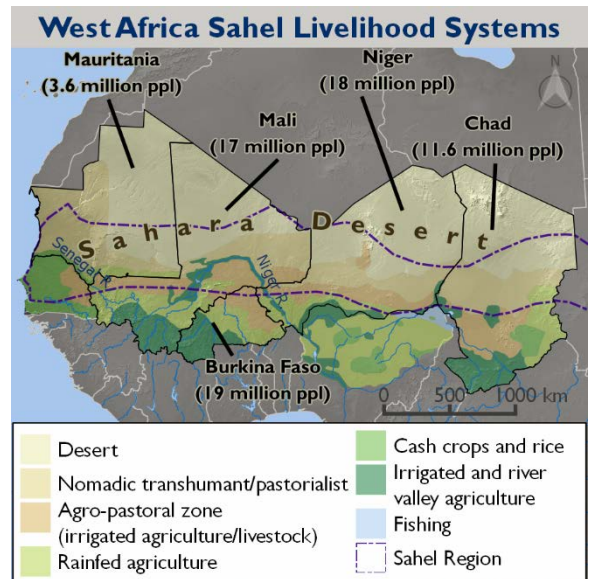




CLIMATE CHANGE RISK PROFILE WEST AFRICA SAHEL

REGIONAL OVERVIEW

The West Africa Sahel region is a semi-arid area that runs from the Atlantic Ocean eastward to Chad, separating the Sahara Desert to the north and the Sudanian Savana to the south. The region is one of the poorest and most environmentally degraded in the world, and is considered one of the world's most vulnerable regions to climate change, as temperature increases are projected to be 1.5 times higher than in the rest of the world. Climate vulnerability is compounded by the region's high dependence on rainfed agriculture and its natural resources to support food security and livelihoods, rapid population growth, and chronic humanitarian crises due to recurrent drought, flooding, food insecurity, epidemics, and violent conflict. The region is still recovering from the food crisis brought about by the severe droughts experienced in 2005, 2008, 2010 and 2012. Data from 2015 suggest that over 20 million food insecure people and nearly 6 million malnourished children live in the Sahel. With substantial population growth (average 3 percent per year) and recurring challenges linked to environmental degradation, pervasive poverty and political instability, climate change in the Sahel will compound existing vulnerabilities. Water scarcity, longer dry seasons and impacts of higher temperatures may trigger new conflict and forced migration, issues that already impact the region. This fact sheet focuses on five countries: Burkina Faso, Chad, Mali, Mauritania, and Niger. (3, 20, 21, 23, 32)



CLIMATE PROJECTIONS



3–6°C increase in temperature by 2100



Increased inter-annual variability in rainfall with sudden oscillations between very wet and very dry years



Increased occurrence of erratic rainfall and extreme droughts, floods and thunderstorms

Agriculture

Crop loss/failure from drought, floods, soil erosion & infestations
Increased food insecurity



Water Resources

Reduced water availability and quality, especially during dry season
Increased water insecurity & flood risk



Human Health

Increased food insecurity
Increased risk of famine, vector-borne diseases and migration/displacement



Livestock

Loss of livestock productivity
Loss of rangelands and water sources
Conflict between farmers & herders



Ecosystems

Increased degradation/deforestation
Biodiversity loss and extinction



Fisheries

Reduced fishery productivity
Loss of fishery habitat and biodiversity



April 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

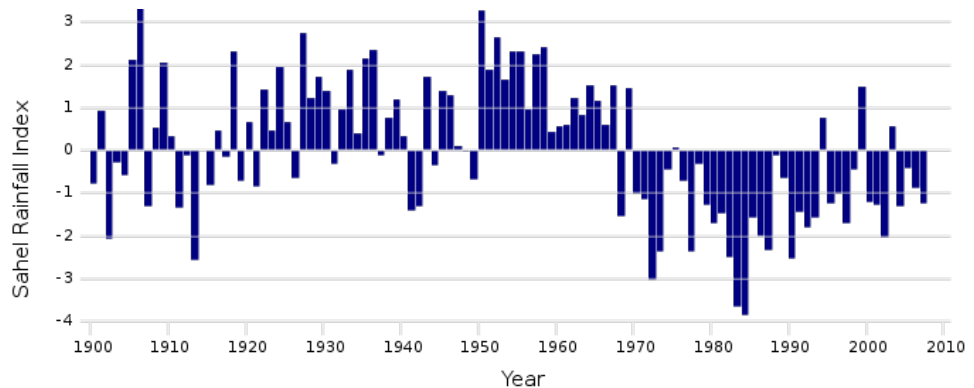
The Sahel has a hot, semi-arid climate characterized by very high temperatures year-round; a long, intense dry season from October–May; and a brief, irregular rainy season linked to the West African monsoon. Mean temperatures range 21.9°–36.4°C, with substantially cooler temperatures in the mountainous regions of northern Chad, Niger, and Mali, and the coastal zone of Mauritania. Mean annual rainfall varies from year to year and decade to decade, but generally is lower in the north (100–200 mm) than in the south (500–600 mm) and is limited to the summer months of June–September. The length of the rainy season ranges from one to two months in the north and four to five months in the south. In the winter (November–March), the dry, dust-laden Harmattan trade winds blow from the northeast to the southwest; these induce desert-like weather conditions (i.e., low humidity, very little cloud cover, no rainfall) and can produce severe dust/sandstorms.

In the 1970s and 1980s, the region experienced the most dramatic drought observed in the 20th century, with a 30 percent decrease in rainfall, initially attributed to human mismanagement of land resources. However, studies now strongly indicate that ocean warming and air pollution from human activity played a significant role in the drying of the Sahel. Although the Sahel has seen a recovery in rainfall since the 1980s, cumulative precipitation has not returned to pre-1960s levels and certain characteristics have changed: rainfall events appear to be less frequent and have a shorter duration with greater intensity. However, eastern regions (Chad and eastern Niger) have seen a return of wetter conditions. (6, 11, 17, 20, 29)

Figure 1: Sahel precipitation anomalies, 1900–2010

Sahel precipitation was above the long-term mean from 1915 through the late 1930s and during the 1950s–1960s, after which it was persistently below the long-term mean, with the largest negative anomalies in the early 1980s.

Source: JISAO, 2016.



HISTORICAL CLIMATE

Historic climate trends include:

- Average temperature increases of 0.6°–0.8°C between 1970 and 2010 – slightly higher than the global average.
- Increase in number of warm days/nights and decreased number of cold days/nights.
- Overall reduction in cumulative rainfall. From 2000–2009, average rainfall was below average in Burkina Faso by 15%, in Chad by 13%, in Mali by 12%, and in Niger by 8%.
- Lengthening of the dry season.
- Growing climate divide between Eastern (Niger, Chad) and Western Sahel (Burkina Faso, Mali, Mauritania) with less rainfall in the west.
- Increase in frequency and severity of extreme rainfall events and flooding.

FUTURE CLIMATE

Projected climate changes include:

- 3° to 6°C rise in average temperatures by 2100, with +3°C in the coastal areas (Mauritania) and +4°C in Continental Sahel (Mali, Chad, Burkina Faso, Niger).
- Maximum warming affects summer months (June–September) and min. temperatures
- Uncertain precipitation projections due to high inter-annual variation, but inter-annual and spatial variability are expected to increase.
- Reduced duration of rainy season, with increased extreme rainfall events in the south.
- Decrease in frequency of days and nights that are considered 'cold'; in much of the region 'cold' nights will not occur at all by the 2090s.
- Sea level rise in Mauritania of up to 14.4cm by 2050 and 40cm by 2100.

SECTOR IMPACTS AND VULNERABILITIES

AGRICULTURE

Agriculture in the Sahel is extensive, poorly mechanized and almost entirely reliant on the limited three to four months of variable summer rainfall (June–September), making it highly vulnerable to climate variability and change. In dry years, the region faces serious challenges related to food security and must rely on grain purchases and food aid to meet food requirements. Agriculture contributes 40 percent of the combined regional GDP and employs more than 70 percent of the labor force in Niger, Burkina, Mali, and Chad, and 52 percent in Mauritania. Farming is practiced down to the 350 mm rain belt, while pastoralism provides the principal livelihood below this threshold. Landlocked countries (Burkina Faso, Chad, Mali, and Niger) are major cereal producers that export to neighboring countries. Staple dryland crops include millet, sorghum and cowpea, while cotton and groundnut constitute major cash crops. Temperature increases higher than 2°C are projected to decrease millet and sorghum yields by 15–25 percent by 2080. Studies cited by UNEP also suggest that because of changing rainfall patterns and degraded land, Chad and Niger could potentially lose their entire rainfed agriculture by 2100, while in Mali cereal harvests might decline by 30 percent.

Climate Risks and Potential Impacts AGRICULTURE	
Stressors	Risks
Increased temperatures and evaporation	Reduced crop yields due to heat and water stress
	Altered onset and reduced length of growing periods
	Increased risk of crop disease and pest infestations
Shorter duration of rainy period	Deteriorated agricultural land due to desertification, erosion and sand intrusion
Drought and rainfall variability	Damage to crops from floods, droughts and erratic rains
	Increased food prices, food insecurity and urban-rural/southern migration
	Increased need for food aid as rainfed agriculture becomes less dependable

Soils in the region are generally nutrient-limited and at risk of degradation due to deforestation, overgrazing and continuous cropping, while reduced precipitation and higher temperatures increase desertification and sand intrusion. Land cover changes, primarily deforestation for firewood, alter the moisture content of the soil, increasing water stress and lowering crop productivity. Much of this deforestation occurs during drought years as people cut trees for additional income. These degraded environmental conditions have fostered the growing pattern of north-south and rural-urban migration taking place in the region, especially within landlocked Niger, Burkina Faso, and Mali. During the 30-year drought from the 1960s to 1990s, an estimated 1 million people left Burkina Faso alone, most resettling in urban areas throughout West Africa. Even with imperfect knowledge of future rainfall in the region, rising temperatures and more variable rainfall patterns will likely alter the distribution and timing of crop diseases and pests. For example, a hotter, wetter environment increases the risk of disease from mildew, leaf spot, bacterial stem and root rot, while aphids, borers, bollworm, beetles, and whitefly thrive in a hotter, drier environment. (2, 4, 8, 9, 10, 23)

LIVESTOCK

The Sahel is one of the continent’s most prominent livestock rearing regions, and climate change threatens sector productivity and traditional herd-migration routes through environmental constraints, including water scarcity and extreme weather events. Goat, camel, sheep, and cattle herding is an integral part of Sahelian livelihoods (e.g., for employment, meat and milk production, a source of credit, savings, and dowry payments). Livestock herding contributes up to 10–15 percent of GDP in Burkina Faso, Chad, Mali, and Niger, and an even larger share in Mauritania, where 50 percent of the population is pastoralist. Changes in temperature, rainfall, and the occurrence of droughts and floods all negatively affect forage and fodder production, water availability, and livestock productivity. For example, higher temperatures reduce feed intake and lead to energy deficits and decreased milk production, fertility, fitness, and longevity, while drought can reduce calving rates from the normal 60–70 percent to 25–30 percent.

Historically, pastoralists maximized productivity by migrating herds south during the dry season (October to June) and north during the wet season, thereby exploiting grazing and water imbalances. However, erratic rainfall and ongoing drought have forced pastoralists to alter traditional migratory corridors in search of new seasonal watering holes and rangelands, leading to conflicts. While farmers and pastoralists historically worked together effectively (with pastoralists benefiting from grazing of crop residue and farmers benefitting from manure droppings), increased competition and conflict is now an issue of concern between the Sahel's farming and pastoralist communities as land degradation and competition over water and land resources (grazing versus crop cultivation) increases. In Burkina Faso, an estimated 4,000 farmer-herder conflicts took place between 2005 and 2011. (14, 23, 31, 35)

Climate Risks and Potential Impacts LIVESTOCK	
Stressors	Risks
Increased temperatures	Loss of traditional rangelands and water sources alter herders' migratory patterns
	Decrease in animal fodder production; changes in commodity prices
Erratic precipitation	Decreased milk production, meat quality and fertility rates and increased mortality and morbidity rates reduce livestock productivity
Increased incidence of drought and flooding	Increased competition and conflict over water and land resources
Desertification	Permanent migration to southern, coastal and/or urban centers

FISHERIES

Fishing is a key livelihood activity, offering one of the most common and cheapest protein sources to those living in the Sahel. Both coastal and inland fishing suffer from overfishing and habitat degradation. Climate change introduces new threats to the ecosystems that support fisheries, through increased temperatures, more variable rainfall and more severe weather events and sea level rise. Inland fishing occurs along all major rivers and lakes of the region, including the Niger River (Mali and Niger), the Senegal River (Mali and Mauritania), Lake Volta (Burkina Faso), and Lake Chad (Chad and Niger). For important inland fish species such as characin and perch, rising temperatures alter water quality and dissolved oxygen content in lakes, reducing lakes' ability to support their reproduction. Increased rainfall variability and drought can lower water levels of tributaries and prevent seasonal fish migrations to rich flood plains for feeding and breeding.

The coastal waters of Mauritania are among the richest fishing grounds in the world due to a large upwelling ecosystem and are commercially exploited by foreign fleets. Fisheries account for about 10 percent of Mauritania's GDP and 50 percent of export earnings, sourced principally from cephalopods (e.g., octopus, squid, cuttlefish) and crustaceans (e.g., lobster, shrimp, crab). It is estimated that Mauritania's fisheries are exploited 30-40% higher than the maximum sustainable yield. Climate change poses additional risks, such as habitat and biodiversity loss, due to increased temperatures, ocean acidification, extreme weather events, and sea level rise, all of which alter food chains and the habitats that support them. For example, ocean acidification inhibits development of the skeletal structure of plankton, mollusks, and other shellfish, the main food sources for Mauritania's fisheries. (7, 23, 36)

Climate Risks and Potential Impacts FISHERIES	
Stressors	Risks
Increased temperatures and rainfall variability	Altered timing of fish breeding and migration; constrained access to preferred spawning grounds
	Reduced fishery productivity, negatively affecting income, employment and protein intake
Increased incidence of drought and flooding	Increased southward migration of fishermen in search of more productive waters
Sea level rise and ocean acidification	Reduced marine fishery productivity as ocean acidification and sea level rise destroy fishery habitat and food chain

WATER RESOURCES

Water is a limiting factor for development in the Sahel. The region's water supply is unevenly distributed, is poorly accessible due to undeveloped hydraulic supply systems, and crosses national boundaries, creating significant management challenges. For example, more than 40 percent of water supply in Mali and Chad and 90 percent in Mauritania and Niger come from outside each country's boundaries. Surface water is limited and often seasonal, making groundwater a primary source of water for many people in the region. Studies suggest that Chad and Mauritania hold significant groundwater reserves in desert areas, but these are far from urban centers. Declines in rainfall, increases in temperature, and more frequent droughts contribute to a decline in surface and groundwater availability and accessibility. However, total renewable water resources per capita range from 745,600 m³/year in Burkina Faso to 6,818,000 m³/year in Mali. Thus the problem is thought to be one not of absolute water scarcity, but rather a lack of infrastructure to provide access to supplies for use in dry seasons and dry years. Nevertheless, areas including Burkina Faso, Mauritania, and Niger that have low, but sufficient, water resources per capita are expected to experience physical water scarcity (defined as when the water supply falls below the 1,000 m³ per person per year) by 2025. Increasing demand from a growing population and planned irrigation schemes along the Niger and Senegal Rivers have led to 25–60 percent reductions in flows over the last 30 years, causing increasingly severe low water levels with frequent pauses in water flows, depleted reservoirs, and reduced water supplies for cities. Lake Chad, the largest lake in the Sahel, has shrunk by 95 percent since the 1960s, with estimates attributing 50 percent of the decrease to increased water use (e.g., from population growth and unsustainable irrigation projects) and 50 percent to changing rainfall and increasing temperatures. As a result, disputes over access to water, fish catches, and ownership of land exposed by receding waters have increased dramatically in the area. Concerns persist that Lake Chad and other surface water bodies are in danger of running dry or being reduced to seasonal waterbodies. For example, Mali's Lake Faguibine has been dry or nearly dry since the 1970s, forcing more than 200,000 farmers and fishermen to abandon their livelihoods. (4, 5, 8, 9, 10, 18, 30)

Climate Risks and Potential Impacts WATER RESOURCES	
Stressors	Risks
Increased temperatures	Increased variability of runoff and river flows; reduced water levels
	Increased evaporation of surface waters and reduced runoff
Increased rainfall variability	Compromised irrigation potential and expansion plans
Sea level rise	Increased competition and conflict over limited water resources
	Decreased water supply and quality from higher pollutant concentrations and saline intrusion in coastal areas

ECOSYSTEMS

The Sahel's forests, woodlands, wetlands, and grasslands are important ecosystems that host a vast diversity of plant and animal species, and provide food, medicines, energy, and income (e.g., tourism) for the region's inhabitants. Ecosystems are nevertheless already degraded due to prolonged drought, agricultural expansion, deforestation, erosion, the proliferation of invasive species, and biodiversity loss from poaching. Between 1975 and 2013, forest cover was reduced by 37 percent in West Africa. Endangered mammals such as the cheetah, giraffe, and lion, once common in the region, are now largely absent outside of protected areas (e.g., Air and Ténéré National Nature Reserve in Niger and Sahel Partial Faunal Reserve in Burkina Faso) due to overhunting for food and sport. Climate change threatens to further degrade land, vegetation and water resources through increased incidence of drought, desertification and floods and projected shortening of the rainy season. Roughly 50 percent of Chad, 65 percent of Mauritania and Mali, 80 percent of

Climate Risks and Potential Impacts ECOSYSTEMS	
Stressors	Risks
Increased temperatures	Increased land degradation and desertification; decline in density of trees/shrubs
Droughts and prolonged dry periods	Loss of key ecosystems, ecosystem services and biodiversity
	Reduced water levels, impacting biodiversity and composition of flora and fauna in aquatic ecosystems
Increased frequency of extreme events	Loss of tourism potential

Niger, and the northernmost point of Burkina Faso are within the Sahara Desert boundaries, which is expanding southward into the Sahel at a rate of 1–10 km per year. As a result of long-term declines in rainfall from the 1970s to 1990s, the Sahel ecological zone has shifted 25–35 km southward, resulting in biodiversity loss and conversion of arable land to sand dunes. This migration of sand dunes buried a large expanse of viable agricultural lands, prompting the southward migration of people and consequent intensification of resource requirements as more people settle on the remaining arable land. Increased drought events threaten to dry out land and water resources that are vital to the region’s flora and fauna, including migratory bird species that use the southern Sahel as a stopover point before crossing the Sahara Desert. (12, 28, 33)

HUMAN HEALTH AND DISASTER RISK

The Sahel has some of the lowest human health indicators in the world and is currently suffering from the effects of four consecutive food crises, all of which occurred in the last 10 years. Climate change is likely to aggravate acute malnutrition and disease outbreaks. Burkina Faso, Mali, Mauritania, Niger, and Chad have some of the highest under-five mortality rates in the world, with the majority of deaths resulting from pneumonia, diarrhea and malaria. Malnutrition and poor access to health care exacerbate the impacts of these illnesses and increase vulnerability to climate change impacts.

Increased temperatures and variable rainfall will likely exacerbate food and water insecurity, especially in the dry season. Reduced water availability concentrates water users around limited water sources, enhancing conditions for contamination and transmission of endemic water-related diseases such as cholera, diarrhea and typhoid. West Africa has the highest rates of malaria infection and deaths in the world and this burden will continue in many parts of the region. Nevertheless, the outlook for malaria is more favorable in the long term, with climate change projected to render a large part of the western Sahel unsuitable for malaria transmission by 2050 if temperature increases exceed the limits of mosquito survival. Changing rainfall patterns have increased the frequency and intensity of flood events in virtually all of Burkina Faso, most of southern Niger and southern Chad, and large parts of Mali. The region experienced the worst floods in over 30 years in 2007, 2008 and 2009, with losses estimated at several billion dollars and hundreds of thousands of people displaced. Displacement from flood, drought and violent conflict across the region has led to a decline in public health indicators as displaced people live in precarious conditions with poor sanitation and no access to clean water. Currently, Africa’s fastest growing displacement crisis is unfolding across the oil-rich Lake Chad Basin (Nigeria, Chad, Niger, and Cameroon), where violence from Boko Haram and drought threaten the lives and livelihoods of 20 million people. (3, 12, 19, 20, 34).

Climate Risks and Potential Impacts HUMAN HEALTH AND DISASTER RISK	
Stressors	Risks
Increased temperatures	Increased risk of food insecurity and malnutrition; reduced maternal and child health
	Increased disaster risk and exposure to heat waves, droughts, floods and storms
Increased rainfall variability	Reduced water availability and quality due to changing rainfall patterns
Increased frequency and intensity of flood and drought events	Increased risk of waterborne diseases, such as cholera and diarrhea
	Changing distribution of vector-borne diseases
	Forced migration and relocation from high-risk areas

Country	Number of food insecure people	Number of people affected by floods in 2016*
Burkina Faso	2.5 million	30,000
Chad	3.8 million	206,000
Mali	3.0 million	11,000
Mauritania	1.2 million	n/a
Niger	2.5 million	105,000

*similar data for number of people affected by drought is not available. Source: OCHA, 2016.

CONFLICT AND MIGRATION

More than 1 million people, both refugees and internally displaced persons, are forcibly displaced in Burkina Faso, Chad, Mali, Mauritania, and Niger as a result of conflict. The relationship between climate change, migration, and conflict is complex and interlinked. Competition over scarce resources such as fertile land and water is driven by a variety of factors such as population growth, abject poverty, weak governance, and displacement from violent extremism and conflict throughout the region. Higher temperatures and variable rainfall are additional stressors that reduce water availability and contribute to land degradation. This resource scarcity can increase the risk of intercommunity conflict (e.g., between fishers and farmers, farmers and herders, urban natives and in-migrants, locals and refugees), intensify existing regional conflict, and trigger outbreaks of new conflict. For example, in Burkina Faso, Malian refugees have three times more livestock than locals, increasing the likelihood of competition over land and water resources.

Climate Risks and Potential Impacts CONFLICT AND MIGRATION	
Stressors	Risks
Increased temperatures	Increased resource scarcity exacerbates conflict levels and increases migration.
	Increased allure of insurgent groups offering food and money to recruits.
Increased rainfall variability	Increased rural-urban migration may benefit terrorist groups by allowing them to operate more freely in depopulated rural areas.
	Limited government ability to respond to conflict as excessive rainfall destroys infrastructure, such as unpaved roads.
Increased frequency and intensity of flood and drought events	Humanitarian assistance provided in refugee camps leads to tensions with refugees and local population and returnees and populations that never left.

When analyzing climate-driven conflict, studies have correlated rainfall with large- and small-scale conflict across Africa: very high and very low rainfall years increase the likelihood of political and social conflict, with violent conflict more likely to occur in wetter years. Despite these correlations, empirical research largely questions the causal link between climate and conflict in the Sahel, indicating that root causes of conflict are more historical and political but recognizing that droughts and floods often escalate conflict. For example, farmer-herder conflicts in Mali and Niger are associated with state pastoral and land tenure policies and legislation while pastoral marginalization and the embezzlement of drought relief funds by government officials is at the root of the Tuareg conflict in Mali and Niger. (37, 38, 39, 40, 41).

Country	Situation	Internal Displacement	Refugees
Burkina Faso (Sept 2016)	On-going unrest in Mali hampers return of refugees; violent extremist organizations (AQIM, al-Murabitun) active in border regions	20,000 IDPs; 2,800 returnees	Hosting 32,000 Malian refugees and their livestock
Chad (Mar 2017)	Hosting 10th largest refugee population worldwide due to conflict in neighboring Sudan, CAR, Nigeria and Libya. Violent extremist organizations (ISIL, AQIM, Boko Haram) active in border regions.	103,600 IDPs; 116,500 returnees	Hosting 395,000 refugees, including 312,000 Sudanese refugees who arrived +10 years ago
Mali (Mar 2017)	Terrorism (ISIS, AQIM, al-Murabitun), armed conflict and violence in North (Menaka, Timbuktu) and Central (Mopti) Mali with broad impunity since the 2012 Tuareg rebellion and military coup.	45,000 IDPs; 141,000 Malian refugees	Hosting 17,500 refugees, primarily Afro-Mauritanian expelled from Mauritania in 1989.
Mauritania (Feb 2017)	Ongoing unrest in Mali hampers return of refugees. Terrorist groups (ISIS, AQIM, al-Murabitun) active along southern and eastern border with Mali.	-	Hosting 48,000 refugees, primarily from Mali
Niger (Mar 2017)	Violent extremist organizations (AQIM, Boko Haram) active in border regions, especially Nigerian border.	121,000 IDPs	Hosting 119,000 Nigerian and 61,000 Malian refugees

Source: [US Department of State](#) and OCHA (see country hyperlinks), 2017.

POLICY CONTEXT

INSTITUTIONAL FRAMEWORK

While Sahelian states have taken actions to address climate change, mainly through the entry points of drought and food security, regional coordination of policies and strategies for adaptation are nascent. All countries are parties to the United Nations Framework Convention on Climate Change (UNFCCC) and have signed and ratified the Kyoto Protocol. Alongside national governments, several regional institutions address climate change issues in the Sahel:

- **The Permanent Interstate Committee for Drought Control in the Sahel (CILSS)** is the regional body coordinating policy discussions, including consideration of a range of climate change initiatives. Created in 1973 as a regional body to address severe drought conditions in the 1970s, the CILSS is mandated by ECOWAS (Economic Community of West African States) to oversee environmental governance issues in relevant ECOWAS member states. CILSS comprises nine Sahelian countries and conducts research and policy work to address the effects of drought and desertification.
- **AGRHYMET** is a specialized institution of CILSS created to provide technical assistance to CILSS members. It oversees regional and national multidisciplinary working groups to monitor meteorological, hydrological, crop and pasture conditions during the rainy season. AGRHYMET has partnership agreements with numerous international institutions and organizations, particularly WMO, FAO, and IRD.
- **SRAP-RV-WA** is a regional working group responsible for developing a subregional framework program and action plan to reduce vulnerability of natural, economic and social systems to climate change in West Africa and Chad.
- **The Sahel and Sahara Observatory (OSS)**, an independent international organization founded in 1992, serves as a platform for North-South-South cooperation to combat desertification in Africa. In 2010, it extended its areas of interest to include the African Union's New Partnership for Africa's Development (NEPAD), the Johannesburg Plan of Action, and other multilateral environmental agreements. In this framework, OSS developed an environmental monitoring program focused on climate change, drought and desertification that will assess ecosystem vulnerability to the impacts of climate change, as well as adaptation to climate change through the development of climate information and early warning systems.
- Three **basin organizations** were created to oversee governance of three transboundary basins in the region: The Organization for the Development of the Senegal River Basin (OMVS) in Dakar, the Niger Basin Authority (NBA) in Niamey and the Lake Chad Basin Commission (LCBC) in N'Djamena. They are all stakeholders in IWRM (Integrated Water Resource Management), which was developed under the Global Water Partnership (GWP), which also has a West African branch, the West Africa Water Partnership (WAWP). All basin organizations oversee natural resources management of basin areas, which are directly impacted by climate variability. (1, 15, 16)

NATIONAL STRATEGIES AND PLANS

In addition to regional strategies, every country has submitted at least two National Communications (NCs) and a National Adaptation Programme of Action (NAPA) to the UNFCCC (see table). The NCs focus strongly on adaptation in the agriculture sector considering the importance of this sector's contribution to livelihoods and Sahelian countries' national economies. The NCs are also motivated

through the lens of poverty alleviation and drought control, considering that many countries in the region suffer from recurring drought conditions. While climate change is generally not explicitly addressed in policies and strategies, climate variability, particularly drought, is often recognized as a root driver of food insecurity and poverty. Policies are being put in place in all CILSS member countries to diversify agricultural activities away from traditional export crops by initiating R&D in non-traditional agricultural commodities. (1, 15, 16)

Country	National Communication	National Adaptation Programme of Action
Burkina Faso	2002; 2015	2007
Chad	2001; 2013	2010
Mali	2002; 2008; 2014	2007
Mauritania	2000; 2012	2004
Niger	2000; 2009	2006

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SELECTED ONGOING EXPERIENCES

The table below summarizes recent and ongoing non-USAID donor-funded programs related to climate change adaptation in the West Africa Sahel region, excluding those focused on emergency food aid.

Selected Program	Amount	Donor	Year	Implementer
Sahel Adaptive Social Protection Trust Fund	+\$75 million	Multi-donor trust fund with World Bank and DfID	2014–2017	Governments of Burkina Faso, Chad, Mali, Mauritania, Niger and Senegal
Kandadji Niger Basin Water Resources Program	\$55.2 million	World Bank	2014–2016	Niger Basin Authority
The Great Green Wall for the Sahara and the Sahel Initiative (GGWSSI)	+\$8 billion	+20 bilateral donors including World Bank, EU, UNDP, UNEP	2007–ongoing	Coordinated by African Union
Regional Sahel Pastoralism Support Project	\$248 million	World Bank	2015–2021	Permanent Interstate Committee for Drought Control in the Sahel (CILSS)
Senegal River Basin Climate Change Resilience Development Project	\$84.6 million	GEF, World Bank	2013–2021	L'Organisation pour la mise en valeur du fleuve Senegal (OMVS)
Integrated and Sustainable Management of Shared Aquifer Systems and Basins of the Sahel Region	\$6.2 million	Donations from IAEA member states and the EC under the Peaceful Uses Initiative	2012–2017	International Atomic Energy Agency (IAEA); UNESCO, JICA, the Sahara and Sahel Observatory
Burkina Faso: Integrating climate resilience into agricultural and pastoral production for food security in vulnerable rural areas through the Farmers Field School approach.	\$23.3 million	GEF	2013–2017	FAO
Mauritania: Improving Climate Resilience of Water Sector Investments with Appropriate Climate Adaptive Activities for Pastoral and Forestry Resources in Southern Mauritania	\$20.9 million	GEF	2013–2018	AfDB
Burkina Faso: Participatory Natural Resource Management and Rural Development Project in the North, Centre-North and East Regions (Neer-tamba Project)	\$110.2 million	IFAD, GEF	2012–2020	Burkina Faso Ministry of Agriculture and Water Resources
Niger: Food Security and Development Support Project in the Maradi Region	\$31.7 million	IFAD, WFP	2011–2017	Government of Niger
Chad: Project to Improve the Resilience of Agricultural Systems in Chad (PARSAT)	\$36.2 million	IFAD, GEF	2014–2021	Ministry of Agriculture and Irrigation
Mali: Fostering Agricultural Productivity Project – Financing from the Adaptation for Smallholder Agriculture Programme (PAPAM/ASAP)	\$173.4 million	World Bank, EU, GEF, IFAD	2012–2017	Ministry of Agriculture