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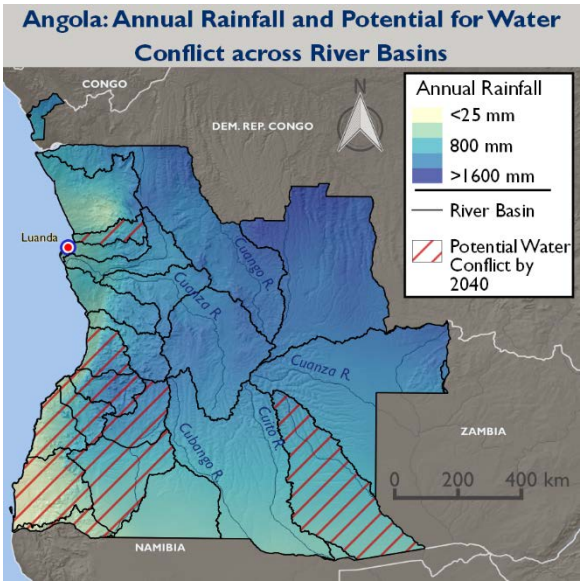
FACT SHEET

CLIMATE RISK PROFILE
ANGOLA

COUNTRY OVERVIEW



Since the end of a 27-year civil war in 2002, Angola has been rebuilding infrastructure and administrative capacity, as well as addressing development challenges such as high poverty rates (40.5 percent). Several lasting impacts of the war, however, have increased Angola's vulnerability to climate change. Food insecurity increased as many people abandoned farming and moved to cities during the war, which shifted the country from a food secure, primarily agrarian economy to a net food importer (some estimates put the country's food imports as high as 90 percent). This migration to urban areas has concentrated the population and infrastructure on coastlines, which are vulnerable to sea level rise, erosion, and storm surges. High dependence on oil exports (80 percent of state revenue) leaves public spending vulnerable to oil-sector performance; following a drop in oil prices in 2016, the Angolan government cut spending by 50 percent. As most weather stations were destroyed in the war, historical climate information and studies on potential climate variability in Angola are severely limited. However, recent cycles of droughts and floods in the southern provinces (which caused an estimated $242.5 million in agricultural losses) provides some insight into the country's vulnerability to future climate shocks and stressors. (7, 5, 27)

CLIMATE PROJECTIONS

- 4.9°C increase in temperatures by 2100
- Increase in rainfall variability
- 13–56 cm rise in sea level by 2100

KEY CLIMATE IMPACTS

Agriculture
Reduced crop yields; increase in crop pests
Reduced production of livestock products; increased risks to livestock health

Water
Decrease in water tables
Increased conflict between water users
Increase in hydropower potential

Human Health
Changing seasonality and range of vector-borne diseases
Increased food insecurity

Fisheries
Changing distribution of fish stocks
Impact on population's protein intake
Damage to equipment and infrastructure

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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

Angola's diverse climate zones are influenced by maritime currents and geography. The semiarid, narrow coastal region has an average annual rainfall of 600 mm, with higher rainfall in the north and lower rainfall in the south. Angola's broad interior plateau can be subdivided into three agro-ecological zones: a warm, wet north with heavy rainfall that exceeds 1,500 mm annually and high average annual temperatures of more than 22°C; a central zone whose tropical climate is tempered by altitudes of 1,000 – 2,500 meters, with 1,250 –1,500 mm of rainfall per year and annual temperatures of 18°C–20°C; and a semiarid southwest zone, near the Kalahari desert, whose low temperatures in the hot season are driven by tropical continental air masses and the Benguela Cold Current. Seasonal temperatures do not vary widely, although two seasons are recognized: a cool dry *Cacimbo* season from June to September and a warm, humid, rainy season from October to May. Lack of historical weather data makes it difficult to establish climate trends. (6, 9, 17, 19, 20, 29)

HISTORICAL CLIMATE

Historical climate trends since 1960 include:

- Increase in average temperature of 0.33°C per decade; more rapid increases June–August.
- Increased frequency of hot days in all seasons and increase in hot nights except June–August; decrease in annual frequency of cold nights.
- Decrease in average annual rainfall of around 2.4 percent per month per decade, largely due to decreases from March to May.

FUTURE CLIMATE

Although complicated by lack of historical data and present-day ground measurements, projected changes by 2100 include:

- Increase in temperatures by up to 4.9°C.
- Faster rate of warming in the interior; slower rates of warming in coastal areas.
- Likely increase in rainfall variability.
- Rainfall models vary, but generally agree that rainfall will decrease in the future, with stronger decrease in the southern region.
- Sea level rise of 13 cm – 56 cm.

SECTOR IMPACTS AND VULNERABILITIES

WATER RESOURCES

Hydropower is central to the government's development plans. Although Angola has 47 major river basins, water distribution is uneven, with surface flows highest in the center, north, and northeast. Although specificity is lacking, climate change, combined with economic growth and urbanization, could increase pressure on limited water resources, particularly along the coast and in the south. In 2016, 30 percent of boreholes in the south were nonfunctional due to lack of parts and fuel, or low water levels left them inaccessible; in the same region, a drought since 2011 has led to lowered water tables and the drying of rivers. Reduced rainfall and increased variability (especially in coastal zones) are drying shallow wells and compromising water quality, leading to informal water markets in urban areas that provide low-quality water at high prices. Regional climate change will impact water resources, particularly in the Zambezi basin (one of five transboundary basins in Angola), which is projected to have a 25–40 percent decrease in runoff by 2050 due to increases in temperature, evaporation, and rainfall variability. Higher temperatures will increase crop and livestock water requirements as well as cooling requirements (i.e., increased energy demand). In 2013, over 70 percent of Angola's electricity was hydro-based. Climate change is likely to produce increased rainfall and hydropower in the Cuanza River basin while also leading to higher evaporation rates and rainfall variability that will decrease crop production. (5, 12, 3, 15, 16, 20, 22, 28)

Climate Stressors and Climate Risks WATER RESOURCES

Stressors	Risks
Rising temperatures **Increased rainfall variability**	Changes in spatial and temporal availability of water resources
	Decrease in water availability and quality for consumption, sanitation, crops, and livestock; increased potential for conflict between multiple water users.
	Variable hydropower production; potential increase in Cuanza basin

AGRICULTURE

The civil war devastated Angola's agricultural sector. Only 10 percent of arable land is under cultivation despite the country's fertile soil. Constraints, including lack of information on markets, absence of rural extension services, and reliance on outdated production technology reduce producers' ability to adapt to climate variability. Smallholders comprise approximately 90 percent of the sector, primarily through subsistence, rainfed cultivation. Angola's varied climate affects crop production: cassava in the north, maize in the center, and sorghum and millet in the south. The effect of changes in rainfall will depend on location; however, throughout the country, temperature increases can reduce soil moisture, impacting both rainfed and irrigated crops. Some climate scenarios project a reduction in crop yields by 2030. Climate change will also impact livestock, which are an important asset in southern provinces such as Huíla and Cunene, where more than two-thirds of cattle are located. Prolonged drought requires longer transhumance migrations for feed and water, which reduce milk and meat production and increase livestock morbidity and mortality. In the southern regions of Cunene, Namibe, and Huíla, 500,000 livestock deaths were reported in the drought years of 2015 and 2016. Flooding during the rainy season also harms crops and livestock. In 2009, floods (caused by historically heavy seasonal rains following several years of drying) destroyed 90,000 hectares of land mostly in the Cuvelai basin. Crop pests, such as the burrowing nematode, may expand into the highlands as temperatures increase, and the range of zoonotic diseases may change: for example, sleeping sickness is transmitted by the temperature-sensitive tsetse fly and affects both livestock and humans. (26, 1, 24, 13, 17, 14, 21, 8)

Climate Stressors and Climate Risks AGRICULTURE

Stressors	Risks
Rising temperatures	Increased evaporation and reduced moisture in the soil, limiting plant growth and reducing crop yields
Increased aridity and drought conditions	Adverse impacts on livestock health and production due to reduced pasture and water availability
Increased rainfall variability	Expanded range of crop pests such as the burrowing nematode and black leaf streak disease
Heavy rainfall events	Spread of zoonotic diseases, e.g., those transmitted by tsetse flies
	Flooding of croplands

HUMAN HEALTH

Malaria and diarrheal disease are leading causes of death in Angola. More frequent extreme rainfall and flooding could lead to increased incidence of waterborne diseases, and temperature shifts may alter the range of disease vectors and duration of malaria transmission seasons. For example, by 2030 areas currently not at risk of malaria transmission may become suitable for transmission 7–9 months out of the year, putting an additional 250,000 people at risk, primarily in the western provinces of Moxico and Bie and areas in the north. Limited infrastructure and access to medical care further compromise health outcomes, particularly in the face of extreme events. For example, heavy rains in 2016, combined with uncollected garbage due to budget cuts, contributed to a spike in the number of malaria, diarrhea, and yellow fever cases in Luanda. In spite of investments in sanitation and water treatment, as of 2015 only 49 percent of Angolans had access to safe water and 52 percent to improved sanitation facilities. Prior to the civil war, Angola was self-sufficient in most food crops, but population displacement and infrastructure damage during the civil war severely disrupted agricultural production, and now Angola imports a majority of its food. Climate changes in Angola and globally may impact both local crop yields and the price of imported foods, in turn compromising food security and nutrition gains. (23, 25, 26, 30)

Climate Stressors and Climate Risks HUMAN HEALTH

Stressors	Risks
	Changes in seasonality and range of vector-borne diseases
Increased temperatures	Increase in the length of malaria transmission season in the central highlands
Extreme rainfall events and associated flooding	Increased incidence of diarrhea, cholera, typhoid, and other water-borne diseases
Drought	Potential for increased malnutrition rates due to lower crop yields locally and higher costs of imported food

FISHERIES

Warming oceans, changes to the hydrologic cycle, and extreme weather events are likely to impact fisheries, which are an important source of economic and food security to many Angolans. About 90 percent of catch is sold domestically and provides 25 percent of the population's animal protein intake. Artisanal fishing has increased in recent years to more than 40 percent of total catch and is an important livelihood for coastal communities. Marine fisheries dominate production at 96 percent, primarily sourced from southern coastal provinces that benefit from the Benguela current. Overfishing has also stressed the marine ecosystem, making climate-driven changes difficult to discern. However, an observed decline in zooplankton and a general trend of surface water warming in the Benguela system's northern section may lead to changing distribution of fish species. Sea level rise may increase the risk of saltwater intrusion into coastal urban and agricultural riverine areas, where more than half the population is located. (4, 5, 10, 11, 17)

Climate Stressors and Climate Risks FISHERIES	
Stressors	Risks
Rising sea levels and surface temperatures	Changes in availability and distribution of marine and inland fish stocks, e.g., the shift south of the dusky kob (an estuarine fish)
Increase in extreme weather events and flooding	Saltwater intrusion
	Damage or loss of fishing boats, equipment, etc.

POLICY CONTEXT

The government has taken steps to establish policies and regulations to address climate change adaptation, and in 2008 approved a National Implementation Strategy for the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. However, progress to fulfill the activities envisioned in the implementation strategy has been limited. (2, 18)

INSTITUTIONAL FRAMEWORK

The National Committee on Climate Change and Biodiversity was created under the Ministry of Environment in 2012. The committee is responsible for harmonizing programs and policies to implement climate change strategies and create a plan for investments related to climate change, biodiversity, and desertification. A Climate Change Office within the Ministry of Environment was created by presidential decree in 2014. Measures developed under the National Action Programme to Fight Desertification, approved in 2014, have the potential to increase climate resilience.

NATIONAL STRATEGIES AND PLANS

At the 2017 UN Climate Change Conference in Bonn, the Angolan Minister of Environment announced development of a national climate change adaptation plan. Interministerial planning meetings took place in February 2018.

- National Adaptation Programme of Action (2011)
- Draft Intended Nationally Determined Contribution (2015)
- National Strategic Program for Water 2013-2017
- National Development Plan 2013-2017 (2012)

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Map source: WorldClim Global Climate Data and Hijmans, R.J. et al. 2005. Very high resolution interpolated climate surfaces for global land areas. International Journal of Climatology 25: 1965–1978. Hydrobasin data accessed from: http://www.fao.org/geonetwork.

SELECTED ONGOING EXPERIENCES

In addition to the recent and ongoing work listed below, in February 2018 the FAO upgraded its presence in Angola to that of a Partnership and Liaison Office. The FAO's country programming framework for Angola includes as a priority area "increasing resilience of rural livelihoods to climatic shock and climate change."

Selected Program	Amount	Donor	Year	Implementer
Supporting EU-African Cooperation on Research Infrastructures for Food Security and Greenhouse Gas Observations	$2.4 million	European Commission	2017–2020	multiple
Integrating Climate Resilience into Agricultural and Agropastoral Production Systems	$6.6 million	GEF – Least Developed Countries Fund	2016–2021	FAO
Enhancing Climate Change Resilience in the Benguela Current Fisheries System	$24 million	GEF – Least Developed Countries Fund	2015–2020	FAO, Benguela Current Commission
Addressing Urgent Coastal Adaptation Needs and Capacity Gaps in Angola	$18.5 million	GEF – UNEP and UNDP	2016–2019	MINAMB
Building Resilience of Vulnerable and Drought Affected Communities in Huila Province	$169,345		2017–2018	FAO
Promoting Climate-Resilient Development and Enhanced Adaptive Capacity to Withstand Disaster Risks in Angola's Cuvelai River Basin	$9.4 million	GEF - UNDP	2016–2019	MINAMB
GFCS [Global Framework for Climate Services, World Meteorological Organization] — Adaptation and Disaster Risk Reduction in Africa	$7 million	Norwegian Agency for Development Cooperation	N/A	UK Met Office