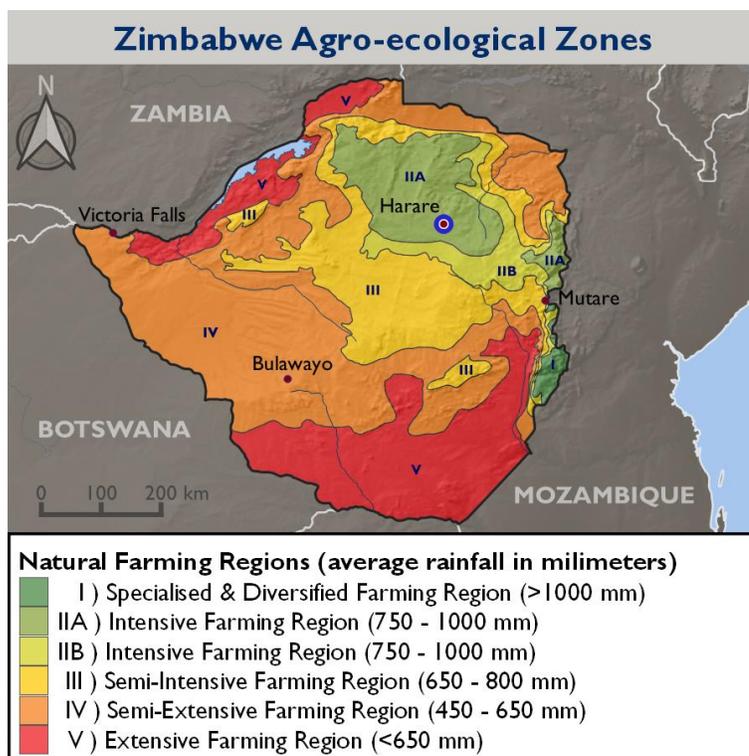




# CLIMATE RISK PROFILE ZIMBABWE

## COUNTRY OVERVIEW

Zimbabwe, a landlocked sub-Saharan African country, faces risks from years of political and economic instability and rapid population growth. These risks may be exacerbated by an increasingly variable and changing climate, which is already disrupting livelihoods, contributing to high poverty rates (63 percent), and adversely impacting food security, health, water security, and freshwater ecosystems. Agriculture, largely rainfed and therefore highly sensitive to rainfall variability, is the backbone of Zimbabwe's economy, contributing approximately 10 percent of annual gross domestic product (GDP) between 2012 and 2016. Nearly 80 percent of the country's 16.1 million people, the majority of whom (70 percent) live in rural areas, depend on agriculture for their livelihood. Zimbabwe's climate is projected to become more erratic, with some projections suggesting that widespread crop failure will occur every three out of five years. Droughts are also projected to increase in frequency and severity, causing food and nutrition insecurity among rural populations to persist or worsen. Continued population growth will likely exacerbate competition for and degradation of the natural resource base, contribute to an increase in greenhouse gas emissions, intensify land use change (and deforestation), and increase vulnerability to climate-related hazards. The increasingly erratic nature and unreliability of the rainy season and the resultant reduction in water availability, coupled with more severe and prolonged extreme weather events (e.g., droughts, floods, cyclones), also threaten water resources, human health, and Zimbabwe's forests/ecosystems, which provide food, income, fuel, and other environmental services to vulnerable populations. (8, 40, 44, 15)



## CLIMATE PROJECTIONS



1.2–2.2°C increase in temperature by 2050s



Increased rainfall variability



Increased frequency of floods and storms



21% increase in drought by 2050s

## KEY CLIMATE IMPACTS

### Agriculture



Crop loss/failure  
Shifting in planting/harvest seasons  
Increased presence of pests/diseases

### Livestock



Reduced feed and limited water sources,  
Increased physiological stress,  
Increased presence of diseases

### Human Health



Increased heat stress  
Increased hunger and malnutrition  
Increased vector- and waterborne illnesses

### Water Resources



Reduced water availability/quality  
Reduced hydropower potential

### Forestry



Soil erosion/degradation  
Deforestation  
Increased presence of pests/diseases

## December 2019

This document was prepared under the 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

Zimbabwe has a variety of climate zones that align with the country's varied topography. The landscape is dominated by a high central plateau (called the "highveld") and a high elevation watershed that sits between 1,200 to 1,600 m above sea level and is characterized by a subtropical climate. The hot, dry Kariba Valley, the Eastern Highlands and the Inyanga and Udizi mountain ranges line the country's eastern boundary. The lowlands (called the "lowveld") include major low-lying valleys of the Zambezi (northern region) and Limpopo (southern region) rivers and are characterized by a tropical climate. The remainder of the country is classified as semiarid. Two seasons are recognized: a rainy season with high temperatures (averaging approximately 21°C to 25°C from October to March) and a dry season with lower temperatures (averaging approximately 15°C to 21°C from June to August). Zimbabwe's relatively high elevation has a moderating effect on temperatures throughout the year; average temperatures range from 10°C in the highveld to over 40°C in the southeastern and northeastern lowveld areas. Mean annual precipitation has historically shown substantial variability both from year to year and geographically, ranging from 300 mm in the southern lowveld to over 1,000 mm in the Eastern Highlands. Rainfall seasonality is heavily influenced by the Inter-Tropical Convergence Zone (ITCZ). (2, 4, 25, 40, 15)

### HISTORICAL CLIMATE

Key climate observations since 1901 include (47, 40, 38, 25, 6, 22, 1):

- Increased temperature of 0.9°C between 1901 and 2012, with most warming occurring after 1980 (0.3–0.5°C)
- Increase in number of hot days and fewer cold days since 1950; daily minimum and maximum temperatures increased between 2.6°C and 2.0°C, respectively
- Decline in rainfall of 5 percent since 1915 and increased temporal and spatial variation of mean annual rainfall, particularly during the rainy season
- Increased frequency and length of dry spells during the rainy season
- Although drought is part of the natural cycle, in the past decade drought has increased in severity
- Between 1955 and 2003, no significant trends in number of heavy precipitation days

### FUTURE CLIMATE

Projected changes include (47, 40, 16, 25):

- Increase in temperature of 1.2–2.2°C between 2040 and 2059
- Increase in days with maximum temperatures >35°C by 39 days between 2040 and 2059
- More variable precipitation, with some models projecting an increase in the long term, and others projecting a decrease
- Increased rainfall in the north and east; reduced rainfall in the south and west
- Dry spells lasting 13 days longer than the average current duration between 2040 and 2059
- 21 percent increased incidence of severe drought between 2040 and 2059

## SECTOR IMPACTS AND VULNERABILITIES

### AGRICULTURE

Recurrent droughts, erratic rainfall, and extreme weather events (including cyclones and localized heavy seasonal rainfall and subsequent flooding) render Zimbabwe's agriculture sector highly vulnerable to climate variability and change due to its high reliance (80 percent) on rainfed crops (e.g., maize, millet, sorghum, wheat). The sector underpins the country's economy, food security, and poverty reduction efforts; it is the main livelihood for 90 percent of rural households and employs nearly 70 percent of the total population. Most crop production is subsistence-oriented and done by small-scale farmers, many of whom lack access to

irrigation or other inputs. Maize, which dominates the national diet, is cultivated on one-half of Zimbabwe’s agricultural land and accounts for 80–90 percent of domestic staple crop production. However, maize is particularly vulnerable to rising temperatures and lack of precipitation; temperatures over 35°C result in lower yields. Since 1993, maize production has seen a strong negative trend that has increased food insecurity nationwide: decreased production has been linked to droughts and prolonged dry spells (e.g., 2001/02, 2004/05, 2006/07, 2011/12, 2012/13, 2015/16, and 2018/19), as well as land tenure changes. During the 2015–2016 season, for example, below-average rainfall and an El Niño event-related drought,

Climate Stressors and Climate Risks AGRICULTURE	
Stressors	Risks
Rising temperatures	Reduced soil moisture and increased erosion
Increased variability of rainfall	Decreased yield of rainfed crops and crop failure; increased food shortages, leading to increase in prices and imports
Longer and more intense dry spells	
Increased frequency of droughts	Increased incidence of pests (e.g., locusts, fall armyworm)
Increased intensity of extreme weather events	Waterlogging/crop damage due to flooding

reduced total production by 35–50 percent below the five-year average (2010–2015). Between 1991 and 2016, Zimbabwe experienced six moderate-to-severe droughts, of which four were linked to El Niño events. Alternative crops to maize, such as sorghum and millet, are more resilient to higher temperatures and droughts due to their shorter growing periods and moisture requirements, but are still at risk from declining soil fertility, increasing rainfall variability, and prolonged dry spells. Irrigated and dryland agriculture will also face reduced yields due to declines in flow rates from water courses (e.g., streams, rivers) because of higher temperatures and increased evaporation, jeopardizing food security. Changing weather patterns could also create conditions more conducive to the spread of pests (e.g., fall armyworm), posing threats specifically to maize and sorghum. (9, 26, 25, 40, 41, 43, 44, 46, 36, 34)

## LIVESTOCK

Extreme heat, heavy rainfall events (both seasonal and cyclone-induced), recurrent droughts, and flooding are the most significant stressors facing Zimbabwe’s livestock sector, which is dominated by cattle, sheep, goats, and pigs. While typically more resilient to climate variability and change than crops, livestock are susceptible to heat stress, and their viability is affected by the productivity and availability of pasture, feed production, water availability, and pest and disease dynamics. In Zimbabwe, livestock are a key source of food, income, capital, and draught animal power; ownership is important for the resilience of smallholder farmers in rural, semiarid regions. Cattle are the most abundant livestock animal in Zimbabwe, with 60–75 percent of households owning cattle. During the 2015–2016 drought, 27 percent of reported cattle deaths were drought-related due to poor grazing and lack of water. Decreased precipitation combined with heat stress and intense rainfall events also have negative implications for livestock health, creating conditions conducive to the increased incidence and range of livestock pests and diseases (e.g., Newcastle disease, Rift Valley fever, theilerioses, zoonoses, anthrax, foot-and-mouth disease). Additionally, severe floods can contribute to significant losses in livestock by destroying key infrastructure, including dip tanks

Climate Stressors and Climate Risks LIVESTOCK	
Stressors	Risks
Rising temperatures	Increased rate of development of parasites and pathogens
Increased variability of rainfall	Reduced livestock reproduction and growth rates due to heat stress
Longer and more intense dry spells	Increased rate of livestock loss due to heat and water stress impacting fodder and pastureland quality
Increased frequency of droughts	Drying pasture, decreasing grazing potential
Increased intensity of extreme weather events (cyclones, floods)	Changes in the distribution and presence of disease vectors (e.g., mosquitoes, ticks, fleas)

and paddocks. As a result, livestock become more susceptible to malnutrition, pests, and disease. (10, 11, 15, 21, 27, 30, 31, 33, 37, 40)

### WATER RESOURCES

Coupled with population growth, climate stressors including rising temperatures and higher evaporation rates, reduced precipitation, more intense flooding and more frequent cyclones and droughts are expected to have diverse but mostly negative impacts on Zimbabwe’s water availability and quality. The country, especially urban areas, relies overwhelmingly on surface water (e.g., rivers, lakes, reservoirs) for its needs (about 90 percent) and has almost 40 medium-to-large reservoirs and lakes. Reduced precipitation is projected in all but two of Zimbabwe’s seven river catchments, which would render current sources of water more unreliable. Reduced river and stream flows would also curtail electricity production from hydropower, which in 2014 contributed 51.4 percent of national power production. Recurrent episodes of drought coupled with variable rainfall patterns have caused water levels to fluctuate in Zimbabwe’s main man-made lake and dam, Lake Kariba, which provides 33 percent of Zimbabwe’s power requirements. As a result of the 2015–2016 drought, water levels dropped to 12 percent of capacity, underscoring the severity of prolonged droughts that threaten crop production and power generation. Groundwater, albeit limited in quantity compared with surface water, is the main source of drinking water for more than 70 percent of the rural population; communal and commercial sectors in rural areas also rely primarily on groundwater to meet their needs. In recent years, urban demand for groundwater has also increased due to the increasing unreliability of water distribution systems. Projected higher temperatures and declines in mean annual precipitation reinforce a drying climatic outlook with reduced groundwater recharge. This overall reduction in water availability means that by 2080, should medium or high population growth projections be realized, Zimbabwe could fall into the United Nations “absolute water scarcity” category. (2, 7, 14, 48, 13, 28, 16, 45, 51, 50)

Climate Stressors and Climate Risks WATER RESOURCES	
Stressors	Risks
Rising temperatures	Reduced water availability resulting in reduced crop yields
Increased variability of rainfall	Increased incidence of infectious diseases from reduced water quality, flooding, and standing water
Longer and more intense dry spells	Reduced runoff and stream flows impacting hydropower
Increased frequency of droughts	
Increased intensity of extreme weather events	Reduced groundwater recharge

### HUMAN HEALTH

Projected increased temperatures, frequency and/or intensity of floods, storms, and droughts will adversely impact human health and nutrition across Zimbabwe. Climate stressors will expand the geographic range of malaria and dengue and increase the burden of waterborne and diarrheal diseases (e.g., cholera). Malaria is the third leading cause of morbidity nationally. By 2050, changes in temperature and precipitation are expected to alter the transmission and increase the incidence of malaria, with the highest malaria risks concentrated in the southeastern lower-lying regions and Zambezi River Valley. Previously unsuitable, densely populated higher-elevation areas will also become suitable for transmission, which could increase disease burdens. The increased frequency of floods and heavy rainfall events also put already vulnerable communities that lack access to clean water or sanitation at greater risk of cholera and other diarrheal diseases. Increased temperatures, recurrent drought, and variable precipitation will continue to be main drivers of stunting and wasting among children. Droughts pose a significant threat to food security and nutrition, given the country’s reliance on subsistence, rainfed agriculture. Droughts have been linked to decreases in household production of staples (e.g., maize), reducing income and the ability to purchase food. Additionally, drought-tolerant crop varieties commonly promoted have been shown to be deficient in essential micronutrients. Research also shows that increased CO2 levels reduce the nutrient levels in some

crops. These factors particularly affect households' ability to provide children with adequate nutrition. Finally, research points to an association between reduced malnutrition and both improved sanitation, (i.e., reduction in open defecation) and hygiene practices (e.g., breastfeeding, complementary feeding, handwashing, deworming). The increasing geographic range of infectious disease coupled with food shortages will disproportionately impact Zimbabwe's vulnerable HIV/AIDS population (13.3 percent in 2017); since those with the disease have higher nutritional requirements; the inability to access adequate nutrition weakens their immune system, creating a vicious feedback loop. (2, 5, 20, 3, 18, 39, 22, 17, 35)

### FORESTRY

Heightened water stress from recurrent droughts, flooding, and erratic and reduced precipitation are expected to exacerbate the vulnerability of Zimbabwe's varied and rich forests (e.g., miombo woodlands, Zambezi teak forests, mopane woodlands, etc.), which cover approximately 45 percent of the total land area and are home to nearly 1,103 amphibians, birds, mammals, and reptiles. Five percent of the country's forests are classified as primary forest, which is the most biodiverse and carbon-dense form. Just under three-quarters of this forest cover is found in communal areas, commercial farming and resettlement areas, with the remaining located in national parks and reserves. Biomass supplies 69 percent of the country's primary energy; forests generate the majority of Zimbabwe's biomass energy, especially for rural communities and the urban poor. Fuelwood supplies about 98 percent of biomass energy and accounts for 85 percent of household energy nationwide. Climate stressors aside, the use of forests for energy has negative implications for human health and threatens biodiversity. Forests also provide a wide range of both timber (e.g., charcoal, craft, and building materials) and nontimber products (e.g., honey) and services (e.g., water purification, flow regulation), that provide a "safety net" underpinning livelihood security. For example, insufficient and/or erratic rainfall affects honey production due to the combined impact on bee survival. Water stress from droughts, rising temperatures, and reduced precipitation can increase the risk of forest fires, resulting in loss of species, altered habitats, and reduced water availability. Climate impacts are compounded by high levels of deforestation and land use changes, which degrade the quality and availability of forest products and services. Between 1990 and 2010, Zimbabwe lost approximately 29 percent of its forest cover. Annually, an estimated 300,000 hectares of forest are disrupted, either converted to agricultural use or harvesting for timber. Flooding and erratic precipitation, combined with land use change, are also expected to increase soil erosion and increase the incidence of pests and diseases affecting forests (e.g., blue gum chalcid, bronze bug). (23, 24, 29, 12, 19, 41, 15, 40)

Climate Stressors and Climate Risks HUMAN HEALTH	
Stressors	Risks
Rising temperatures	Increased mortality and morbidity related to heat stress
Increased variability of rainfall	Expanded range of disease-carrying vectors (e.g., mosquitoes) and increased transmission of infectious diseases such as malaria, Rift Valley fever and dengue
Increased frequency of droughts	Increased incidence of diarrheal and other waterborne diseases (e.g., cholera, giardiasis)
Increased intensity of extreme weather events	Increased food insecurity, hunger, and malnutrition from heat stress, flood, and drought

Climate Stressors and Climate Risks FORESTRY	
Stressors	Risks
Rising temperatures	Increased surface runoff
Increased variability of rainfall	Increased soil erosion
Increased frequency of droughts	Increased threat from current pests/introduction of new pests
Increased intensity of extreme weather events	Reduced availability of timber/nontimber products and services (wild fruits, honey, mushrooms).

## POLICY CONTEXT

### INSTITUTIONAL FRAMEWORK

The Government of Zimbabwe uses a sectoral approach to guide the response measures addressing the impacts of climate change and to mainstream adaptation and mitigation strategies. The Office of the President and Cabinet has the overall responsibility for all decisions concerning national climate policy. The Ministry of Environment, Water and Climate is mandated with coordinating the management, development, and sustainable use of natural resources and the environment. The Climate Change Management Department, established in 2013 within the ministry, is tasked with effective coordination of climate change issues in the country, including the development of the UN Framework Convention on Climate Change (UNFCCC) National Communications. Inadequacy of data due to institutional and technological capacity constraints combined with limited human and financial resources have been highlighted as key barriers to addressing climate risks nationally. (32, 2)

Internationally, Zimbabwe participates in the [Global Climate Observing System \(GCOS\)](#) plan through provision of data and [Global Framework for Climate Services \(GFCS\)](#) activities. Regionally, the country participates in [Monitoring for Environment and Security in Africa \(MESA\)](#) and is a member of both the [Southern Africa Development Community \(SADC\)](#) and the [Southern Africa Power Pool \(SAPP\)](#), both of which are forums for regional negotiation, planning, and management of shared, scarce resources, among other functions. (32, 2)

### NATIONAL STRATEGIES AND PLANS

Zimbabwe's two key national instruments driving their commitment to addressing climate variability and change are the [National Climate Policy \(NCP\)](#) and [National Climate Change Response Strategy](#); as of 2019, Zimbabwe is in the process of developing a National Adaptation Plan. The NCP aims to reduce Zimbabwe's vulnerability to climate and climate-related disasters through climate-proofing the country's socioeconomic development sectors. (32, 2)

- [Initial National Communication to the UNFCCC](#) (1998)
- [Second National Communication to the UNFCCC](#) (2012)
- [Third National Communication to the UNFCCC](#) (2015)
- [Zimbabwe National Climate Policy](#) (2017)
- [National Climate Change Response Strategy](#) (2014)
- [Intended Nationally Determined Contribution](#) (2015)
- [National Adaptation Plan \(NAP\) Roadmap for Zimbabwe](#) (2019)

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## SELECTED ONGOING EXPERIENCES

Below are selected projects focused on climate change adaptation, or some aspect of it, in Zimbabwe.

Selected Program	Amount	Donor	Year	Implementer
<a href="#">Amalima</a>	\$43 million	USAID Food For Peace	2013–2020	Cultivating New Frontiers in Agriculture (CNFA)
<a href="#">Building Climate Resilient Rural Communities in Zimbabwe</a>	\$58.4 million	United Nations Development Programme (UNDP); Global Environment Facility (GEF)	2012–present	Ministry of Environment and Natural Resources Management
<a href="#">Feed the Future Zimbabwe Livestock Development Program</a>	\$11.9 million	USAID	2015–2020	Fintrac
<a href="#">Project for Zimbabwe Smallholder Horticulture Empowerment and Promotion (ZIM-SHEP)</a>	\$2 million	Japan International Cooperation Agency (JICA)	2019–2023	Ministry of Lands, Agriculture, Water and Rural Resettlement
<a href="#">Resilience Building Fund</a>	\$55.6 million	UNDP DFID	2015–2019	Ministry of Lands, Agriculture, Water and Rural Resettlement
<a href="#">Strengthening Biodiversity and Ecosystems Management and Climate-Smart Landscapes in the Mid to Lower Zambezi Region of Zimbabwe</a>	\$57.4 million	UNDP and GEF	2018–2024	Ministry of Tourism, Environment, and Hospitality (MTEH)
<a href="#">Zimbabwe Livelihoods and Food Security Programme</a>	£68.2 million	DFID	2013–2021	Palladium International Ltd Food and Agriculture Organization (FAO)
<a href="#">Zimbabwe Resilience Building Fund Programme (ZRBF)</a>	£39.9 million	DFID	2015–2021	UNDP