Climate Change Profile
West African Sahel
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Introduction

This climate change profile is designed to help integrate climate actions into development activities. It complements the publication ‘Climate-smart = Future-Proof! – Guidelines for Integrating climate-smart actions into development policies and activities’ and provides answers to some of the questions that are raised in the step-by-step approach in these guidelines.

The current and expected effects of climate change differ locally, nationally and regionally. The impacts of climate change effects on livelihoods, food and water security, ecosystems, infrastructure etc. differ per country and region as well as community and individual, with gender a particularly important vulnerability factor.

This climate change profile provides a brief analysis of climate change vulnerability and adaptive capacity in the countries in the West African Sahel: Burkina Faso, Chad, Mali, Mauritania, Niger, and Nigeria. This region is one of the poorest and most environmentally degraded regions in the world. Drought and high inter-annual climate variability are already being felt in the region in the form of decreased agricultural yields, loss of pastureland, and the shrinking of important water bodies. It is one of the most vulnerable regions to climate change, not only because of rising temperatures and decreasing and erratic rainfall, but also because of its poverty, food insecurity, rapid population growth, gender inequality, political instability and conflict. Climate change in the Sahel will amplify existing vulnerabilities, especially food insecurity and political instability.

Overall ranking

The countries in the West African Sahel make only a minor contribution of an estimated 0.92% (if Nigeria is excluded, 0.25%) to global GHG emissions with the per capita emissions of four of the countries (Burkina Faso, Chad, Mali and Niger) among the world’s lowest 10% and two of the countries (Mauritania and Nigeria) among the lowest 25% (see Table 1). Additional information for Mali can be found in its Climate Change Country Profile.

West African Sahel region


1 Although Nigeria is often not included in the West African Sahel country cluster, northern Nigeria is included in this profile.
4 USAID (2017)
5 The large size of Nigeria’s population is a primary reason for its larger contribution to global emissions.
However, the countries in the West Sahel are very vulnerable to climate change. Like elsewhere in Africa, the burden of climate change will be borne by countries in the Sahel that produce very little of the greenhouse gases that are contributing to climate change. According to the ND-GAIN Index which summarizes a country’s vulnerability to climate change and other global challenges in combination with its readiness to improve resilience, all but one of the Sahel countries (Nigeria) rank among the 20% most vulnerable to climate change, and three (Burkina Faso, Chad, Mali) are among the most vulnerable 10%. Vulnerability measures the exposure, sensitivity, and ability to cope with climate related hazards by accounting for the overall status of food, water, environment, health, and infrastructure within a country. Readiness measure a country’s ability to leverage investments and convert them to adaptation actions by considering economic, governance and social readiness.

Biophysical Vulnerability

The Sahel (meaning “shore” in Arabic) is commonly defined as the area in Africa between 12° N and 20° N (see Map 1).7 Bordered on the west by the Atlantic Ocean it extends eastward to Chad, separating the Sahara to the north and the Sudanian Savanna to the south. A transitional ecoregion it includes semi-arid grasslands, savannas, steppes, and thorn shrublands. It has a hot, semi-arid climate characterized by very high temperatures year-round, a long dry season from October-May, and a brief, irregular rainy season linked to the West African monsoon.8 Of the six Sahelian countries, two of the countries (Mauritania, Nigeria) have Atlantic coastal areas and four are landlocked (Burkina Faso, Mali, Niger, Chad). Topographically the Sahel is mainly flat with most of it lying between 200 and 400 m in elevation with highlands in northern Chad, Niger, and Mali. Mean annual temperature range between 21.9-36.4°C with cooler temperatures in the highlands and coastal zone of Mauritania. Mean annual rainfall is highly variable with a general pattern of lower rainfall in the north (100-200 mm)9 than in the south (500-600 mm) with the rainy season in the north ranging from one to two months and four to five months in the south. In the winter (November-March) the Harmattan, dry sand laden winds, blow from the Sahara Desert of the northeast across West Africa to the Gulf of Guinea10 to the southwest, resulting in desert-like weather conditions, haze, and producing dust/sandstorms. Multi-decadal droughts reoccur and inter-annual rainfall variations are high. Drought is the major environmental concern of this region11 (see below).

Climate trend

The West Sahel has become measurably drier and hotter. The trends during the last 50 years include:

- Temperature has risen with an average temperature increase between 0.6-0.8°C, slightly higher than the global average increase;
- Increase in the number of warm days/nights and decrease in number of cold days/nights;
- 200 mm is considered to be the minimum rainfall for rainfed agriculture – although the rainfall pattern if also a major factor.
- Gulf of Guinea is the northeastern most part of the tropical Atlantic Ocean from Gabon, north and west to Liberia.
- USAID (2017); IPCC (2014); CDKN (2014)
- USAID (2017)
• Reduction in cumulative rainfall with less rainfall in the western Sahel (Burkina Faso, Mali, Mauritania) than in the Eastern Sahel (Niger, Chad, and northern Nigeria); in the 1970s and 1980s the region experienced one of the most severe multiyear droughts of the last hundred years with a 30% decrease in rainfall. Since the 1980s rainfall has not returned to pre-1960s levels.

• Lengthening of the dry season with rainfall less frequent, of shorter duration and with greater intensity.

• Increase in frequency and severity of extreme rainfall events and flooding.

An analysis of historical observations for the average precipitation for the month of August over the period 1990-2010 in the Sahel, suggests the presence of at least three climate hotspots (see Map 2) in the Sahel of which two are in the West Sahel: one lies along the most western part of the region (Senegal and Mauritania) with the second stretching between Mali and Niger. These climate hotspots experienced rainfall declines by up to 100% during the 10 most severe droughts of the 20th century. These findings are reflected in the reports of West Sahel countries to the UNFCCC (e.g. National Communications) which include observations of erratic rainfall, the shift of isohyets to the south (see Map 3), increased occurrences of dry spells, and severe multi-year droughts, such as the droughts in 1972-1990 and the more recent droughts over the last 10 years.

Future climate
Climate projections suggest that the West Sahel will be hotter and drier with more frequent extreme events.

Temperature. Projections for temperature suggest that an increase, especially for summer, is likely to largely exceed the global mean increase. The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment (2014) climate model projections (CMIPs) suggest that unprecedented change in climate will occur earliest in Sahel and West Africa by the late 2030s to early 2040s. Temperatures will rise and extremely hot seasons will become more frequent in the future. By 2100, temperatures will rise +3°C in the coastal areas (Mauritania) and up to +4°C in the inland countries of Mali, Chad, Burkina Faso, and Niger. The summer months (June-September) will experience maximum warming. There will be a decrease in the frequency of days and nights that are considered ‘cold’; in much of the region ‘cold’ nights will not occur at all by the 2090s.

Precipitation and Rainfall Pattern. There is not a similar consensus on rainfall as there is for a rise in temperature, however, for the western-most Sahel most models agree on a significant decline in annual precipitation. Rainfall projections are hampered by the lack of data and in-depth understanding of the interplay of the three processes of the West Sahelian rainfall: a flow of moist air from the south associated with the west African monsoon, the seasonal movement of the Intertropical Convergence Zone (ITCZ) and a dry advection from the Sahara (Harmattan). While there are differences, the projections are suggesting a decrease in rainfall, particularly in the northern region of the Sahel, with some areas in the southern Sahel receiving moderately higher although erratic rainfall.

Declining access to water. By 2030-2050, it is anticipated that changes in temperature and precipitation due to climate change will have variable impacts on surface water levels in different areas of the region. In general, river basins and their water supplies in the Sahel, and particularly in the Western Sahel, will be very vulnerable to climate change because of the projected higher temperatures and lower precipitation by the 2050s. Climate variability and change - in addition to stressors such as population and economic growth, poor water management and infrastructure, inefficient water provision, inadequate joint management of basin resources, declines in groundwater, and land use/land cover changes - are expected to further reduce river basin water supply in the future. Climate change is estimated to contribute to the projected decline in river flows of 15-20% for 2020 and of 20-40% by 2050.

Extreme events. Droughts are likely to increase in severity with a decrease in rainfall and increase in temperature, particularly during the summer.
Rising sea levels. Overall, for Africa due to increased ocean warming and increased loss of glaciers and ice sheets, the rate of sea level rise will very likely exceed that observed during the past three decades. The IPCC (2014) projects a sea level rise between 18 and 59 cm by 2100 which in the West Africa Sahel will threaten the coastal zone of Mauritania with possible sea level rise of up to 14.4 cm by 2050 increasing coastal erosion, affecting settlements, and increasing saline intrusion, which in turn affect groundwater, infrastructure and ecosystems along the coast. Similar sea level rise is anticipated along the Niger coastal areas raising deep concerns over climate risks to its large coastal cities, populations, and industries.

Socio-economic and political vulnerability

Climate vulnerability is the result of the complex interplay between the short and longer-term trends of climate change (e.g. heat, drought, erratic rainfall, sea level rise) and the socio-economic and political factors that enable effective adaptation. The West African Sahel is a region of rapidly growing populations, poverty, food insecurity, gender inequality, illiteracy, conflict, and political instability. Of the West Africa Sahel countries (see Table 3), three (Burkina Faso, Chad, and Niger) rank in the bottom five countries of

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Table 2. Climate Change in the West Sahel Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Temperature (increase)</th>
<th>Precipitation</th>
<th>Rainfall pattern</th>
<th>Extreme Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burkina Faso</td>
<td>3.4°C (2080-2099)</td>
<td>Models inconsistent; likely less rainfall;</td>
<td>Increase in climate variability; longer dry periods and drought</td>
<td>Increase in temperature and drought</td>
</tr>
<tr>
<td>Chad</td>
<td>1.0-3.4°C by 2060s</td>
<td>-15 mm to +9 mm per month by the 2090s</td>
<td>The amount of rain that falls in ‘heavy’ rainfall events is projected to increase in southern Chad but decrease in northern Chad; increase in drought</td>
<td>Heat wave durations to increase over all of Chad by 2065 and 2100 with central-northern Chad to experience the largest increases in the length of heat waves</td>
</tr>
<tr>
<td>Mali</td>
<td>1.2 to 3.6°C (2060)</td>
<td>Models inconsistent; likely less rainfall</td>
<td>Erratic rainfall</td>
<td>More frequent and longer droughts</td>
</tr>
<tr>
<td>Mauritania</td>
<td>0.5 to 2°C (2040)</td>
<td>Models inconsistent; likely less rainfall in eastern areas</td>
<td>Erratic rainfall</td>
<td>Increase in sea level rise and flooding; coastal erosion; increased saline intrusion, largest cities at risk</td>
</tr>
<tr>
<td>Niger</td>
<td>1.1°C by 2020-2049</td>
<td>Models inconsistent</td>
<td>Rainfall is projected to begin later in the rainy season</td>
<td>Increase in drought frequency; Heat wave duration increase by middle and late 21st century</td>
</tr>
<tr>
<td>Nigeria (North/Northeastern)</td>
<td>1.1°C by 2060s; 1.4°C by 2090s</td>
<td>Models inconsistent; north and south variability with drier north;</td>
<td>Lower and erratic rainfall in the north</td>
<td>Heat wave duration projected to increase by middle (2046-2065) and late 21st century (2081-2100); longest increase in length of heat waves in northern Nigeria</td>
</tr>
</tbody>
</table>

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40 USAID (2017); World Bank Climate Change Knowledge Portal (2018) available at http://sdwebx.worldbank.org/climateportal/countryprofile/home.cfm?page=country_profile&CCode=MRT&ThisTab=ImpactsVulnerabilities
41 Models inconsistent; likely less rainfall;
42 Temperature reference 1980-1999;
43 temperature reference 1986-2005;
44 Temperature reference 1976-2005;
45 Temperature reference 1986-2005;
46 Temperature reference 1986-2005;
47 Temperature reference 1986-2005;
48 Temperature reference 1986-2005;
49 Temperature reference 1986-2005;
50 Temperature reference 1986-2005;
51 Temperature reference 1986-2005;
52 Temperature reference 1986-2005;
the global Human Development Index (HDI), one (Mali) in the bottom 10% and two (Mauritania and Nigeria) in the bottom 20%.\textsuperscript{55} Also, the West Sahelian countries\textsuperscript{56} all rank in the bottom 25% of the Gender Inequality Index of the HDI. Within Africa four of the West Sahelian countries (Chad, Mali, Mauritania, and Niger) are in bottom 10 (of 52) African countries in the Africa Gender Equality Index (AGEI) with only Burkina Faso and Nigeria ranking in the top 50%. The OECD Social institutions and Gender Index (SIGI) for West Africa had similar results (see Map 6) citing very high level of discrimination for women in Chad, Mali, Mauritania, Niger and Nigeria and a high level of discrimination in Burkina Faso in customary practices, social norms, in addition to discriminatory legal frameworks and poor implementation measures\textsuperscript{57}.

The instability of the West Sahel is reflected in the fragile state index ranking of its countries. Globally, Chad is ranked as one of the ten most fragile states with Niger and Nigeria ranked as being among the twenty most fragile states. None of the three remaining countries (Burkina Faso, Mauritania and Mali) have a ranking below 44, placing all three within the 25% most fragile countries in the world. Due to its population growth rates, the West Sahel population (excluding Nigeria) of 81.069.984 is projected to more than double to 198.282.000 by 2050, placing an increasing number of people, already struggling with food insecurity, at risk to the consequences of climate change.

As in other regions in Africa (e.g. Greater Horn of Africa) the demographic, political instability and conflict, poverty, and climate change trends of the countries of the West Sahel are structural challenges that are interacting and driving one another to the detriment of its people\textsuperscript{58}. Climate change acts as a threat multiplier amplifying pre-existing vulnerabilities such as food insecurity and political instability.

Table 3. Socio-Economic Situation in the Sahel

<table>
<thead>
<tr>
<th></th>
<th>Burkina Faso</th>
<th>Chad</th>
<th>Mali</th>
<th>Mauritania</th>
<th>Niger</th>
<th>Nigeria</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (PPP)\textsuperscript{59}</td>
<td>1771</td>
<td>1990</td>
<td>2125.7</td>
<td>3852.5</td>
<td>986</td>
<td>5861.1</td>
</tr>
<tr>
<td>Population (2018 est)\textsuperscript{60}</td>
<td>19,751,651</td>
<td>15,335,184</td>
<td>19,107,706</td>
<td>4,540,068</td>
<td>22,311,375</td>
<td>19,751,651</td>
</tr>
<tr>
<td>Pop. growth rate\textsuperscript{61}</td>
<td>2.9</td>
<td>3.1</td>
<td>3.0</td>
<td>2.8</td>
<td>3.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Pop. 2050\textsuperscript{62}</td>
<td>43,207,000</td>
<td>33,636,000</td>
<td>44,020,000</td>
<td>8,965,000</td>
<td>68,454,000</td>
<td>410,638,000</td>
</tr>
<tr>
<td>Pop. Density\textsuperscript{63}</td>
<td>68</td>
<td>11</td>
<td>15</td>
<td>4</td>
<td>16</td>
<td>204</td>
</tr>
<tr>
<td>Human Development Index (HDI) (2016)\textsuperscript{64} (188 countries)</td>
<td>185</td>
<td>186</td>
<td>175</td>
<td>157</td>
<td>187</td>
<td>152</td>
</tr>
<tr>
<td>Corruption Perception Index (CPI) (2017)\textsuperscript{65} (180 countries)</td>
<td>72</td>
<td>159</td>
<td>116</td>
<td>143</td>
<td>101</td>
<td>148</td>
</tr>
<tr>
<td>Gender Inequality Index (GII) (2016)\textsuperscript{66} (188 countries)</td>
<td>146</td>
<td>157</td>
<td>156</td>
<td>147</td>
<td>157</td>
<td>n.a.</td>
</tr>
<tr>
<td>Africa Gender Equality Index (2015)\textsuperscript{67} (52 countries)</td>
<td>22</td>
<td>44</td>
<td>50</td>
<td>46</td>
<td>45</td>
<td>23</td>
</tr>
<tr>
<td>Fragile State Index (2017)\textsuperscript{68} (178 countries)</td>
<td>44</td>
<td>8</td>
<td>31</td>
<td>28</td>
<td>20</td>
<td>13</td>
</tr>
</tbody>
</table>

\textsuperscript{55} http://hdr.undp.org/en/content/human-development-index-hdi
\textsuperscript{56} Nigeria is not assigned a ranking in the GII.
\textsuperscript{58} National data.
\textsuperscript{59} https://data.worldbank.org/indicator/NY.GDP.PCAP.PPP.CD
\textsuperscript{60} World Population Review 2018 estimates http://worldpopulationreview.com/countries/
\textsuperscript{61} https://data.worldbank.org/indicator/SP.POP.GROW
\textsuperscript{63} https://data.worldbank.org/indicator/SE.ADT.LITR.ZS
\textsuperscript{64} http://hdr.undp.org/en/content/human-development-index-hdi
\textsuperscript{65} https://www.indexmundi.com/facts/indicators/SE.ADT.LITR.ZS/rankings
\textsuperscript{66} Developed by the African Development Bank, it reflects the status of women along three dimensions of equality: economic opportunities, social development, and law and institutions. The index ranks 52 African countries according to their overall score and to these distinct dimensions of equality. Available at https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/African_Gender_Equality_Index_2017-EN.pdf
\textsuperscript{67} http://fundforpeace.org/fsi/
\textsuperscript{68} https://www.indexmundi.com/facts/indicators/SE.ADT.LITR.ZS/rankings
In the West Sahel, economic reliance on farming and pastoralism link livelihoods and food security to weather trends and environmental conditions. Agriculture is vitally important to national economics and livelihoods in the West Sahel contributing about 40% of the combined regional GDP and engaging more than 70% of the labor in Niger, Burkina Faso, Mali and Chad and over 50% in Mauritania. Agriculture plays a less important role in Nigeria, contributing less than 25% to the GDP and employing around 20% of labor. However, agriculture and livestock play a more important role in the north of the country (the most vulnerable region to climate change) than in its southern part. Farming in the West Africa Sahel is practiced down to the 350 mm rain belt while pastoralism provides the principal livelihood below the agriculture threshold (see Map 4). Agriculture in the West Sahel is almost entirely rain-fed and reliant on the limited three to four months of increasingly variable summer rainfall (June-September) making it highly vulnerable to climate variability and putting at risk the large percentage of the region’s people that rely on agriculture as their primary source of livelihood. The generally nutrient limited soils in the regions, which are being degraded by overgrazing, continuous cropping, and deforestation, will be further threatened by desertification and sand intrusion brought about by reduced precipitation and higher temperatures. The degraded environmental conditions have fostered the growing pattern of north-south and rural urban migration taking place in the regions, especially within Niger, Burkina Faso and Mali (see below).

Burkina Faso, Chad, Mali and Niger are the major cereal producers in the region and export to the neighboring countries. Staple dryland crops include millet, sorghum and cowpeas, with cotton and groundnut the major cash crops. Agricultural productivity in the region is already low by global standards and anticipated to fall even further due to the impact of climate change, not only because of the biophysical changes, but the limited economic and institutional capacity to cope with and adapt to climate variability and change. Examples of the impact in countries in the West Sahel include:

- Decrease in millet and sorghum yield by 15-25% by 2080 in the region;
- Chad and Niger could potentially lose their entire rain-fed agriculture by 2100, while the cereal harvest in Mali might decline by 30%.

Livestock rearing plays a significant role in the West Sahel region contributing up to 10-15% of GDP in Burkina Faso, Chad, Mali and Niger, and a larger share in Mauritania where 50% of the population is pastoralist. Pastoralism has a long history in the West Sahel as livestock were moved from northern to southern pastoral areas during the dry season and back north during the wet season. The seasonal movement usually follow a similar pattern from year to year, over areas known to the herders (see Map 7). Climate change threatens livestock production by affecting forage and fodder production, water availability, and livestock productivity (e.g. decreased milk production fertility, fitness, and longevity, and reduced calving rates). As drought and reduced rainfall diminish and alter traditional grazing areas and water resources, pastoral communities are increasingly under threat of losing their livelihoods and coming into conflict with settled agrarian communities as land degradation and competition over water and land resources increase (see below).

In the West Sahel climate change does not affect all people equally. Women are among the most vulnerable. Existing social and economic disparities, which are the result of their limited access to land, credit, technology and low level of participation in decision-making, significantly reduce their ability to be resilient to external shocks. Their role as primary caregivers and providers of food and fuel make them more vulnerable when droughts and floods occur. Resource shortages force women and girls to spend more time and go further to collect water and fuel wood. Increasingly long dry seasons and drought place greater demands on rural women to support their families as men migrate to urban areas for work (see below). Since women are more likely to experience poverty it is more difficult to recover from climate-related disasters.

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29 USAID (2017)
30 UNEP (2011)
32 USAID (2017)
33 USAID (2017); UNEP (2011); OECD (2018).
Climate change, conflict and migration

The relationship between climate change, conflict and migration is complex. Steady urbanization and long-established international, intra-regional and circular migration between rural and urban areas are important and ongoing demographic trends. In the past and present, West Sahel livelihood strategies have included migration. Pastoralists, as noted above, seasonally move their herds. Predating colonialism, in response to the extremely seasonal and unimodal distribution of rainfall, ‘circular migration’ is a common practice in which people travel long distances, especially to towns and to work by the roadsides, to seek work or alternative sources of income during the agricultural off-season when they are unable to grow food. For agricultural households particularly vulnerable to rainfall variability, this seasonal migration also establishes social and economic networks and provides a hedge against the frequent droughts that occur in the region. Climate change is expected to intensify the conditions which result in migration, in particular in the poorest and most climate-vulnerable areas. Climate variability, particularly multi-seasonal drought in dryland areas, is anticipated to increase the pace of internal migration and the refugee flows in the region.

In response to crises and opportunities, there is robust long-term rural-urban migration as well as migration within the region and a much smaller migration to the OECD countries. Over the past 60 years, urbanization has fundamentally changed West Africa with the number of people living in cities increasing from 5 million in 1950 to 133 million in 2010. During the same period the number of towns and cities with more than 10,000 inhabitants grew from 159 to close to 2,000, the large majority of which are secondary cities and small towns. Urbanization in the four internal Sahelian countries (±20% Burkina Faso, Mali, Niger, and Chad) are lower than those countries with coastal areas (±30% Mauritania and Nigeria).

In West Africa the majority of people who leave their country stay within the region. The south-south migration is seven time greater than flows from West Africa to other parts of the world, including Europe. Of the West Sahel countries, Burkina Faso and Mali have the highest percentage of migrant populations (9.6% and 5.1%) with Cote d’Ivoire the top regional destination for both. Italy, France and Germany were the destination OECD countries for Burkina Faso and France and Spain for Mali.

Analysis by the International Organization for Migration (IOM) and a recent study by the World Bank suggest, as noted above, that ‘environmental’ migration is primarily internal (with the country) with a smaller proportion moving cross border, principally to neighboring countries. As reflected in past and current trends, migration can be temporary or permanent depending on the environmental trigger. In the West Sahel it is anticipated that there will be an increase in rural-urban migration in response to an increase in climate-related risks. This will increase the pressure on urban areas as anticipated crop failures and high livestock mortality will encourage rural to urban migration, placing increasing pressure on urban employment, housing, energy, health and sanitation.

However, also cities may become areas of out-migration as a result of climate-related risks such as water scarcity, flooding and high temperatures.

Conflict. Competition over resources such as land and water is driven by a number of factors. In the Sahel there has been an increase in tensions between pastoralist and farmers.
with increasing competition for land and water. Northern pastoralists are extending further southwards (see Map 7) into areas traditionally dominated by crop agriculture. In southern Mali, for example, farmers are expanding crop production into migratory corridors traditionally used by herders. Expansion into pastoralist areas is fragmenting the migratory routes of pastoralists, triggering grievances and tension, while of movement of livestock into crop fields threatens farmer income\(^{100}\).

It is well-accepted that climate change can fuel existing tensions such as that between pastoralists and farmers and there is on-going analysis and discussion as to the complex and intertwined relationship between climate change and armed conflict\(^{99}\). There is agreement that areas in which there is conflict, such as in Chad and Northeastern Nigeria, are more vulnerable to the effects of changing climate conditions compared to more politically stable areas. It is also recognized that climate change is the ‘ultimate threat multiplier’ with extreme weather events and sea level rise resulting in livelihood insecurity and migration, fueling local resource and transboundary water competition, and driving up food prices\(^{100}\). A prevailing view suggests that while the root causes of conflict are more historical and political, climate-related factors such as drought, flood, and migration often heighten conflict\(^{100}\)\(^{99}\). Under certain conditions (e.g. history of violence, low levels of development, poor governance and inequality) climate change can increase the risk of conflict and affect the dynamics of conflict, including the conflict’s duration, severity and likelihood of ending quickly\(^{99}\)\(^{100}\). When institutions cannot address the shocks brought about by climate change, even stable states can be ‘pushed to fragility’\(^{100}\).

**Lake Chad.** The shrinking of Lake Chad and its far-reaching consequences is an often-cited example of how a combination of weak institutions, poor resource management, population growth and pressure, climate change and violent extremism can result in a disastrous social, economic and political situation (see Maps 8 and 9). Lake Chad Basin is currently one of the most unstable areas in the world. There are 2.3 million displaced people and around 4.5 million people across the conflict-hit region are food insecure, still needing food assistance as armed attacks and insecurity continue\(^{107}\).

Lake Chad sits in the Chad Basin near Niger, Nigeria and the Cameroon\(^{108}\). The Lake Chad Basin is the largest inland drainage area in Africa and covers an area of 2,434,000 km\(^2\), equal to 8% of the total area of the African continent. The basin extends through seven countries: Algeria, Cameroon, Niger, Nigeria, Central Africa Republic, Chad, and Sudan\(^{99}\). The water level is largely the result of the inflow from the Chari River from the south and, seasonally the Komodugu-Yobe river from the northwest. Rainfall also reaches the lake from smaller tributaries and groundwater discharge\(^{99}\). Inflow fluctuates with the shifting patterns of rainfall associated with the West African Monsoon, making it very sensitive to drought with years of little rain having a direct relationship with the water supply\(^{111}\).

The Lake Chad Basin Commission (LCBC) was established by Cameroon, Niger, Nigeria, and Chad\(^{99}\) in 1964 with the objective to i) sustainably and equitably managing the lake’s natural resources; ii) preserving the lake’s ecosystems; and iii) promoting economic integration and peace between the founding countries\(^{111}\). However, the Lake Chad Basin Commission manages only about 20% (427,500 km\(^2\)) of the total area of the basin. Underfunded with little authority, the LCBC has only minimal influence on the area under its management.

Since 1963 when Lake Chad spanned an estimated 25,000 km\(^2\), it has contracted by over 90 percent, down to 1,350 km\(^2\). In addition to a decline in rainfall for much of the period, resource misuse and overuse as well as the increased demand for water associated with population growth contributed to this massive contraction. Between 1983 and 1994, the volumes of water used for irrigation were four times larger than during the previous 25 years. The population in the region increased from 13 million in 1960 to more than 35 million in 2007 and is expected to continue to grow by another 75 percent by 2025\(^{114}\). The reduction in the size of the lake has severely threatened the resources and livelihoods of the population.

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\(^{99}\) Crawford (2015)

\(^{100}\) UNEP (2011).


\(^{101}\) USAID (2013)


\(^{103}\) Planetary Security Initiative (2017)

\(^{104}\) OCHA (2018) Lake Chad Basin: Crisis Overview (March 26, 2018) Available at https://public.tableau.com/profile/burnou.syz865ch/ vizhome/lcb_snapshot/Tableadebords

\(^{105}\) K. Hansen (2017). The Rise and Fall of Africa’s Great Lake. Earth Observatory. Available at https://earthobservatory.nasa.gov/features/LakeChad

\(^{106}\) USAID (2013)

\(^{107}\) Hansen (2017)

\(^{108}\) Hansen (2017)

\(^{109}\) In 1996, the Central African Republic became a member of the Lake Chad Basin Commission, followed by Libya in 2008.

\(^{110}\) USAID (2013)

\(^{111}\) UNEP (2011)
in the Lake Chad region\textsuperscript{19} . The drying-up of the Northern half\textsuperscript{20} of the Lake caused migration to the remaining Southern shores, intensifying pressure on resources for agriculture, fishing, and livestock breeding in the rest of the lake area and related conflicts with spill over migration to Europe\textsuperscript{21} . As the receding waters exposed new islands, land ownership issues created tensions between Cameroonian, Chad, Niger and Nigeria\textsuperscript{22} . The lack of capacity of existing political institutions to resolve these competing claims increased the likelihood of violent conflicts over resources. Disputes focusing on land and on fish catches and on access to and use of water, are occurring regularly. Numerous conflicts have broken out among pastoralists and farmers, and between different ethnic groups in Niger, because of the loss of the lake and its resources\textsuperscript{23} .

Conflicts over the diminished and degraded resources are occurring within the larger political context of the Boko Haram, the greater majority of whom are of the Kanuri ethnic group which historically resided in the Lake Chad Basin area. Recent analysis\textsuperscript{24} suggests that non-state armed groups, such Boko Haram, thrive in a fragile environment such as Lake Chad in which resource scarcity erodes the livelihoods of many people, aggravates poverty and unemployment, leads to population displacement, and increases local competition for land and water that often fuels social tensions and even violent conflict. In this context Boko Haram can operate more easily and engage not only in acts of violence but also in transnational organized crime. At the same time, as climate change degrades yields from agriculture, cattle rearing and fisheries, many people are left unemployed, with few economic opportunities and low levels of education making them extremely vulnerable not only to negative climate impacts but also to recruitment from terrorist groups such as Boko Haram\textsuperscript{25} .

National Strategies and Policies

All the countries in the West Sahel have ratified the UN Convention on Biological Diversity (CBD), the Convention to Combat Desertification (CCD), the Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The countries have also signed and ratified the Paris agreement on climate change. Four of the countries (Burkina Faso, Chad, Mali, and Nigeria) have prepared two National Communications to the UNFCCC; Mauritania and Niger have prepared a Third National Communication. Burkina Faso is the only country in the region that has submitted a National Adaptation Plan (NAP)\textsuperscript{26} and Mali the only one that submitted Nationally Appropriate Mitigation Actions (NAMA\textsuperscript{27} ) to the UNFCCC\textsuperscript{28} .

In addition to the reports and commitments submitted to the UNFCCC, West Sahel countries have prepared national climate change-related strategies, policies and actions:

- **Burkina Faso** has prepared a number of strategies and proposed actions: Strategic Framework for Investment in Sustainable Land Management (SFI-SLM); Strategy for Accelerated Growth and Sustainable Development (SAGSD); National Adaptation Plan (NAP); National Action Programme for Adaptation for Climate Change (NAPA) (2007);
- **Chad**\textsuperscript{29} : Country Resilience Priorities (PRP) AGIR CHAD (2020); National Investment Plan for the Rural Sector (PNISR) (2014 - 2020); National Adaptation Programme of Action for Climate Change (NAPA);
- **Mali - National Policy on Climate Change (2008)**; National Climate Change Strategy (2011)\textsuperscript{30};
- **Mauritania**: prepared one of the first National Action Programme for Adaptation (NAPA) (2004) submitted to the UNFCCC; National Environmental Action Plan (PANE);
- **Niger**: National Action Programmes for Adaptation (NAPAs); Strategic Framework for Sustainable Land Management (SF-SLM);


\textsuperscript{20} UNEP (2011)

\textsuperscript{21} UNEP (2011)

\textsuperscript{22} M. Sow (2017). Brookings : Africa in Focus, website article \url{https://www.brookings.edu/blog/africa-in-focus/2017/02/09/figure-of-the-week-the-shrinking-lake-chad/}

\textsuperscript{23} The area which has been the Northern lake is now a desert.

\textsuperscript{24} The area which has been the Northern lake is now a desert.


\textsuperscript{26} The results of a two-year G-7 Climate-Fragility Risk Assessment on Lake Chad (2017-2019) will be reported at the Planetary Security Initiative conferences. \url{https://www.adelphi.de/en/in-focus/g7-lake-chad-risk-assessment-project}

\textsuperscript{27} UNEP (2011)

\textsuperscript{28} See the Adaptation Partnership (2011) review of the Adaptation strategies and proposed actions. Available at \url{https://www.preventionweb.net/files/256274_chad.pdf}

\textsuperscript{29} See the Adaptation Partnership (2011) review of the Adaptation strategies and proposed actions. Available at \url{https://www.preventionweb.net/files/256274_chad.pdf}

\textsuperscript{30} Two projects for preparation: renewable energy and energy efficiency; forestry sector. Available at \url{http://www4.unfccc.int/nap/Documents/Parties/PNA_Version_version%20finale[Transmission].pdf}

\textsuperscript{31} Two projects for preparation: renewable energy and energy efficiency; forestry sector. Available at \url{http://www4.unfccc.int/nap/Documents/Parties/PNA_Version_version%20finale[Transmission].pdf}

\textsuperscript{32} Two projects for preparation: renewable energy and energy efficiency; forestry sector. Available at \url{http://www4.unfccc.int/nap/Documents/Parties/PNA_Version_version%20finale[Transmission].pdf}

\textsuperscript{33} See the Adaptation Partnership (2011) review of the Adaptation strategies and proposed actions. Available at \url{https://www.preventionweb.net/files/256274_chad.pdf}

\textsuperscript{34} Mali Ministry of Environment and Sanitation (2011) : Stratégie Nationale Changements Climatiques – Mali. \url{http://narm.upd.org/document/download/261}

Nationally Determined Contributions (NDC)

Prior to COP21 in Paris at the end of 2015, all the West Sahel countries submitted an Intended Nationally Determined Contribution (INDC) to UNFCCC, which they later submitted as their First NDC. In their NDCs the countries stressed their vulnerability to climate change, especially for food security, and while committing to do their fair share for emissions, highlighted adaptation as the priority and included adaptation actions. While the proposed NDC adaptation actions reflect each country’s priorities (see Table 4), there are similar actions for large scale restoration of degraded lands, including afforestation/reforestation/agroforestry and improved pasture; climate-smart or conservation agriculture including improved seeds, crop diversification and for livestock, rotational grazing; water harvesting and efficiency; and early warning systems.

Although low emissions countries, each makes a commitment to lower emissions taking into consideration their business-as-usual scenario. As with proposed adaptation actions, while the NDCs reflect each of the country’s priorities, there are similar interests and actions in renewable energy, energy efficiency, transport, and reforestation/afforestation (to mitigate emissions). The majority of the proposed mitigation and adaptation actions are conditional, requiring significant international finance and technical assistance for implementation (see Table 4).

Table 4. NDC Targets and Priorities

<table>
<thead>
<tr>
<th>NDC</th>
<th>Targets and Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mitigation</strong></td>
<td><strong>Adaptation</strong></td>
</tr>
<tr>
<td><strong>Burkina Faso</strong></td>
<td>11/11/2016</td>
</tr>
<tr>
<td><strong>Chad</strong></td>
<td>12/01/2017</td>
</tr>
</tbody>
</table>

127 https://cgspace.cgiar.org/handle/10568/68165
129 http://www4.unfccc.int/ndcregistry/Pages/Home.aspx
130 Target year: 2030 except for Niger which includes targets for 2020 and 2030
131 NDCs are posted on the NDC registry, UNFCCC. Available at http://www4.unfccc.int/ndcregistry/Pages/Home.aspx
133 Targets and priorities in agriculture, water, sustainable land management.
<table>
<thead>
<tr>
<th>Country</th>
<th>Submission Date</th>
<th>Reduction Goals</th>
<th>Mitigation Goals</th>
<th>Adaptation Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mali</td>
<td>23/09/2016</td>
<td>29% reduction in emissions by 2030</td>
<td>Agriculture: - 92,000 ha under climate smart agriculture and sustainable land management; - Improve livestock rotation over grazelands to reduce farmer-livestock conflict over 400,000 ha; - Improved crop and livestock varieties; - Small scale agricultural development, including fruit trees for reforestation, and vegetation cover and erosion prevention (post 2020); Land use and forestry: - Anti-desertification and protection of 9 million ha; - Reforestation of 325,000 ha.</td>
<td>Water and water supply: - Rainwater harvesting and storage to ensure universal potable water access; - 75,000 rural households have drinking water from drinking water systems and water collection structures; - Watershed management (post-2020)</td>
</tr>
<tr>
<td>Mauritania</td>
<td>27/02/2017</td>
<td>22.3% reduction of which 12% unconditional 88% conditional</td>
<td>Agriculture and land management: - Aerial seeding of degraded land (10,000 ha per year) to promote regeneration of the natural environment; - Restoration of natural pastures (deferred grazing and rangeland management); - Exploration of aquifers (drilling)</td>
<td>Fisheries and aquaculture: - Promotion of fish-farming and responsible fishing on Lake Foum Gleita; Water and water management: - Rehabilitation and integrated management of sustainable wetlands against the effects of climate change; - Drinking water supply systems in rural areas equipped with solar energy; Climate risk management: - Protecting cities of Nouakchott and Nouadhibou against risks marine emersion and silting;</td>
</tr>
<tr>
<td>Niger</td>
<td>21/09/2016</td>
<td>2.5% unconditional 25% conditional 2030 reductions: 3.5% unconditional 34.6% conditional</td>
<td>Agriculture and sustainable land management: - Restoration of agricultural/forestry/pastoral lands: 1,030,000 ha.; - Assisted natural regeneration: 1,100,000 ha.; - Fixation of dunes: 550,000 ha.; - Management of natural forests: 2,220,000 ha.; - Hedgerows: 145,000 km.; - Planting of multiuse species: 750,000 ha.; - Planting of Moringa oleifera: 125,000 ha.; - Seeding of roadways: 304,500 ha.; - Private forestry: 75,000 ha.</td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>05/05/2017</td>
<td>45% reduction 20% unconditional 25% conditional</td>
<td>Agriculture: - Adopt improved agricultural systems for both crops and livestock (e.g. diversify livestock and improve range management); - Increase access to drought resistant crops and livestock feeds; - adopt better soil management practices; - provide early warning/meteorological forecasts and related information; - Implement strategies for improved resource management (e.g., water efficiency of irrigation systems; increase rainwater &amp; sustainable ground water harvesting); - Increase planting of native vegetation cover &amp; promotion of re-greening efforts; - Focus on agricultural impacts in the savanna zones, particularly the Sahel, the areas that are likely to be most affected by the impacts of climate change.</td>
<td></td>
</tr>
</tbody>
</table>
Climate Finance and key projects

All the countries in the West Sahel are engaged in seeking international climate finance for programs and activities (e.g. all have a nationally designated authority (DNA) for the Green Climate Fund and the Adaptation Fund). All the countries have received international finance for climate related projects.

Table 5: Internationally financed climate projects in the West Africa Sahel

<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Fund (implementing agency)</th>
<th>Funding Approved (USD millions)</th>
<th>Date of project approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGW: Community Based Rural Development Project 3rd Phase with Sustainable Land</td>
<td>GEF-5^135 (World Bank)</td>
<td>7.4</td>
<td>2012</td>
</tr>
<tr>
<td>and Forestry Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrating Climate Resilience into Agricultural and Pastoral Production for</td>
<td>GEF-5 (FAO)</td>
<td>3.8</td>
<td>2014</td>
</tr>
<tr>
<td>Food Security in Vulnerable Rural Areas Through the Farmers Field School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strengthening Climate Information and Early Warning Systems in Africa for</td>
<td>GEF-5 (UNDP)</td>
<td>4</td>
<td>2013</td>
</tr>
<tr>
<td>Climate Resilient Development and Adaptation to Climate Change - Burkina Faso.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adapting Natural Resource Dependent Livelihoods to Climate Induced Risks in</td>
<td>GEF-5 (UNDP)</td>
<td>7</td>
<td>2014</td>
</tr>
<tr>
<td>Selected Landscapes in Burkina Faso: the Boucle du Mouhoun Forest Corridor and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the Mare d’Oursi Wetlands Basin.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gazetted Forests Participatory Management Project for REDD+ (PGFC/REDD+)</td>
<td>Climate Investment Funds:</td>
<td>12</td>
<td>2013</td>
</tr>
<tr>
<td>Forest Investment Program (African Development Bank)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Africa Hydromet Program-Strengthening Climate Resilience in Sub-Saharan Africa:</td>
<td>Green Climate Fund (World Bank)</td>
<td>25</td>
<td>2018-2023</td>
</tr>
<tr>
<td>Burkina Faso Country Project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chad 139 140</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCB-NREE Chad Child Project: Integrated Management of Natural Resources in the</td>
<td>GEF-5 (African Development Bank)</td>
<td>2.6</td>
<td>2016</td>
</tr>
<tr>
<td>Lake Chad Basin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restoring Ecological Corridors in the Mayo-Kebbi Quest, Chad, to Support</td>
<td>GEF-6 (IUCN)</td>
<td>5.37</td>
<td>2018</td>
</tr>
<tr>
<td>Multiple Land and Forests Benefits - RECONNECT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chad National Adaptation Plan</td>
<td>GEF-6 (UNDP)</td>
<td>5.78</td>
<td>2018</td>
</tr>
<tr>
<td>Restoring Ecological Corridors in the Mayo-Kebbi Quest, Chad, to Support</td>
<td>GEF-6 (IUCN)</td>
<td>5.37</td>
<td>2018</td>
</tr>
<tr>
<td>Multiple Land and Forests Benefits - RECONNECT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhancing the Resilience of the Agricultural Ecosystems</td>
<td>GEF-5 (IFAD)</td>
<td>7.3</td>
<td>2015</td>
</tr>
</tbody>
</table>

^135 https://www.thegef.org/country/burkina-faso
^136 https://www.adaptation-fund.org/adaptation-fund-in-djibouti/
^138 Global Environment Facility
^139 https://www.thegef.org/country/chad
<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Fund (implementing agency)</th>
<th>Funding Approved (USD millions)</th>
<th>Date of project approval (GEF) / Implementation dates (others)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mali</strong> 141 142 143 144</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MALI First Biennial Update Report</td>
<td>GEF-6 (UNDP)</td>
<td>352</td>
<td>2015</td>
</tr>
<tr>
<td>Flood Hazard and Climate Risk Management to Secure Lives and Assets in Mali</td>
<td>GEF-5 (UNDP)</td>
<td>8.9</td>
<td>2016</td>
</tr>
<tr>
<td>Promoting Sustainable Electricity Generation in Malian Rural Areas through Hybrid Technologies</td>
<td>GEF-5 (UNDP)</td>
<td>1.16</td>
<td>2016</td>
</tr>
<tr>
<td>GGW Natural Resources Management in a Changing Climate in Mali</td>
<td>GEF-5 (World Bank)</td>
<td>8.43</td>
<td>2013</td>
</tr>
<tr>
<td>Strengthening the Resilience of Women Producer Groups and Vulnerable Communities in Mali</td>
<td>GEF-5 (UNDP)</td>
<td>5.46</td>
<td>2014</td>
</tr>
<tr>
<td>Strengthening Resilience to Climate Change through Integrated Agricultural and Pastoral Management in the Sahelian zone in the Framework of the Sustainable Land Management Approach</td>
<td>GEF-5 (FAO)</td>
<td>2.17</td>
<td>2014</td>
</tr>
<tr>
<td>Programme support for climate change adaptation in the vulnerable regions of Mopti and Timbuktu</td>
<td>Adaptation Fund</td>
<td>8.5</td>
<td>2015-2018</td>
</tr>
<tr>
<td>Rural Electrification Hybrid Systems</td>
<td>Climate Investment Funds: Scaling Up Renewable Energy Program (SREP)</td>
<td>15.4</td>
<td>2013</td>
</tr>
<tr>
<td>Africa Hydromet Program- Strengthening Climate Resilience in Sub-Saharan Africa: Mali Country Project</td>
<td>Green Climate Fund (World Bank)</td>
<td>22.8</td>
<td>2016-2020</td>
</tr>
<tr>
<td><strong>Mauritania</strong> 145 146</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promoting Sustainable Mini-grids in Mauritanian Provinces Through Hybrid Technologies</td>
<td>GEF-5 (UNDP)</td>
<td>1.27</td>
<td>2015</td>
</tr>
<tr>
<td>Development of an Improved and Innovative Management System for Sustainable Climate-resilient Livelihoods in Mauritania</td>
<td>GEF-5 (UNEP)</td>
<td>5</td>
<td>2017</td>
</tr>
<tr>
<td>Improving Climate Resilience of Water Sector Investments with Appropriate Climate Adaptive Activities for Pastoral and Forestry Resources in Southern Mauritania</td>
<td>GEF-5 (African Development Bank)</td>
<td>6.35</td>
<td>2014</td>
</tr>
<tr>
<td>Enhancing Resilience of Communities to the Adverse Effects of Climate Change on Food Security in Mauritania</td>
<td>Adaptation Fund (World Food Program)</td>
<td>7.8</td>
<td>2014-2018</td>
</tr>
</tbody>
</table>

141 https://www.thegef.org/projects?f][=field_country:102&f][=field_p focalareas:2207
142 https://www.adaptation-fund.org/project/programme-support-for-climate-change-adaptation-in-the-vulnerable-regions-of-mopti-and-timbuktu-
143 https://www.climateinvestmentfunds.org/projects/rural-electrification-hybrid-systems
144 https://www.greenclimate.fund/-/africa-hydromet-program-strengthening-climate-resilience-in-sub-saharan-africa-mali-country-project
145 https://www.thegef.org/projects?f][]=field_country:105&f][]=field_p focalareas:2207
<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Fund (implementing agency)</th>
<th>Funding Approved (USD millions)</th>
<th>Date of project approval (GEF) / Implementation dates (others)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niger: Food-IAP: Family Farming Development Programme (ProDAF)</td>
<td>GEF-6 (IFAD)</td>
<td>7.6</td>
<td>2016</td>
</tr>
<tr>
<td>Disaster Risk Management and Urban Development Project</td>
<td>GEF-5 (World Bank)</td>
<td>6.65</td>
<td>2013</td>
</tr>
<tr>
<td>Integrating Climate Resilience into Agricultural and Pastoral Production for Food Security in Vulnerable Rural Areas through the Farmers Field School Approach</td>
<td>GEF-5 (FAO)</td>
<td>3.8</td>
<td>2014</td>
</tr>
<tr>
<td>Scaling up Community-Based Adaptation (CBA) in Niger</td>
<td>GEF-5 (UNDP)</td>
<td>3.75</td>
<td>2014</td>
</tr>
<tr>
<td>Enhancing Resilience of Agriculture to Climate Change to Support Food Security in Niger, through Modern Irrigation Techniques</td>
<td>Adaptation Fund</td>
<td>9.9</td>
<td>2016-2021</td>
</tr>
<tr>
<td>Community Action Project for Climate Resilience (CAPCR)</td>
<td>Climate Investment Fund: Pilot Programme for Climate Resilience (PPCR) (IBRD)</td>
<td>63.4</td>
<td>2012-2017</td>
</tr>
</tbody>
</table>

**Nigeria**

<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Fund (implementing agency)</th>
<th>Funding Approved (USD millions)</th>
<th>Date of project approval (GEF) / Implementation dates (others)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food-IAP: Integrated Landscape Management to Enhance Food Security and Ecosystem Resilience in Nigeria</td>
<td>GEF-6 (UNDP)</td>
<td>7.14</td>
<td>2017</td>
</tr>
<tr>
<td>Sustainable Fuelwood Management in Nigeria</td>
<td>GEF-5 (UNDP)</td>
<td>4.4</td>
<td>2016</td>
</tr>
<tr>
<td>GGW: Nigeria Erosion and Watershed Management Project (NEWMAP)</td>
<td>GEF-5 (World Bank)</td>
<td>8.6</td>
<td>2012-2020</td>
</tr>
</tbody>
</table>

[5] LCB: Lake Chad Basin
Maps
**Map 1** The Sahel region

![Map of the Sahel region between 12°N and 20°N](image1.png)


**Map 2** Climate hotspots in the Sahel

![Climate hotspots in the Sahel](image2.png)

Map 3  Shift of climate zones to the south


Map 4  Livelihood systems in the Sahel

Map 5  Food insecurity in the West Sahel region


Map 6  Gender discrimination in the West Africa Sahel

Map 7  Pastoral seasonal migration in the West Sahel


Map 8  Location of Lake Chad

Map 9  The shrinking of Lake Chad

