facility plays a crucial role in channeling climate financing and providing sector-specific support to government ministries. The CRGE strategy aligns with the Ten-Years Development Perspective Plan (2020-2030), which emphasizes climate-resilient growth and addresses key issues like land degradation, pollution reduction, increased productivity, greenhouse gas emissions reduction, forest protection, renewable energy production, and upgrading of technology. (34)

CLIMATE FINANCE OVERVIEW

Between 2019 and 2020 Ethiopia attracted investments of around USD 1.7 billion per year toward climate action (compared to around USD 5.3 billion received in 2020 for overall development assistance). This amount represents 7 percent of international climate finance needs outlined in their NDC (USD 25.3 billion per year). While climate finance for mitigation is more prevalent globally, Ethiopia tends to receive more climate finance for adaptation (56 percent) than mitigation (38 percent). The majority of adaptation finance supports the agriculture and water sectors, while health, transport, and forestry notably receive less funding (see summary in figure below).

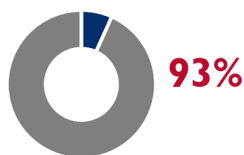
The climate finance landscape in Ethiopia primarily consists of international public finance, which accounts for 92 percent of climate-related funds. Multilateral funds such as the Green Climate Fund (GCF) contributed 46 percent of climate finance, while bilateral assistance accounts for 33 percent. Bilateral funds are primarily from the United Kingdom, United States, Germany, France, and Japan. The agriculture, forestry, and other land uses (AFOLU) sector receives the majority of funding (29 percent), followed by the water sector (16 percent). Notable projects include GCF-funded projects to enhance drought risk management with early warning systems and community-based interventions. USAID is investing in strengthening weather forecasting, enhancing soil and water conservation, and in early warning/early detection systems for malaria outbreaks informed by climate data. (14)

Ethiopia identified
USD 25.3 billion

in climate adaptation and mitigation finance needs (annual) (based on 2021 NDC commitments)

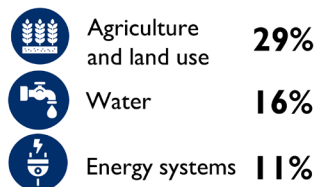
Source: CPI (2020)

Climate finance gaps



Over 93% of Ethiopia's identified climate finance needs are unmet

Top sectors receiving climate funds



90%

Over 90% of Ethiopia's climate finance comes from international public finance

SECTOR IMPACTS AND VULNERABILITIES

Ethiopia's people and economy are highly vulnerable to ongoing and future changes in climate. Limited rainfall and rising temperatures already affect multiple sectors: the country is seeing reduced crop production in extreme drought years, livestock losses, water scarcity, and recurring food insecurity leading to poor nutrition outcomes. While urbanization and off-farm activities are rising, extreme weather and a changing climate still impact most livelihoods heavily. The impacts of climate change threaten to compound the effects of Ethiopia's already severely degraded ecosystems, agricultural and pastoral lands, and poorly utilized water resources that have exacerbated poverty, food insecurity, and loss of biodiversity while aggravating conflict.

The Government's Productive Safety Net Program (PSNP) is a multi-billion-dollar food security, public works, and social safety net program that supports millions in need across Ethiopia. The PSNP provides a safety net for households that are chronically food insecure and poor, while also leveraging risk financing mechanisms to scale up assistance to additional households during acute crises. However, with a growing population, ongoing conflict, and increasing environmental pressure due to land degradation, desertification, extreme temperatures, water scarcity, and increasing floods, pressure on the system may increase.

Compounding climate impacts also threaten Ethiopia's ability to respond to crises as well as the ability of people to access government services. Floods, landslides, and temperature extremes threaten destruction of infrastructure like bridges and roads that can lead to reduced mobility, access to markets, and access to basic services like security, justice, and economic or humanitarian assistance—especially in remote areas. (5)

CRITICAL POPULATIONS

In Ethiopia, the people experiencing the highest degree of vulnerability include women, youth, and ethnic minorities. These populations also bring unique perspectives and innovative solutions to manage climate risks.

Erratic rainfall patterns, droughts, and reduced agricultural productivity place additional burdens on women and girls, exacerbating their already challenging daily responsibilities. Women and girls often bear the brunt of climate-related impacts, as they are responsible for household food security and water collection, a scarce resource in Ethiopia. Collecting water is time intensive, so it can interfere with girls' school attendance. However, women and girls bring knowledge of water resources and the social structure around them, so they should be involved in efforts to identify climate risk management and adaptation solutions in the water sector. (36)

Climate impacts such as those detailed below can also disrupt traditional livelihoods, leading to increased unemployment and economic uncertainty for youth, but also opportunities for new leadership and entrepreneurship. In addition, ongoing conflict and humanitarian crises displace or affect millions in Ethiopia, and disproportionately affect children. Minority populations, who often reside in environmentally fragile regions of Ethiopia, are vulnerable to invasion and forced resettlement, land degradation, deforestation, and loss of biodiversity, but also have local ecological knowledge to build community resilience and adaptation. Minority ethnic populations in Ethiopia often rely on pastoralism in remote, arid regions particularly vulnerable to drought, some of which have been experiencing protracted conflict. Furthermore, Ethiopia does not have national legislation protecting land rights. As a result, land grabbing can occur and climate impacts can be a driver of conflict over resources. (15, 16)

CROP PRODUCTION

Agriculture is a cornerstone of Ethiopia's economy and livelihoods and is highly vulnerable to climate variability and change. Irrigation feeds only 1 percent of cultivated land and 95 percent of the nation's agricultural production depends on smallholder farmers, who are less likely to have the coping capacity to manage climate variability and change, including extreme weather events. Ethiopia's high dependency on rain-fed agriculture and natural resources, and relatively low adaptive capacity to deal with these expected changes, could lead to significant climate impacts to agriculture. Women make up more than 40 percent of the agricultural labor force and head approximately 25 percent of all farming households in the country, so these impacts will affect them particularly. (37)

Ethiopia already experiences high temperature extremes. Projected future changes in climate pose significant additional challenges to the agriculture sector. Rising temperatures could lead to reduced crop yields, affecting staple crops such as

teff, maize, and barley. Shifts in rainfall patterns could disrupt traditional timing of crop cycles and impact crop yields. Changes in rainfall patterns and higher temperatures could also shorten the growing season, preventing maximum utility of shrinking arable lands. Meanwhile, with a projected increase in heavy rainfall events, the sector will also see an increased risk associated with flooding. Depending on the timing of floods, this could lead to damaged crops or even lost harvests. However, with adaptation practices in place, flood waters could provide an opportunity for new cultivation areas. Additionally, projected increase in frequency and intensity of droughts could not only impact general food availability directly, but also the livelihoods of farmers, reducing their already limited income, and disrupting agricultural supply and value chains.

Climate conditions, including instances of heavy rainfall in arid or desert regions, influence desert locust outbreaks. In 2020, Ethiopia faced one of the worst desert locust infestations in decades, leading to significant agricultural damage and posing threats to food security. In 2023, there were reports of smaller locust swarms, particularly in Afar and Tigray. The conditions that can exacerbate locust swarms could worsen under future climate change, leading to more frequent and severe locust outbreaks and reduced agricultural productivity.

In response to these challenges, the Government of Ethiopia is implementing various strategies, including improved water management, drought-resistant crop varieties, and famine early warning systems. Enhancing the resilience of smallholder farmers, building adaptive capacity, and providing local authorities with resources to strengthen early warning systems information are strategies that can help safeguard the critically important agriculture sector against the impacts of climate change and strengthen food security, in addition to creating additional non-farm income opportunities. (17, 18, 19, 20, 21)

LIVESTOCK

Ethiopia has the largest number of livestock in Africa with more than 70 million cattle, 43 million sheep, 53 million goats, 11 million donkeys, and 8 million camels. More than half of the country (54 percent) is engaged in some form of livestock production, and the sector contributes nearly 20 percent of national GDP. Mixed crop-livestock production systems dominate the landscape, with crops providing the primary source of income and a small number of animals owned per household reared as a safety net. However, in the arid and semi-arid areas of northern, eastern, and southern Ethiopia, nomadic pastoralism is the dominant livelihood.

Several factors constrain livestock production in Ethiopia: limited pasture and feed, recurrent drought, and limited access to veterinary services. Extreme heat and repeated droughts in the arid and semi-arid regions put pastoralist livelihoods at risk. Drought conditions lead to reduced pasture availability, water scarcity, and livestock diseases, affecting animal health and productivity. Extreme heat leads to reductions in milk production, and cattle are at high risk of mortality from heat exposure. Future projections of increased temperature and potentially reduced

Climate Stressors and Risks	
CROP PRODUCTION	
Climate Stressors	Risks
Increased temperatures	<ul style="list-style-type: none"> Increased heat stress, evapotranspiration, and reduced soil moisture content can impact crop yields negatively, which may lead to potential indirect effects on health and nutrition (see Health section below)
Increased intensity of precipitation	<ul style="list-style-type: none"> Potential loss or shifting of arable land Increased incidence of floods and landslides, damaging crops and increasing soil erosion
Increased unreliability of rains, especially the belg	<ul style="list-style-type: none"> Changes to traditional rainfall patterns and growing seasons, threatening crop viability and yield Increased risk of pests and crop diseases driven by patterns of increased drought and heavy precipitation events

Climate Stressors and Risks	
LIVESTOCK	
Climate Stressors	Risks
Increased temperatures	<ul style="list-style-type: none"> Reduced water, fodder, and pasture availability Reduced animal productivity and heat stress leading to morbidity and mortality of livestock
More frequent and intense drought	<ul style="list-style-type: none"> Increased spread of livestock disease Increased conflict over limited water resources in arid regions, with potential increases in humanitarian needs Accelerated desertification

precipitation in some regions could lead to further desertification, limiting pasture areas and triggering conflict among pastoralists and between farmers and herders. This decrease in pasture area will heavily affect the livelihoods of pastoralist communities that depend on communal land, as they do not have secure land rights.

Livelihood adaptation investments have been a focus in Ethiopia for many years. This includes encouraging sustainable grazing practices, promoting drought-resistant livestock breeds, and integrating climate information into decision-making. However, with limited alternative income sources, pastoralists who face livestock losses are at times forced to rely on external assistance, highlighting the need for adaptation and livelihood support. (22, 23, 24, 25)

WATER RESOURCES

Ethiopia’s abundant water resources include 12 river basins that are unevenly distributed. Regions in western Ethiopia generally have more access to freshwater, while areas in Afar and southern Ethiopia have less. Projected temperature increases and rainfall variability threaten these freshwater resources.

Most projections suggest that, despite more rain expected in areas that feed into the Nile Basin, more frequent and severe dry spells could worsen water scarcity. As of 2022, Afar and southern Ethiopia experienced three consecutive failed rainy seasons, resulting in severe drought conditions and resulting food insecurity, lack of clean water, and malnutrition for millions. With changes in the climate, the number of people facing water scarcity in Ethiopia is projected to increase by up to 35 percent by 2040. 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, which harms rural communities whose livelihoods depend on regular and reliable rainfall patterns. Of special concern is the potential for water scarcity to increase burdens on women, who traditionally hold the responsibility for collecting water in Ethiopia’s rural areas. Water scarcity also affects hydropower potential in Ethiopia, as river flow volume is subject to impacts from changing rainfall patterns and increasing temperatures. (26, 27, 28, 29)

HUMAN HEALTH

Despite major investments both from international development agencies and national government funds, poor sanitation infrastructure and insufficient access to clean water overwhelms

Climate Stressors and Risks	
WATER RESOURCES	
Climate Stressors	Risks
Increased temperatures	<ul style="list-style-type: none"> Reduced runoff and river flows, reducing water availability. This may lead to indirect effects on cropping and livelihood patterns (see Agriculture section above)
Increased intensity of precipitation	<ul style="list-style-type: none"> Drying of wetlands, impacting key bird species Damage and/or destruction of supply and storage infrastructure
Increased unreliability of rains, especially the belg	<ul style="list-style-type: none"> Increased conflict over usage of scarce water resources in arid regions Reduced availability of water can lead to unsafe drinking water conditions, and indirectly exacerbate health conditions (see Health section)
Recurrent drought	<ul style="list-style-type: none"> Increased pressure on groundwater supplies; decreased reliability of groundwater sources Disruption of hydropower generation; increased energy costs

Climate Stressors and Risks	
HUMAN HEALTH	
Climate Stressors	Risks
Increased temperatures	<ul style="list-style-type: none"> Expansion of vector-borne diseases, especially in highland areas
Increased intensity of precipitation	<ul style="list-style-type: none"> Increased incidence of heat stress and strokes Increased incidence of waterborne diseases including cholera and diarrhea
Increased unreliability of rains, especially the belg	<ul style="list-style-type: none"> Increased mortality from drowning near rivers during flood events Increased conflict over usage of scarce water resources in arid regions
Recurrent drought	<ul style="list-style-type: none"> Reduced availability of food, leading to malnutrition and heightened vulnerability to diseases and/or displacement and conflict over access to and control of scarce resources

Ethiopia's health sector. These conditions exacerbate the vulnerability of communities to climate-sensitive diseases, which are common throughout the country. Approximately 69 percent of the population lives in malaria-endemic areas. In 2022, there were reports of 1.6 million cases of malaria and 180 deaths. Pregnant women, children under the age of 5, and migrant workers are at higher risk of infection. Increased temperatures will expand the range of malaria to highland areas, which have been historically free of malaria risk. In addition, increased flooding will facilitate the spread of waterborne diseases like cholera. More than 70,000 deaths annually are tied to household (indoor) and ambient (outdoor) air pollution, which a hotter, more drought-prone climate will exacerbate. Three consecutive years of drought between 2020 and 2023 pushed 11.8 million Ethiopians into severe food insecurity, requiring emergency food assistance to avoid severe malnutrition and concomitant health impacts. As of 2023, estimates of acute malnutrition rates—or wasting—are at a high rate of 11 percent, demonstrating the continued vulnerability of Ethiopia's most vulnerable people to malnutrition. (30, 31, 32, 33)

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