

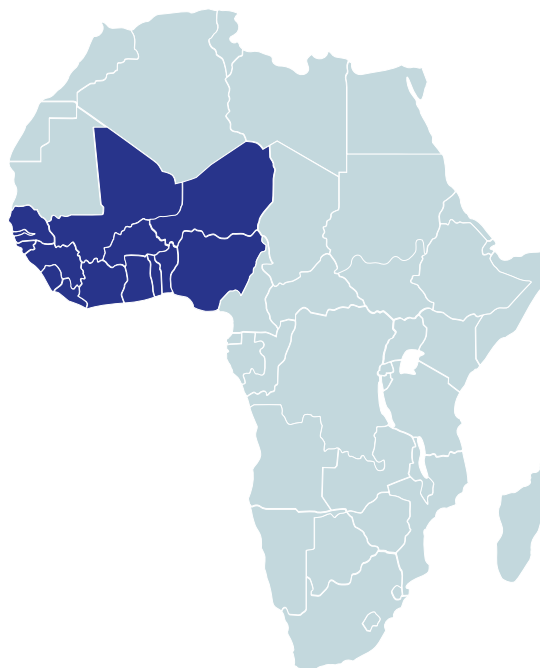
WEATHERING RISK

# Africa Climate Security Risk Assessment

Western Africa



# Western Africa



## Summary

### KEY CLIMATE IMPACTS



**Temperature:** Climate change has led to an increase in temperatures over Western Africa of between 1°C and 3°C since the 1970s. Temperatures are projected to rise with high certainty by between 0.6°C and 3.1°C by 2080 compared to the year 2000. Temperature rises will affect the entire region, although they will be less intense along the coast. In line with rising mean annual temperatures, the annual number of very hot days is also projected to increase with high certainty.



**Precipitation\*:** Although precipitation projections are highly uncertain, scenarios suggest an overall stagnation or decrease in precipitation in the near future, with a trend of lower rainfall in the west and higher rainfall in the east. Heavy precipitation events are expected to become more intense in Western Africa. At the same time, the number of days with heavy precipitation is expected to increase.



**Flooding\*:** The proportion of people in Western Africa exposed to flooding has grown substantially in recent decades, with the proportion of people exposed to flooding having increased by over 50 per cent in many countries between 2000 and 2015. With the projected increase in occurrence and intensity of heavy rainfall events – combined with longer and more intense periods of drought, and rapid population growth – the risk of urban and river flooding in Western Africa is expected to increase, and affect more and more people.



**Droughts\*:** The Sahel droughts of the 1970s and 1980s were some of the most significant climate anomalies of the 20th century. With a 40 per cent decrease in long-term average rainfall in the 1980s, these droughts had dire impacts on the population. Despite the recent recovery in the overall amount of precipitation, high interannual fluctuations between dry and wet phases remain recurrent. Climate projections, especially under a high-emissions scenario, point to an increase in meteorological droughts and rainfall deficits across large areas of Western Africa.

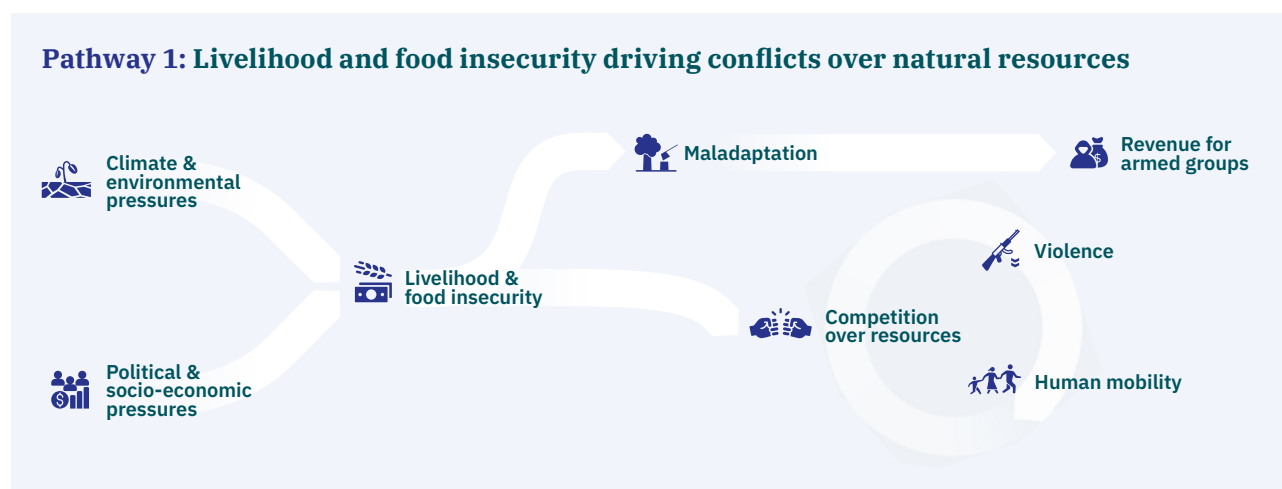


**Sea level rise:** Sea levels along the Western African coast have been rising at rates above the global average and have contributed to substantial shoreline erosion along some coasts. Under a low emissions scenario, sea level rise is projected to be 10 cm by 2030 and 34 cm by 2080, compared to the year 2000. Under a medium-to-high emissions scenario, the long-term rise will be significantly higher (40 cm). Consequently, by 2030, depending on future population growth in the region, between 43.6 million and 47.2 million people living in low elevation coastal zones will be exposed to sea level rise, making them highly vulnerable to frequent and severe flooding, and erosion. This increases the risks of drought and saline intrusion, which undermine agricultural productivity.

\* Climate projections with high uncertainty need to be interpreted with great caution. Please refer to the Annex for an explanation of uncertainty in climate projections.

## CLIMATE SECURITY PATHWAYS IN WESTERN AFRICA

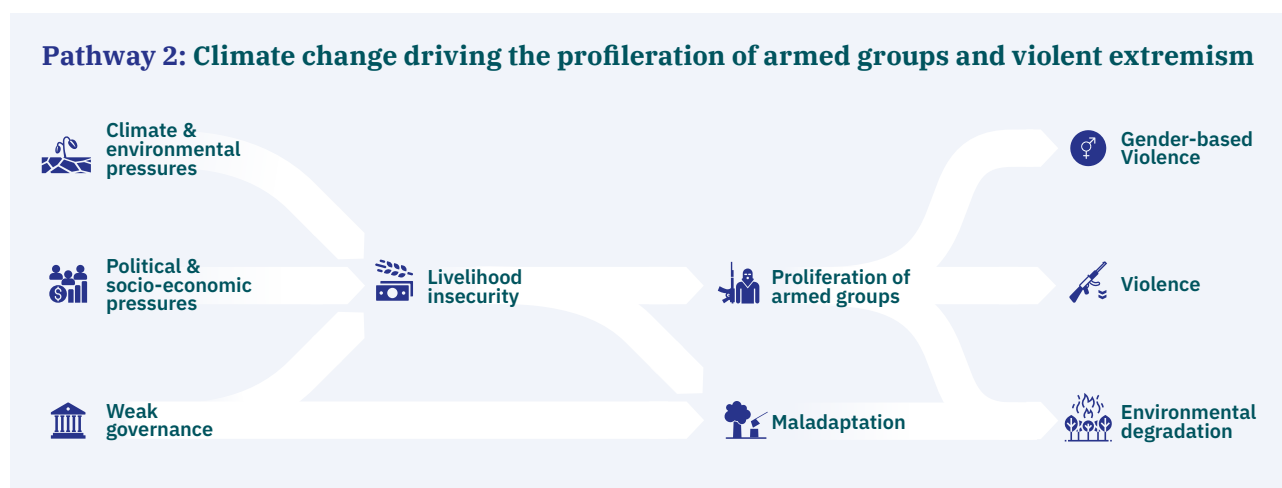
### Pathway 1: Livelihood and food insecurity driving conflicts over natural resources



Climate change contributes significantly to increased livelihood and food insecurity among communities across Western Africa, particularly those directly dependent on natural resources, such as farmers, fishers and pastoralists. These

changes exacerbate competition within and between different livelihood groups over water, land, fisheries and forestry, which if poorly managed can quickly turn violent.

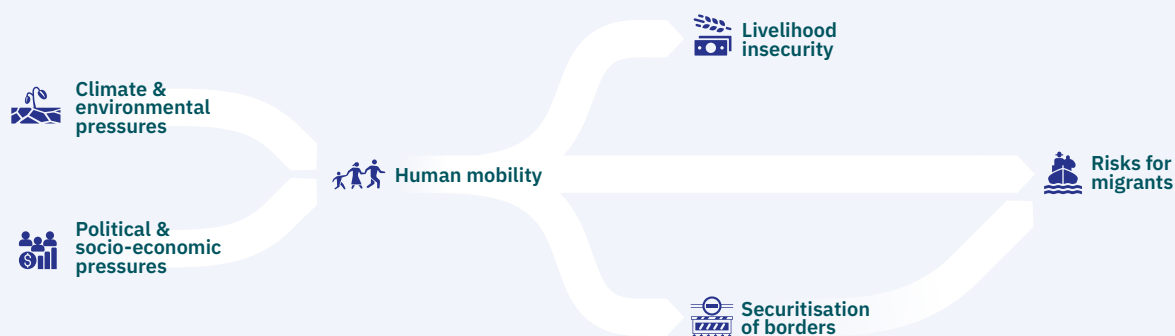
### Pathway 2: Climate change driving the proliferation of armed groups and violent extremism



The direct and indirect effects of climate change create conditions in which some groups in Western Africa, particularly young people, are more likely to engage in illicit and criminal activities as coping mechanisms. In addition, lacking or harmful responses to climate-related security risks can fuel societal grievances, increasing the vulnerability of affected people to recruitment into armed groups

and violent extremism. At the same time, the proliferation of armed groups in Western Africa directly and indirectly causes environmental degradation, for example, through their involvement in extractive industries, and by hampering the implementation of environmental policies, conservation efforts and climate action.

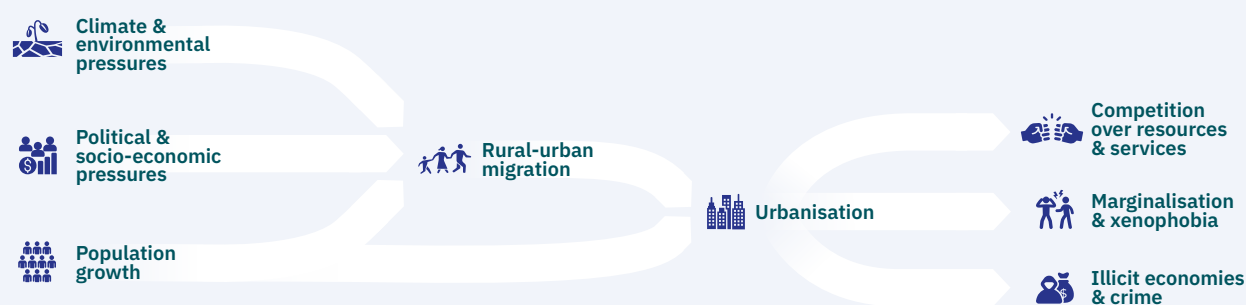
### Pathway 3: Climate-induced changes in migration patterns can increase insecurity and conflict



Human mobility has traditionally been one of the main strategies for people in Western Africa to adapt to the effects of climate change and environmental pressures, often with success. However, climate change impacts, particularly extreme weather events can cause sudden and unplanned changes in human mobility that increase peo-

ple's vulnerability, contribute to severe demographic pressures in certain geographic areas and heighten the risk of conflict. This can be observed across the spectrum of different forms of mobility, including displacement, seasonal migration and transhumance, rural-urban movements, and regional and international migration.

### Pathway 4: Western African cities as hotspots of climate security risks



Climate change is driving rural-urban migration in Western Africa, contributing to rapid rates of urbanisation in the region's cities, leading to severe demographic pressures that increase the risk of rural poverty, poor public services, infra-

structure constraints, urban crime and insecurity. Coastal cities, which already face specific risks in terms of rising sea levels, flooding and erosion, and dwindling fish stocks, are particularly vulnerable.



## Context

### GEOGRAPHY

The Western Africa region as defined by the African Union includes Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.<sup>16</sup> The 15 countries of the region encompass a range of climate zones. The northern areas of Mali and Niger are predominantly arid, as are the northernmost regions of Senegal. Most areas of Senegal, the Gambia, northern Guinea Bissau, southern Mali, Burkina Faso,

southern Niger and northern Nigeria are semi-arid. Further south, sub-humid tropical weather dominates across Guinea, Sierra Leone, northern Ghana, Togo, Benin and southern Nigeria. Finally, large areas of Liberia, as well as the southern regions of Côte D'Ivoire, Ghana and the very south of Nigeria have a humid tropical climate (Binder 2023). Several large rivers intersect these belts, including Senegal, the Gambia, Volta and Niger rivers, as well as Lake Chad. Except for the Cabo Verde Islands, every country in the region shares at least one river, lake or basin with its neighbours (CILSS 2016).

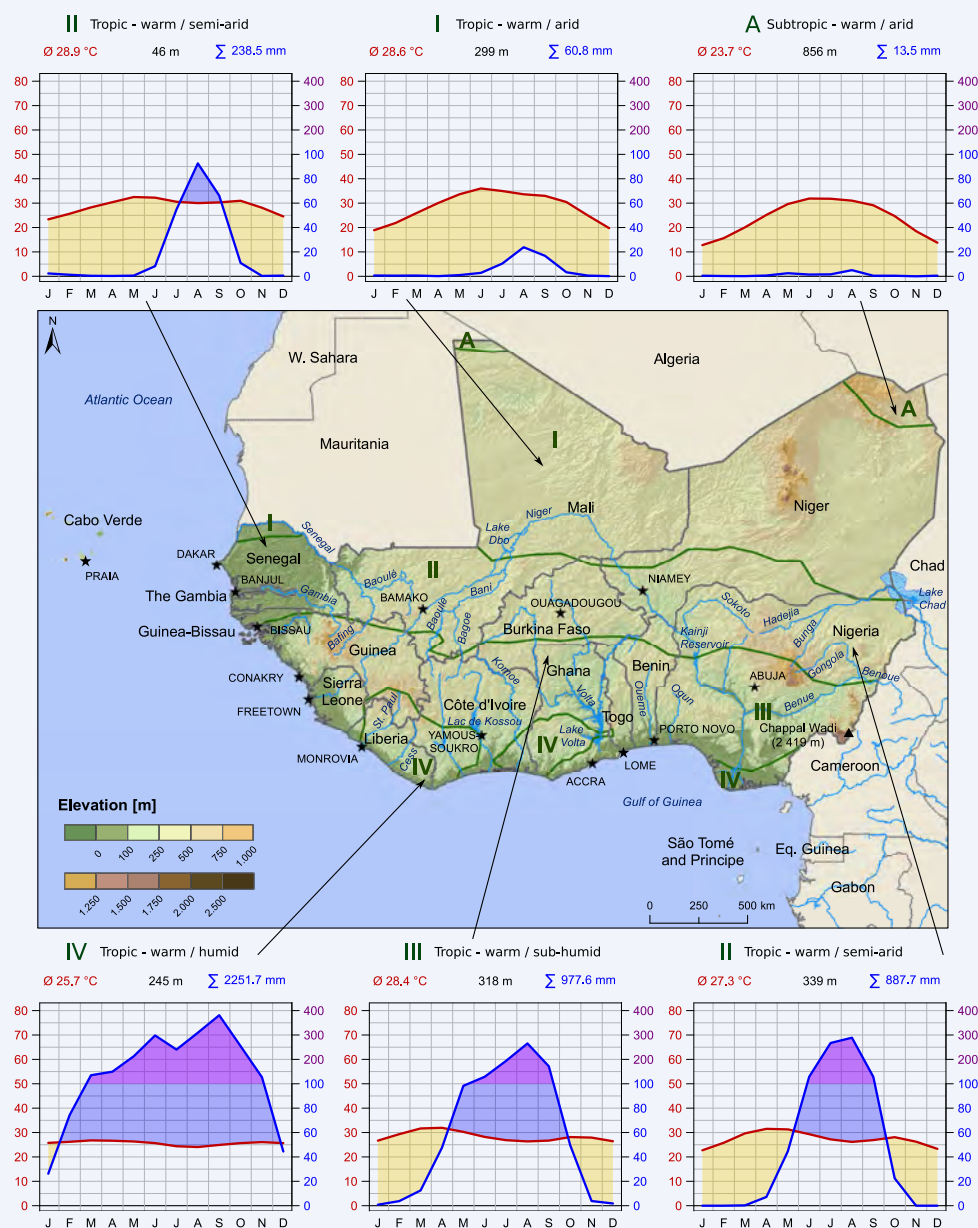


Figure 10: Topographic map of Western Africa with existing precipitation regimes and agroecological zones (Binder 2022c)

16 This report uses the African Union's classification system for geographic regions ([https://au.int/en/member\\_states/countryprofiles2](https://au.int/en/member_states/countryprofiles2)).

Western Africa's forests vary in quantity and quality. For example, Liberia and Guinea Bissau are densely forested, with 79.1 per cent and 70.4 per cent forest cover, respectively, as of 2021. In contrast, Niger is sparsely forested, with less than five per cent forest cover as of 2018 (Uzu et al. 2022). The tropical forests on the coast are especially biodiverse, particularly the Guinean forests of the West Africa Biodiversity Hotspot, which stretches from Guinea and Sierra Leone eastwards to the Sanaga River in Cameroon, and is home to a wide number of endemic plant, bird, mammal and fish species (CEPF 2015). The forests provide key ecosystem services to local populations and are vital carbon sinks for the region. Despite this, deforestation has been widespread, with a nine per cent decline in forest cover throughout coastal Western Africa between 2010 and 2018. This has had the added impact of releasing 575 million tonnes of sequestered carbon (RSPB 2023). The region's minor timber industry means deforestation mostly takes the form of slash-and-burn conversion to agricultural land use (CILSS 2016). Western Africa also hosts dry forests particularly in the semi-arid savannahs between the tropical coast and the Sahel. Besides their crucial importance for local populations and animals, these forests are key in the fight against desertification (Chidumayo and Gumbo 2010).

### **SOCIOECONOMIC CONTEXT**

Western Africa has experienced a surge in economic growth since the early 1990s, with the region's combined GDP rising from USD 105 billion in 2000 to more than USD 659 billion in 2020. The three largest economies in the region – Nigeria, Ghana and Côte d'Ivoire – accounted for one-quarter of Africa's GDP in 2020 with Nigeria making up two-thirds of Western Africa's GDP (African Development Bank 2021). This means there is a huge disparity in terms of economic development within Western Africa, with countries such as Guinea-Bissau, Liberia and Sierra Leone being among the poorest in the world (Mullan and Davies 2021). While regional trade could harmonise the region's economies, Europe and North America account for nearly three-quarters of total exports (African Development Bank 2019). Despite holding an estimated a third of Africa's gas and oil reserves, and significant hydroelectric potential, electrification rates in Western Africa remain low, with an estimated regional rate of 53 per cent in 2019 (World Bank 2021e).

Most Western African countries find themselves performing low in terms of human development, with countries such as Niger, Mali, Guinea and

Burkina Faso all among the 10 lowest scoring countries in the world (UNDP 2022a). In terms of gender inequality, many Western African countries score generally low, with Mali, Benin, Guinea and Niger among the worst performers globally. However, some countries perform better in certain sub-indexes. For example, Liberia is the best performing country globally in terms of gender parity in economic participation and opportunity. In contrast, Senegal, Mali and Benin exhibit the least gender parity in this sub-index at the continental level. Finally, Cabo Verde scores among the best countries in the world with regard to gender parity in terms of health and survival. Nigeria, the Gambia and Sierra Leone are among the lowest performing countries globally in terms of political empowerment (WEF 2023).

### **POLITICAL INTEGRATION**

Integration in Western Africa is well advanced. The main regional organisation is the ECOWAS, providing a range of cooperation avenues including economic and monetary integration, freedom of movement for people, peacekeeping, cultural exchanges, and health care. All Western African countries are members of the Community of Sahel-Saharan States (CEN-SAD), with Mali, Burkina Faso and Niger among the founding members. The CEN-SAD includes arid countries from Western, Northern, Eastern and Central Africa. Despite the CEN-SAD emphasising regional security as a key area for deepened cooperation among member states, few concrete activities have been undertaken, and no clear linkages with climate and environmental security have been drawn.

After a series of military coups and attempted coups in recent years, including in Mali (2021), Guinea (2021), Burkina Faso (2022), Niger (2023), and Gabon (2023), political integration and cooperation in the region has been under severe pressure. The new governments in Niger, Mali, and Burkina Faso formed the so-called Alliance of Sahel States, primarily a security pact against Islamist terrorism but with political, economic, and monetary ambitions, drawing from popular discontent with perceived neo-colonial foreign influence and lack of development (Reuters 2023; Yabi 2023; Kongo 2024). ECOWAS imposed heavy economic sanctions unless civilian-led government is implemented and threatened military intervention against Niger, with the three Alliance members subsequently quitting ECOWAS (Melly 2023). This bifurcation is shifting intra-regional and geopolitical relations, narrowing space for political dialogue and compromise.



## DEMOGRAPHICS AND MOBILITY

In 2021, the population of Western Africa was 414 million (UN DESA 2022a) and was growing rapidly at an estimated rate of 2.75 per cent a year (CILSS 2016), as a result of high fertility rates across many countries in the region (Walther 2021). The free movement zone established by the ECOWAS in 1979 – enabling citizens of member states to freely enter, stay, settle and work in any other member state – facilitated the free movement of people (OECD Sahel and West Africa Club 2006), despite perennial issues such as road disrepair, insecurity and corruption (African Development Bank 2019). For Western Africa, migration is largely a regional phenomenon, with nearly two-thirds of migrants remaining within the region, primarily in Côte d'Ivoire, Nigeria and Burkina Faso (IOM Global Migration Data Analysis Centre 2021).

## PEACE AND SECURITY

Over the past two decades, the occurrence of large-scale civil wars in Western Africa have decreased. However, there has been a significant increase in recurrent coups, election violence, intercommunal violence, extremism and criminal activities (IOM Global Migration Data Analysis Centre 2021). Insecurity has surged in many areas of the region. Notable hotspots include areas of the Central Sahel and the Lake Chad Basin. Since 2015, casualties in these areas have soared, as armed groups have targeted civilians, and battle regional and international counterinsurgency and counterterrorism operations, as well as community-level self-defence groups. In 2019, civilian deaths in the region rose by a staggering 1.87 per cent compared to 2016, with civilian deaths linked to militias increasing by 8.50 per cent in just four years from 2015 to 2019 (Krieger 2022).

Western Africa is home to several ECOWAS-led military operations and regional security initiatives. In 2023, active missions included the ECOWAS Intervention in the Gambia (launched in 2017) and the ECOWAS Stabilization Support Mission in Guinea-Bissau (launched in 2022). The Accra Initiative was launched in 2017, and covers Benin, Burkina Faso, Côte d'Ivoire, Ghana and Togo. It aims to prevent the spillover of terrorism from the Sahel, and to address transnational organised crime and violent extremism in member states' border areas. The Multi-National Joint Task Force is a combined force active around the Lake Chad Basin, and composed of troops in Benin, Cameroon, Chad, Niger and Nigeria. Another key element of Western Africa's security architecture is the G5 Sahel,

an institutional framework between the five Sahel countries of Burkina Faso, Chad, Mali, Mauritania and Niger. It was founded in 2014 with a seat in Mauritania, and coordinates development policies and security matters (Allen 2023) (see Sahel box).

In 2023, with more than a third of ECOWAS member states being led by military factions following coups, the weakening of ECOWAS could derail cooperative efforts around international security, including the G5 Sahel. This poses a threat to cross-border security, and could worsen existing humanitarian crises, food insecurity, transnational crime and environmental hazards (Dan Suleiman 2023).

## Climate change and impacts<sup>17,18</sup>

### AIR TEMPERATURE

Climate change has led to an increase in temperatures across Western Africa by between 1°C and 3°C since the 1970s, with the highest temperature rises across the Sahel and Sahara regions (Binder 2022c). In addition, Western Africa has experienced a rise in the frequency of very hot days. Between 1961 and 2014, the frequency of very hot days (over 35°C) increased by one to nine days per decade. Hot nights have also increased in frequency, while the number of cold nights has declined. Along with rising air temperatures, heatwaves have increased in intensity, duration and extent, compared to the last two decades of the 20th century (IPCC 2022).

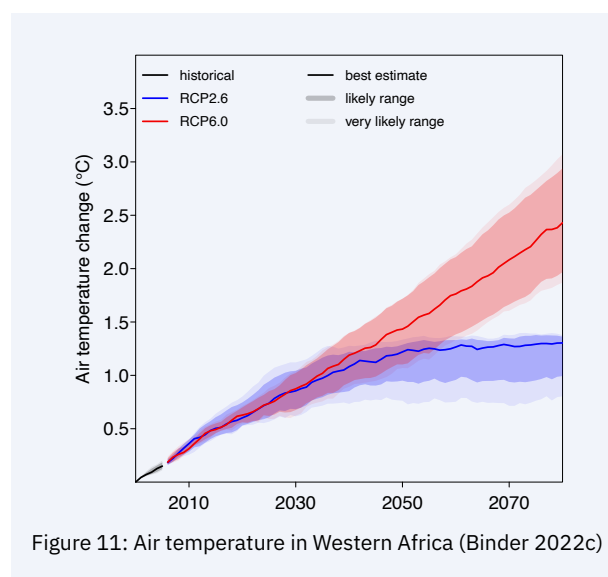


Figure 11: Air temperature in Western Africa (Binder 2022c)

17 Please refer to the Annex for guidance on how to read the plots and for an explanation of the concept of uncertainty in climate projections.  
18 The summary of the key climate impacts in this section is based on: Binder L. 2022. Climate Change in West Africa. Berlin: Potsdam Institute for Climate Impact Research.

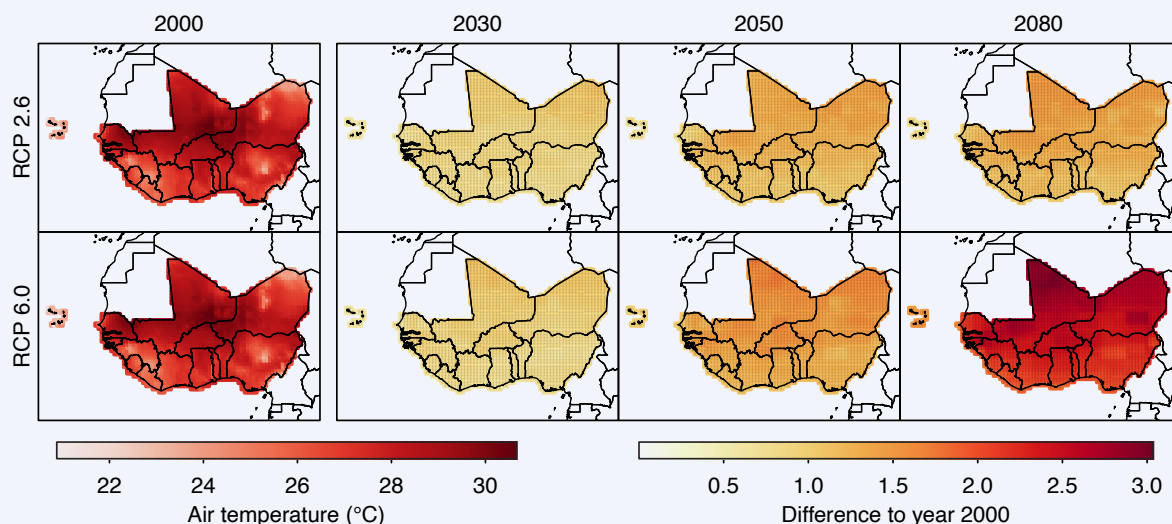


Figure 12: Regional air temperature projections for Western Africa for different GHG emissions scenarios (Binder 2022c)

Depending on the climate change scenario, temperatures across Western Africa are projected to rise with high certainty by between 0.6°C and 3.1°C by 2080 compared to 2000. Temperature rises will affect the entire region, but will be less intense along the coast. The median climate model predicts a temperature increase over Western Africa of approximately 0.85°C by 2030 and 1.3°C by 2080 under the low emissions scenario. Under the medium-to-high emissions scenario, air temperature will increase by between 0.6°C and 1°C by 2030, and by between 1.9°C and 3.1°C by 2080 (very likely range). The median climate model predicts temperature increases of 0.9°C by 2030 and 2.4°C by 2080 (Binder 2022c).

In line with rising mean annual temperatures, the annual number of very hot days (i.e. days with a daily maximum temperature of above 35°C) is projected to increase with high certainty. Around the year 2000, there were on average 194 very hot days per year, with a maximum of 283 very hot days per year in Senegal. The coastlines were much less affected than the Sahel zone further north. Under the low emissions scenario, projections point towards an average annual increase of between 22 and 37 very hot days by 2030 and 2080, respectively, with varying distributions. Very hot days will rise substantially more under a medium-to-high emissions scenario, where the average annual increase will be 28 days by 2030 and 73 days by 2080. In the long run, the increase will be very high in almost all southern regions,

with up to 52 additional very hot days per year projected by 2030 and 131 days by 2080. This rise will be substantially smaller in the northern Sahelian zone, although it will still amount to at least nine additional very hot days per year by 2030 and 27 days by 2080 in the north of Niger (Binder 2022c).

## PRECIPITATION

Western Africa experienced a decreasing trend in precipitation between 1960 and 1980. At the same time, precipitation variability sharply increased during the same period (Pausata et al. 2020; IPCC 2022). During the 1970s and 1980s, the region was recurrently hit by severe droughts with devastating socioeconomic impacts. Declining precipitation trends ended around 1990 and a trend towards wetter conditions began in the mid-1990s. However, cumulative precipitation amounts have to date not returned to the level of the 1960s and heavy precipitation events are making a greater contribution to the total increase in precipitation (IPCC 2018; Binder 2022c).

Rainfall projections are much less certain than temperature projections. The scenarios suggest an overall stagnation or decrease in precipitation in the near future, though with a trend of lower rainfall in the west and higher rainfall in the east (see Figure 13). However, projections are highly uncertain. Rainfall events are also expected to rise in intensity, depending on warming, but again with limited certainty as to the extent of this rise



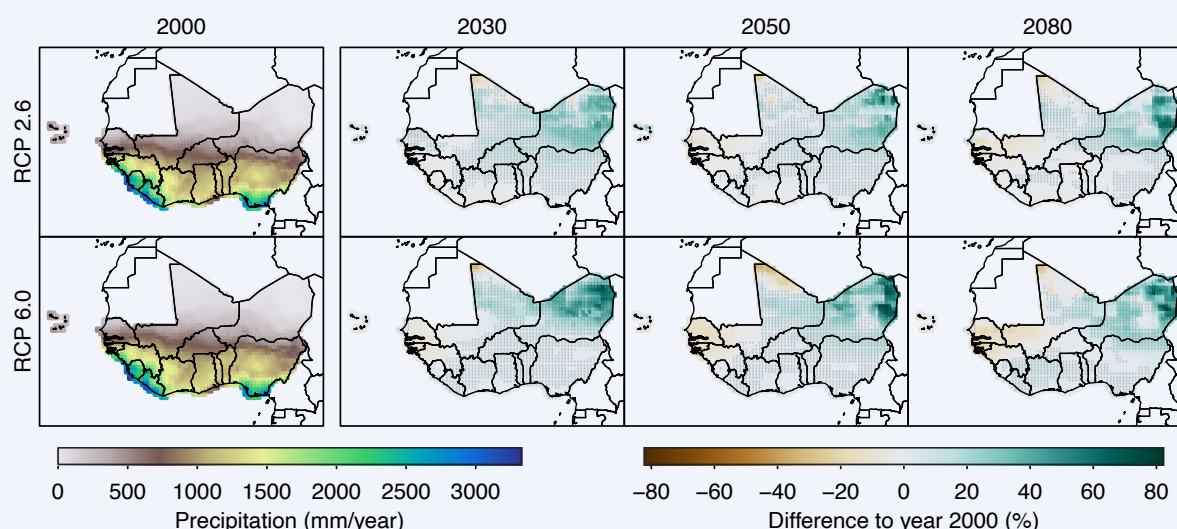


Figure 13: Regional projections of the annual mean rainfall for Western Africa for different GHG emissions scenarios, compared to the year 2000 (Binder 2022c)

(Seneviratne et al. 2021). The impacts of climate change on torrential rain and river flows in Western Africa are uncertain, but research suggests an increase across eastern areas of the region (Rameshwaran 2021; GFDRR 2022). Drought projections are similarly highly uncertain, although the scenarios suggest longer droughts in western areas of the region under a high-emissions scenario (Binder 2022c).

Heavy precipitation events increased in intensity over the Central Sahel region from 17 per cent between 1970 and 1990 to 21 per cent between 2001 and 2010, as well as over the Gulf of Guinea (IPCC 2018). However, a lack of available data and scientific agreement make it difficult to attribute past heavy precipitation events to climate change (Seneviratne et al. 2021). In response to global warming, heavy precipitation events are expected to become more intense in Western Africa – as in many parts of the world – due to the increased water vapour holding capacity of a warmer atmosphere. At the same time, the number of days with heavy precipitation is expected to increase (Seneviratne et al. 2021). Under a 2°C scenario, multi-model median projections suggest an increase in heavy precipitation days by 15 per cent compared to the pre-industrial period. This number increases to 30 per cent (best estimate) under a 4°C scenario (Seneviratne et al. 2021).

## FLOODING

Precipitation variability and land use patterns strongly impact flooding risks across Western Africa. During the drought of the 1970s and 1980s, flows in the major river systems declined by 20–60 per cent. This was not only due to a decrease in precipitation but also due to an increase in water use. Since 1990, as rains have recovered, the flows of some rivers, including the Niger, have also recovered (IPCC 2018). This has resulted in more frequent and intense flooding in the Sahel region (Nka et al. 2015). The propor-

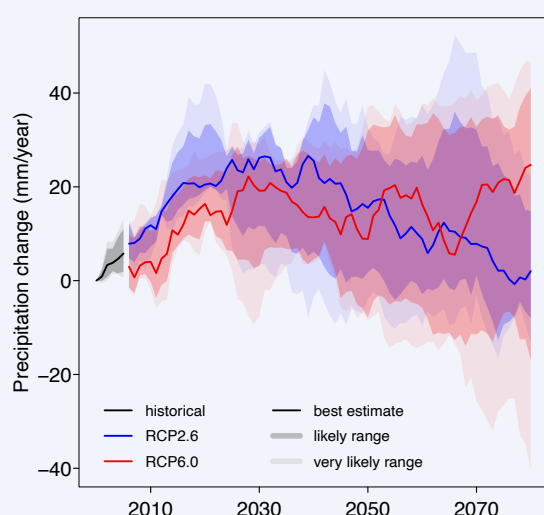


Figure 14: Precipitation in Western Africa (Binder 2022c)

tion of people exposed to flooding has also grown substantially, with the number of people in many Western African countries exposed to flooding increasing by over 50 per cent between 2000 and 2015 (IPCC 2022). According to ThinkHazard, the risk of future urban flooding is high for all countries of Western Africa, except Togo, which has a medium hazard level (GFDRR 2022).<sup>19</sup> With more extreme precipitation events, as is projected for Western Africa, increased runoff and flooding from precipitation are expected to also increase (IPCC 2018).

The increasing intensity of heavy rainfall events and increased flooding risks in the eastern Sahel, combined with longer drought durations and rapid population growth are likely to exacerbate water stress. A previous assessment of climate risks in the Sahel projected that per capita water availability would decrease by 76 per cent by 2080 compared to 2000 in both the low-to-medium and high emissions scenarios (OSCDS and UNHCR 2022). This suggests that, although projections vary throughout the region, water security will decrease overall. Water insecurity will likely also accelerate the spread of diseases, as heavy rain events and flooding exacerbate the risks of malaria, diarrhoea, and other vector-borne and communicable diseases (Binder 2022c).

## DROUGHTS

The Sahel droughts of the 1970s and 1980s were some of the most significant climate anomalies of the 20th century. With a 40 per cent decrease in long-term average rainfall in the 1980s, these droughts had dire impacts on the population (Pausata et al. 2020). Despite the recent recovery in the overall amount of precipitation, significant interannual fluctuations of dry and wet phases persist (IPCC 2018).

Under the low emissions scenario, models project a rise in consecutive dry days over larger areas of the Guinea coast, with an increase by around five to seven days for areas of Mauritania, Senegal and Mali. In contrast, in most areas of Niger and northernmost Nigeria, the number of consecutive dry days is expected to decline (Klutse et al. 2018). At the same time, the frequency and intensity of meteorological droughts is projected to increase across the Niger and the Volta River basins, which would likely have severe implications on future water supply from the two regional water systems (IPCC 2022). Under the high emissions scenario, there will be a more certain increase in meteor-

ological droughts and rainfall deficits. For example, the duration of droughts in western areas of Western Africa will rise from about two months between 1950 and 2014 to around four months in the second half of the 21st century (Ukkola et al. 2020). In general, the increased risk of drought will occur primarily during the pre-monsoon season (IPCC 2018).

## SEA LEVEL RISE

Sea levels along the Western African coast have been rising at rates above the global average and have contributed to substantial shoreline erosion along some coasts (Ranasinghe et al. 2021). In response to climate change, averaged over the entire Western African coastline, the median climate model projects a sea level rise of 10 cm by 2030 and 34 cm by 2080 under the low emissions scenario, compared to the year 2000. Under a medium-to-high emissions scenario, the long-term rise will be significantly higher (40 cm). Consequently, depending on future population growth in the region, between 43.6 million and 47.2 million people living in low elevation coastal zones will be exposed to sea level rise by 2030 (IPCC 2022). Due to sea level rise, coastal regions of Western Africa are highly vulnerable to frequent and severe flooding, with erosion leading to drought and saline intrusion, thereby undermining agricultural productivity (Goxho 2021).

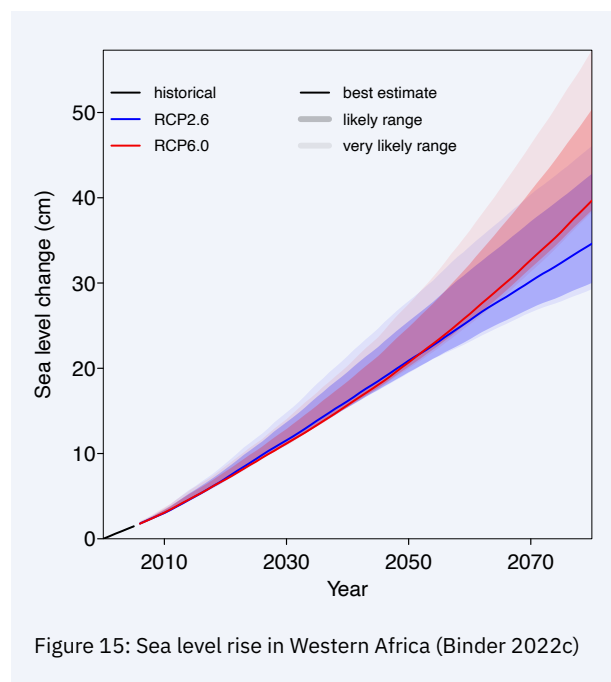


Figure 15: Sea level rise in Western Africa (Binder 2022c)



## Climate security risk pathways

### LIVELIHOOD AND FOOD INSECURITY DRIVING CONFLICTS OVER NATURAL RESOURCES

Climate change contributes significantly to increased livelihood and food insecurity for communities across Western Africa, particularly those directly dependent on natural resources, such as farmers, fishers and pastoralists. These changes exacerbate competition within and between different livelihood groups over water, land, fisheries and forestry, which if poorly managed can quickly turn violent.

#### Climate-induced food insecurity and instability

Western Africa scores low at the global level in terms of food security, but significantly better compared to Eastern Africa and Central Africa. However, with an estimated 14.6 per cent of the population (62.8 million people) undernourished in 2022, it scores worse compared to Northern Africa (7.5 per cent; 19.5 million people) and Southern Africa (11.1 per cent; 7.6 million people). Moreover, the prevalence of undernourishment has risen gradually over the past two decades (from 12.2 per cent in 2005). Meanwhile, the prevalence of severe food insecurity has risen sharply, from 11.4 per cent (41 million people) in 2005 to 22 per cent (94.4 million people) in 2022 (FAO et al. 2023).

The differentiated impacts of climate change on food systems in Western Africa are likely to lead agricultural economies to shift substantially, with negative impacts on food security. In 2014, the IPCC predicted that crop-growing periods in Western Africa could shorten by 20 per cent by 2050, causing a 40 per cent decline in cereal yields and a reduction in cereal biomass for livestock (IPCC 2014). Climate change also has an important impact on food security derived from marine resources. The warming and acidification of the ocean threaten fish populations, which are crucial sources of protein for diets in Western Africa. Fish constitutes more than 30 per cent of protein intake in coastal countries and is a crucial staple in its dried form in most Western African hinterlands (Beatley and Edwards 2018; Schmidt and Muggah 2021).

Beyond the humanitarian impacts of food insecurity on the health and development of individuals, food security issues also risk impacting the stability of Western Africa. However, the link between food insecurity and conflict is complex.

Food insecurity can stoke grievances, and mobilise protest and rebellion, but can also dampen conflict behaviour. Moreover, conflict risks are highest when there are changes in the conditions of food access, whether towards greater scarcity or availability. This suggests that conflict is a result of institutional failures to mediate access to food rather than the scarcity of food itself (Hendrix and Brinkman 2013). Western Africa saw widespread food-related unrest in 2007–2008, particularly in Senegal, Guinea, Côte d'Ivoire and Burkina Faso. Currently, the region faces its worst food crisis in 10 years due to a combination of climate impacts, conflicts, the economic impact of the COVID-19 pandemic and more recently the war in Ukraine. The risk of further food-related unrest and related instability remains high (OXFAM 2022).

#### Violent competition between herders and farmers

The economic resilience and livelihoods of many populations in Western Africa are highly weather-dependent and thereby vulnerable to climate change. Crops and livestock account for an estimated 60 per cent of livelihoods and 35 per cent of the combined GDP of Western Africa (CILSS 2016; USAID 2018). As farming and pastoralism are often the economic backbone of rural communities, climate-induced livelihood insecurity can quickly drive maladaptation and competition over natural resources. Consequently, natural resource conflicts are a challenge across the region, ranging from community-level conflicts around water in Western African basins (DeConing and Krampe 2021) to competition between herders, farmers and fishers (Climate Diplomacy 2022).

Arguably, the most widespread livelihood-related conflicts in Western Africa occur between farmers and herders, as observed on a large scale in countries such as Nigeria, Mali and Burkina Faso. In response to drought and climate-induced losses of pasture, there have been significant shifts in transhumance routes towards regions with more fertile ground, which are often farmland. In the Central Sahel, while arable land is shrinking year-on-year due to the effects of climate change and environmental degradation, demographic expansion requires that areas under cultivation expand. This results in fertile land becoming increasingly scarce and valuable. In the Mopti region of central Mali, levels of agricultural production have risen

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19 No data was available for Cabo Verde.

sharply in recent decades despite increasing land scarcity. The poorly regulated rush towards fertile land has led to violent local conflicts, mostly along ethnic lines, and mainly between herders and farmers, such as the Fulani and Dogon groups (ICG 2020; Nagarajan 2022).

In the Nigerian state of Benue, similar scarcity in fertile land has led to severe clashes, as herders – passing through agricultural land in search of pasture – destroy crops (Tade 2020). In the Gambia, one study found that reductions in agricultural productivity, and increases in saltwater intrusion, food insecurity, poverty and inequality were aggravated by the effects of climate change, and were the principal cause of resource conflict between and within communities (Sambou and Ceesay 2023). Farmer-herder conflicts across Western Africa are increasing in frequency and severity. Half of the 15,000 fatalities recorded since 2010 occurred between 2018 and 2020, with fatalities concentrated in Nigeria and Central Sahel countries (Brottem 2021). In Nigeria, a study found that fatalities from such conflicts had nearly doubled in four years, from over 500 in 2014 to almost 1,000 in 2018 (Adigun 2022). Indeed, herder-farmer conflicts in Nigeria are estimated to be more deadly than violence committed by Boko Haram (Daniel 2021).

### **Natural resource conflicts between livelihood groups**

However, natural resource management conflicts are not limited to herder-farmer disputes, but involve other livelihood groups and even occur within livelihood groups. For example, in Ghana, agriculture accounts for about 21 per cent of GDP, and especially in the country's northern provinces such as the Bawku province, the convergence of the effects of climate change and colonial-induced ethnic tensions between the Kusasi and Mamprusi people have exacerbated conflicts over arable land between farmer (Strouboulis et al. 2023). Local chiefdoms have played a key role in governing environmental resources and acting as traditional custodians of land and informal law enforcement and justice structures since pre-colonial times, but access and control are also vital for their socio-economic standing and political power. Partly triggered by colonial demand of land in the 19th century, many current conflict risks in Ghana stem from decades-long competition over chieftaincy succession, and control over territory and resources (Sackeyefio-Lenoch 2014).

Natural resource conflicts include disputes over dwindling marine fish stocks, as evident along the Gulf of Guinea, which result in a significant reduction in maximum catch potential (Beatley and Edwards 2018). In Senegal, increasing temperatures have caused the northward migration of sardinella, the species of greatest economic value and importance for food security in the region. Consequently, Senegalese fishermen have been compelled to venture across the border into Mauritania for fishing, resulting in confrontations with the coastguard (Beatley and Edwards 2018). As Western African coastal communities see their livelihoods threatened, the most resourceful young people migrate out of the region, while those that stay behind face unemployment. In severely affected areas like Agbavi in Togo, the circumstances have become dire enough that young men have resorted to joining criminal networks engaged in fuel smuggling and illegal beach-sand mining. This illicit activity not only worsens erosion but also compounds other challenges faced by the community (Fagotto 2016).

In Mali, both fishers and farmers face grave environmental challenges including soil infertility, silting of rivers, and depleted fish numbers and variety. Pastoralists also see changes in water bodies, a reduction in quality and quantity of pasture, and the disappearance of grass species. Competition between but also within these livelihood groups erodes social cohesion and increases hostility, with oftentimes violent clashes over access and control of natural resources (Nagarajan 2022).

Conflicts related to natural resources, however, do not always hinge on scarcity. The creation of new resources can also generate conflicts over access and control. For example, a development project in Burkina Faso that aimed to bolster rice production by introducing water resources altered the local demographic and political balance. The project attracted non-local farmers from different ethnic groups, which led to conflicts around resource allocation, and escalated tensions between native and non-native land users (ICG 2020).

To cope with losses in livelihoods such as farming and pastoralism, many of Western Africa's rural poor have tried their luck in other sectors, particularly artisanal and small-scale mining. However, conflict over mineral resources, such as over diamonds in Sierra Leone, and oil and gas in Nigeria, is a perennial issue in the region (Olanrewaju 2020; Abdullahi 2021). Propelled by the dis-



covery of a Saharan gold vein in 2012, countries such as Niger, Mali and Burkina Faso have seen a proliferation of artisanal and small-scale gold mining, underpinned by growing illicit markets in cyanide, a chemical widely used in the extraction process that has detrimental environmental and health impacts. Illicit gold mining also affects security in Western Africa, as it reinforces existing patterns of transnational smuggling, international crime and corruption (Global Initiative Against Transnational Organized Crime 2023). The contamination of chemicals used in artisanal and small-scale gold mining can damage agricultural livelihoods, exacerbating tensions within and between communities, and cause violent conflicts, such as in Mali's Kayes region (Koné and Adam 2021).

Another source of tension is forestry. For example, in Côte d'Ivoire, deforestation for the cultivation of perennial crops, such as cocoa and coffee cultivation, has led to a dramatic reduction in arable land and forest. Since 1960, Côte d'Ivoire has lost over 80 per cent of its forest cover. In this context, tensions between local and migrant communities over the sharing and tenure of the land and forest are increasingly leading to outbreaks of violence, which contribute to the displacement of populations, further increasing the pressure on natural resources in host communities (UNEP 2017b).

#### **CLIMATE CHANGE DRIVING THE PROLIFERATION OF ARMED GROUPS AND VIOLENT EXTREMISM**

The direct and indirect effects of climate change create conditions in which some social groups in Western Africa, particularly young people, are more likely to engage in illicit and criminal activities as negative coping mechanisms. In addition, lacking or harmful responses to climate-related security risks can fuel social grievances that increase the vulnerability of affected people to recruitment into armed groups and violent extremism. At the same time, the proliferation of armed groups in Western Africa directly and indirectly causes environmental degradation, for example, through their involvement in extractive industries, or by hampering the implementation of environmental policies, conservation efforts and climate action.

#### **Climate vulnerability and recruitment**

Livelihood insecurity driven by climate stress can increase the pressure on vulnerable, especially young, people to engage in criminal and illicit activities, such as smuggling and traffick-

ing, banditry, and illegal resource extraction. In Western Africa, many radical Islamist and armed groups are deeply intertwined in criminal networks, offering vulnerable young people a perceived pathway to more lucrative socioeconomic opportunities (Toupane et al. 2021). Especially in the Central Sahel and around the Lake Chad Basin, but increasingly also in rural areas in coastal countries, socioeconomic marginalisation and unemployment have been a significant entry point for recruitment, as armed groups exploit existing grievances (Strouboulis et al. 2023).

While the drivers of recruitment are complex, and always specific to the context and the individual, socioeconomic factors – in addition to other factors such as negative experiences with state authorities, social status and ideology – are generally considered among the most important drivers of youth radicalisation and armed group recruitment across Western Africa (Groupe d'Etudes et de Recherches sur les Migrations et Faits de Société 2021). In Senegal, several studies found that poverty, unemployment and the lack of livelihood options were the main motives identified by young people for joining Jihadist armed groups; factors which also exacerbate the effects of climate change and environmental degradation (Lopez et al. 2021; Sambe et al. 2022). Climate fragile settings – especially when combined with weakening land and natural resource management, fragmented governance frameworks, and high levels of corruption – offer more opportunities for armed groups to thrive by facilitating criminal activities and undermining trust in government (Nantulya 2016; International Crisis Group 2020).

#### **Violent extremism and transnational criminality**

Over the past decade, violent extremism has been of particular concern across Western Africa, especially in the Central Sahel and the Lake Chad Basin. Most recently, concerns have escalated in certain Gulf of Guinea countries, particularly Benin, Togo, Ghana, and Côte d'Ivoire, regarding the southward movement of Jihadists, who have already gained control over significant portions of the Sahel region. Additionally, armed groups are active in wooded areas along the border between Benin and Burkina Faso. Likewise, northern Benin and Togo have experienced an increase in Jihadist assaults, posing a threat to security in coastal nations further to the south (International Crisis Group 2023).

Some of the most lucrative sectors that criminal groups and Jihadis in Western African focus

on include arms, drugs, human trafficking and kidnapping for ransom. The latter is estimated to be the main source of revenue for Jihadist groups (Lounnas 2018). The majority of victims of human trafficking are women and girls, and an estimated three out of four victims are children (UNODC 2021b). Nigeria is a well-evidenced country with strong criminal networks that focus on trafficking. At the same time, Nigeria is a country of origin, transit and destination, which is affected by both domestic and cross-border trafficking (UNODC 2021b). Armed groups are also increasingly involved in drug trafficking, with cocaine imported from Latin America through multiple maritime entry points. These entry points span the coastline between Senegal and Guinea, and further south, with Côte D'Ivoire playing a prominent role in recent years (Bird 2021). In recent years, terrorist and criminal groups have developed strong working relationships to grow their businesses. These networks often depend on the complicity or participation of local actors and state agents, who profit from illicit dealings (Gaye 2018).

The Ghana-Côte d'Ivoire-Burkina Faso tri-border is a key route in illicit arms trafficking, such as small arms and fertiliser for improvised explosive devices (Strouboulis et al. 2023). As seen in regions across the world, extremists in the Sahel have weaponised access to critical natural resources for strategic or tactical purposes, and as a means to terrorise, coerce and subjugate local populations (Strouboulis et al. 2023). Starting from 2021, Jihadist groups from the Sahel have begun to encroach upon W National Park, a vast nature reserve situated along the borders of Benin, Burkina Faso and Niger. Their incursion into the park has disrupted longstanding conservation activities and adversely affected local livelihoods, fueling tensions between settled farmers and nomadic herders over land and water (International Crisis Group 2023). In Mali, in recent years, extremist groups have expanded their lucrative activities in artisanal mining and the illegal gold trade, which leads to further deterioration of the security situation. For instance, in 2021, two terrorist groups engaged in a fierce battle to control gold mining sites in Mali's Gourma region (Abderrahmane 2022). The involvement of armed groups in illicit mining also causes severe damage to the environment, including through the dredging of rivers, and use chemicals such as mercury and cyanide, which present high risks for agriculture, fishing and herding due to ground-water contamination that can lead to animal and human poisoning (Koné and Adam 2021).

## **CLIMATE-INDUCED CHANGES IN MIGRATION PATTERNS CAN INCREASE INSECURITY AND CONFLICT**

Human mobility has traditionally been one of the main strategies used by people in Western Africa to often successfully adapt to climate change and environmental pressures. However, climate change impacts, particularly extreme weather events, can cause sudden and unplanned changes in human mobility that make people more vulnerable, contribute to severe demographic pressures in certain geographic areas and increase the risk of conflict. This can be observed across the spectrum of different forms of mobility, including displacement, seasonal migration and transhumance, rural-urban movements, and regional and international migration.

### **Internal and regional climate migration**

The vast majority of climate migration in Western Africa happens within countries and by 2050, up to 32 million Western Africans are expected to have to move within their countries because of climate change. Internal climate migration is not uniform across Western African countries as some areas are more adversely impacted by climate change than others. Countries that are expected to witness the highest numbers of internal climate migrants are Nigeria and Niger, followed by Senegal, Mali, Benin and Burkina Faso (Clement et al. 2021).

Major climate in- and out-migration hotspots could expand and intensify by 2050. For example, eastern Niger, and the central border area between Nigeria and Niger could see major climate in-migration due to favourable climatic conditions projected in these regions. Meanwhile, the southwest of Niger and the north of Benin are projected to become climate out-migration hotspots due to water stress. Another major climate out-migration hotspot could be in western Mali, around Bamako and the Koulikoro region, due to water stress and crop losses. The southeast, southwest and coastal states of Nigeria are expected to see climate out-migration as well due to sea level rise compounded by storm surge, water stress and crop yield losses (Clement et al. 2021).

When migrants decide to leave their country, most remain within Western Africa, moving from rural areas to urban centres. For example, climate change and related livelihood insecurity are among the key drivers of migration from landlocked Sahelian countries towards the coast. Given the arid climate of departure countries, it has



been suggested that one of the factors driving this migration is the limited in-situ adaptive capacity of populations (Leal Filho et al 2022). Drought-induced food and livelihood insecurity have led to high levels of migration from Sahelian countries over the last decades, with farmer households especially likely to move in case of high dry season temperatures (Teye 2022).

The most common form of intra-regional migration is rural-urban. Most migrants move to cities in coastal countries in search of socioeconomic opportunities, with some cities growing up to nine per cent per year (Devillard et al. 2015). In addition to rural-urban migration, seasonal migration such as transhumance has been a mainstay of Western African societies for centuries and is an important climate adaptation strategy (Teye 2022). While it is difficult to give precise numbers, an estimated 70 per cent of Western Africa's cattle population is expected to be managed through transhumance, involving tens of millions of pastoralists (IOM Global Migration Data Analysis Centre 2021).

Seasonal and intra-regional climate migration help to strengthen the economic resilience and food security of families, and migrants often times decide to permanently settle in their destination countries, with cities as destinations of choice (Jarawura 2013; Dreier and Sow 2015). However, some populations are unable to move as a response to climate change, notably because of a lack of endowments. This often includes the poor and aged, and those who lack the social capital to migrate. Impediments to mobility can also include negative perceptions of migrants, which hinder individuals moving across regions and continents alike (Puig Cepero et al. 2021). Moreover, in patriarchal communities, women are often immobile, both because of a lack of resources and cautions against migrating (Teye 2022).

### **Displacement**

Western Africa is home to millions of IDPs and refugees, a number that has spiked since the deterioration of the security situation in 2016. The Western African countries that host the most refugees and IDPs include Nigeria, Niger, Mali and Burkina Faso. In 2023, Nigeria and Burkina Faso were home to about 3.5 million and two million IDPs, respectively, while Niger hosted some 300,000 refugees and asylum-seekers (UNHCR 2023b).

The increase in the frequency and severity of extreme weather events exacerbates displacement

across the region. From 2008 to 2022, natural hazard-induced disasters and extreme weather events ranging from flash flooding, droughts, storms and cyclones led to the displacement of more than 17 million Western Africans (Leal Filho et al 2022). Rapid sea level rise and coastal degradation have also led to involuntary movement, as seen in the evacuation of the Western African port towns Keta in Ghana and St Louis in Senegal. Meanwhile, flash flooding exacerbated by river silting has affected communities in Sahelian countries, displacing more than 30,000 in Burkina Faso in 2017 (Teye 2022). According to the World Bank, between 0.3 million and 2.2 million people living along the Western African coast could be forced to move out of the 5 km coastal belt by 2050 due to sea level rise compounded by storm surges and flooding (Clement et al. 2021).

### **Migration and human security**

Climate change can severely affect existing mobility dynamics with significant implications for the human security of populations, whether they are on the move, hosts or involuntarily immobile. As part of their journey, migrants can be particularly vulnerable to trafficking, marginalisation and other abuses. These incidents include death, detention, extortion, kidnapping, physical abuse, robbery, and sexual assault and harassment (Mixed Migration Centre 2020). When arriving in a host community, migrants often have to deal with new social, political and economic realities, which can further undermine the ability of these populations to pursue livelihoods (Mobjörk et al. 2020).

Western African migrants attempting long journeys and dangerous crossings are particularly vulnerable to abuse. Notoriously dangerous routes include trans-Saharan and trans-Saharan migration, which often require assistance from human smugglers to cross inhabitable terrain or international borders. Male migrants are primarily subjected to forced labour and physical violence, while female migrants are more exposed to sexual violence and trafficking (UNODC 2021a). The Sahel and Sahara Desert are also key transit points for migrants moving to Northern Africa or even to Europe. Although migration routes constantly shift depending on accessibility and safety, the two main routes in recent years have been along the Western African coast towards Morocco or the Central Sahelian route, with Niger being a key transit country (Yayboke and Aboneaaj 2020). Although inter-continental migration remains marginal, it is increasingly securitised by strict and sophisti-

cated controls at international borders, which has led to a build-up of migrants, notably in Niger and Northern African countries. Migrants respond to this tightening by resorting to increasingly dangerous routes, with higher risks of abuse and death (International Centre for Migration Policy Development 2022).

People from Western Africa who decide to migrate to Northern Africa or Europe often do this because of socioeconomic reasons, with climate change impacts one of the main push factors as it exacerbates livelihood insecurity (Clement et al. 2021). If successful, economic migrants can send remittances from their destination back home to support their families, which can be a vital lifeline in times of climate and environmental stress. In some areas of Western Africa, entire households or even combined families support the migration of young members to more prosperous regions in the hope of receiving remittances later on (IOM 2021b). For instance, in Mali's Kayes region, which is highly dependent on agriculture, migration has traditionally been one of the key adaptation strategies and resilience-building mechanisms. Due to their "culture of migration," Kayesians are by far the largest group of Malians in France and other European countries (Kayes 2020). Similarly, in Burkina Faso, remittances from international migrants have helped households back home to improve their agricultural livelihoods by modernising techniques, diversifying their sources of income, and covering health and education expenses (Tapsoba and Hubert 2022).

#### **WESTERN AFRICAN CITIES AS HOTSPOTS OF CLIMATE SECURITY RISKS**

Climate change is driving rural-urban migration in Western Africa, contributing to rapid rates of urbanisation in the region's cities, and leading to severe demographic pressures that increase the risk of rural poverty, poor public services, infrastructural constraints, urban crime and insecurity. Coastal cities, which already face specific risks in terms of sea level rise, flooding and erosion, and dwindling fish stock, are particularly vulnerable.

##### **Increasing pressures**

Even in the best-case scenario of 1.5°C global warming, urban populations exposed to severe droughts across Western Africa are projected to increase by around 65 million compared to 1986–2005 (Liu W et al. 2018). The risk of urban flooding along coasts and river deltas is high across the region (GFDRR 2022). Urbanisation driven by

population growth and intra-regional migration, displacement and climate change will continue to figure among the major transformations affecting Western Africa. Urbanisation dynamics in Western Africa are cross-border in nature, and shape relations between rural and urban areas, gender equality, political participation, public services, and peace and security (OECD 2020).

Forty per cent of Western Africa's population live in cities, with the urban population growing at between 1.6 per cent and 3.1 per cent per year (Ofoefie, E. I. et al 2022) – a rate which is much higher than the global average of 1.7 per cent for 2021 (World Bank 2022). The region's urban population as a proportion of the total population has risen from under 10 per cent in 1950 to 40 per cent in 2020 (Walther 2021). As exemplified by the wave of urbanisation following the great droughts of the 1970s and 1980s, rural-urban migration is an important adaptation strategy to climate shocks and will likely intensify as climate change impacts increase (OECD Sahel and West Africa Club 2010). As major urban centres in Western Africa are mainly coastal, many people are vulnerable to rising sea levels, flooding and coastal erosion (Croitoru et al. 2019). These challenges are further exacerbated by the intensive and unbridled use of resources and rapid urban expansion (Mbaye 2020), which has already led to the evacuation of several coastal towns, as seen in Senegal and Ghana (Schmidt and Muggah 2021). According to the World Bank, the costs of environmental degradation and climate change in coastal areas of Benin, Côte d'Ivoire, Senegal and Togo were as high as USD 3.8 billion in 2017, some 5.3 per cent of the combined GDP of the four countries. Moreover, coastal degradation, such as flooding, erosion and pollution, is estimated to cause more than 13,000 deaths per year in these four countries as well as high levels of urban displacement (Croitoru et al. 2019).

The rapid urbanisation of Western African countries means governments are struggling to provide the required services to new urban dwellers. As public services struggle to meet demand, urban migration is increasing suburban poverty (Brown and Crawford 2008). Informal settlements combine high population density with insufficient sanitation, water and electricity, as well as increased vulnerability to climate change impacts such as flooding (Joiner et al 2012). This socioeconomic disempowerment is often combined with a lack of representation and participation, which can lead

to urban improvement and adaptation initiatives that fail to take the interests of the urban poor into account (Puig Cepero et al. 2021). Finally, climate change directly causes urban displacement. For example, towns in Senegal and Ghana have been evacuated because of sea level rise and erosion (Croitoru et al. 2019).

### Human security in cities

Populations, livelihoods and resources in Western Africa are mostly concentrated along the coast. The three most populous cities in the region, Lagos, Abidjan and Accra, are coastal. These populations are very vulnerable to the increasingly severe manifestations of climate change. For example, fish stocks are decreasing in quantity and quality, with diets significantly dependent on this food source for protein intake (Beatley and Edwards 2018; Schmidt and Muggah 2021). Coastal agricultural productivity is simultaneously impacted by flooding, erosion and saline intrusion (Goxho 2021).

Urban migration coincides with increased crime, as organisations exploit cities as illicit markets and hubs for trafficking. Due to rapid urbanisation and demographic pressure, major Western African cities have experienced increased human trafficking, including for prostitution, forced labour and the selling of children, as well as illicit trade in arms and drugs (UNODC 2005; Alemika 2013), with women disproportionately affected (Puig Cepero et al. 2021). Coastal insecurity is dominated by crime and illegal extraction, and intensified by climate-induced rarefaction of livelihoods, including smuggling and sand mining. The reduction of fish stocks has led to clashes between coastguards and fishers, and subsequent riots. As fishing declines, the economic resilience of communities and towns alike is affected, leading individuals to migrate out of the affected regions (Beatley and Edwards 2018).

While the emergence of armed opposition groups in the Sahel has ruralised conflict in Western Africa, cities remain centres of conflict due to the concentration of infrastructure, wealth and political power. In major Western African cities such as Lagos and Jos, gangs struggle for power, challenging state monopoly on the legitimate use of violence and forcing vigilante violence on urban dwellers (Bekker and Fourchard 2013).

## Responses and good practices

Across Western Africa, a number of responses to address climate-related security risks have emerged. The following section will highlight some of the initiatives being done at the (1) regional, (2) national and (3) local levels.

### REGIONAL APPROACHES

Transboundary resource management cooperation has been a key axis of regional action on climate security, with water management an important entry point. The oldest transborder water management commission, the Lake Chad Basin Commission (LCBC), which was established in 1964, promotes the sustainable management of the basin and refers conflicts between its members to the International Court of Justice. As early as 1994, it had created the Multi-National Joint Task Force, a combined force composed of troops in Benin, Cameroon, Chad, Niger and Nigeria, which aimed to address trans-border crime and violence, and, especially since 2009, counter extremist groups such as Boko Haram. Security coordination also includes the harmonisation of border control measures as well as the exchange of defence information. Similarly, the Authority of the Niger Basin (ANB) promotes the integrated development of the basin in fields ranging from energy and agriculture to herding, fishing, forestry and industry. Meanwhile, the Senegal River Basin Development Organisation (OMVS) tackles hydropower, fluvial navigation, sustainable and concerted use of water, and livelihoods.

The OMVS is an example of how transboundary cooperation can successfully balance economic development with quality-of-life improvements and ecosystems with robust planning and information systems. Other transboundary initiatives, such as the Gambia River Basin Development Organisation (OMVG), the LCBC and the ANB, have had less success than the OMVS due to basin characteristics and lack of collective action (Guillier and Brown 2022).<sup>20</sup> The younger Volta Basin Authority (VBA) has experienced significant difficulties in collecting data and mobilising resources. Moreover, the basin's geographical characteristics lead to relatively localised transboundary issues that favour bilateral rather than multilateral cooperation (World Bank 2021g).

Similarly, the World Bank Project Cooperation in International Waters in Africa (CIWA) has been an

20 The Gambia Basin is relatively small and the Niger Basin has endorheic water flow.



important actor regarding water security in Western Africa, partnering with the various regional authorities on a number of projects. For example, in 2013, the CIWA and LCBC developed a regional water security framework for the Lake Chad Basin. The project noted the importance of granular data and modelling in areas with complex natural interaction (CIWA 2023). The CIWA also led the Sahel Groundwater Initiative, a technical assistance project that aims to improve groundwater exploration, expertise and regional cooperation, and its use for small-scale irrigation in Ghana, Burkina Faso, Niger, Nigeria and Côte d'Ivoire (CIWA 2022).

Apart from transboundary water management, Western African countries collaborate in numerous other domains to strengthen climate resilience. Notably, the Great Green Wall initiative, launched in 2007 by the African Union, aims to tackle climate insecurity in the region by planting thousands of trees across the Sahel. In turn, this will contribute to carbon sequestration, restore ecosystems and provide sustainable livelihoods through agroforestry (Schmidt and Muggah 2021). The example of the Great Green Wall (see page 33 and page 138 for a more detailed analysis of the Great Green Wall) demonstrates that, despite many implementation difficulties, projects can find renewed momentum by questioning their assumptions, integrating participatory and inclusive processes, and considering the lived experiences of affected populations (Mutanda Dougherty 2023).

Given the complexity of the links between climate change, environmental degradation, and peace and security, and the impact of these links on development and humanitarian action, experts stress the need to address the climate and security nexus through an integrated approach with all actors and stakeholders involved. However, in Western Africa, siloes continue to persist between the climate change and security fields (Guillier and Brown 2022). A recent initiative to enhance integration and cross-sectoral collaboration is the UN Regional Working Group on Climate Change, Security, Environment and Development (UN-CCESD) in Western Africa. Founded in 2021, its objective is to encourage UN information sharing and cross-pillar coordination to reduce the adverse implications of climate change and environmental degradation on human security, and to address the impacts of these phenomena on mobility and peace in the region. Another example is the UN Integrated Strategy for the Sahel (UNISS), which partly covers Western Africa (see Sahel chapter).

The UNDP is the main UN structure that deals with the interconnected fields of climate, disaster risk reduction, governance, conflict prevention, peacebuilding and natural resource management. The UNDP's Sahel Resilience Project integrates various interventions in which it collaborates at the regional level, with actors such as the African Union, ECOWAS and LCBC, as well as at the national level, where it aims to enhance disaster risk reduction strategies and resilience building. The project is being implemented across five areas of intervention: data for decision-making, risk governance, preparedness for recovery, resilient urban areas and regional engagement (UNDP 2021b). The project stems from the growing realisation of the links between climate change and security, and the significant silos that exist between various fields (Guillier and Brown 2022).

Climate change is also a regional priority issue for the ECOWAS, as captured in the recently adopted Regional Climate Strategy and Action Plan (2022–2030), which describes climate change as a factor that reshapes the world, and increases the risk of instability and insecurity in all its forms. It further stipulates how climate impacts across the region exacerbate conflicts linked to scarcity and use of natural resources, food and livelihood insecurity, and migration and displacement, among other challenges (ECOWAS 2022). The ECOWAS's approach to climate security also translates in various thematic focus areas, such as on transhumance. For example, the ECOWAS meets regularly with the largest regional herders' network, the Billital Maroobé Network (*Réseau Billital Maroobé*, RBM), to take stock of the latest transhumance campaigns and to mitigate risks such as inter-communal conflicts. According to the IOM, a key ECOWAS partner with regard to regional climate mobility, some core gaps related to transhumance remain. These gaps include the region's lack of a unified understanding of transhumant movements, their numbers and routes, and the direct impact this has on their ability to make sound policy decisions, as well as the need for localised conflict mitigation approaches to successfully address reoccurring transhumance-related conflicts (IOM 2022d).

ECOWAS and UNOWAS are engaged in a major collaborative effort with the broader UN system, government agencies, and civil society organisations to address the impact of climate change on peace and security in Western Africa. Significant initiatives have been undertaken in this regard, such as the creation of an ECOWAS-UNOWAS

Working Group on Climate Change and Security, and the establishment of the UN-CCESD. In April 2022, following a first-of-its-kind regional conference on climate security in Western Africa, representatives of countries in Western Africa and the Sahel signed a call to action, committing to inclusive, evidence-based analysis and policymaking on climate security in the region, as well as integrated partnerships and collaboration, and scaling up climate financing (UNOWAS 2022).

A key component to address climate-related security risks in Western Africa is risk-informed planning through early action systems. ECOWARN is an observation and monitoring tool for preventing conflicts and aiding decision making. The West Africa Network for Peacebuilding (WANEP) has for many years been a strategic partner for ECOWAS in operationalising ECOWARN. Over the years, the collaboration has resulted in the development of national early warning systems in all ECOWAS member states, which help to integrate more grassroots engagement and information into the system (Eze and Frimpong 2021). Even though ECOWARN is widely considered among the most advanced early warning systems for conflict prevention on the continent, it does not integrate much climate and environmental data into its forecasts and analysis (Gnanguenon 2021).

In addition, Western Africa has developed early warning systems focusing specifically on climate and environment. The CILSS, along with its regional centre Aghrymet, specialises in providing climate forecasts, surveys and training. Forecasts include climate predictions, and tracking of agriculture and herding, respectively helping farmers prepare for extreme weather events and identifying fall-back areas for herders in case of drought, using satellite and drone imaging. Both institutions also conduct hydrological and ecosystem surveys designed to track ecosystem evolution and degradation. Aghrymet supports effective agricultural adaptation by providing farmers with specialised climate information. One project facilitated by the CILSS was the PREGEC, which provides seasonal forecasts as well as water flow forecasts to farmers. However, Aghrymet does not include many peace and security indicators in its forecasts and analyses, and as with ECOWARN lacks enhanced mainstreaming of the climate-conflict nexus (Guillier and Brown 2022).

Finally, numerous initiatives across Western Africa aim to address intersectional vulnerabilities

to climate change, focusing in particular on women and children. The work of UNWOMEN in linking women, peace and security, with climate and environmental issues has made a major contribution to making climate adaptation sensitive to specific vulnerabilities. In Niger, for example, UNWOMEN has articulated its action around several axes, including integrating climate vulnerabilities in the 2020–2024 National Action Plan on Gender (UN Women 2020).

## NATIONAL APPROACHES

Several interventions in Western Africa link national climate objectives to peace and security goals. For example, in Sierra Leone, the UNDP and the national government have worked towards increasing electricity supply to the cities of Freetown, Bo and Kenema to contribute to national peace and security. In 2007, Sierra Leone's government identified the country's power crisis as a key risk to peace and stability. Thus, the project not only aimed to address development issues, but also address feelings of neglect and disillusionment due to the lack of adequate power (UNDP 2010). There is rigorous scientific evidence available that illustrate the causal linkages between access to energy and renewable energy projects, and associated social and economic benefits. Several studies also illustrate the positive effects of energy and electrification, particularly lighting, on individual perceptions of safety and security. This has been especially evident among women and girls in fragile settings, but also on crime rates and violent conflict (Energy Peace Partners 2022).

In Ghana, the Ministry of Food and Agriculture collaborated with the Ministry of National Security to launch the Ghana Cattle Ranching Project to address farmer-herder conflicts. Under the program, large swaths of land were fenced off for cattle to graze (Strouboulis et al. 2023). However, the project faced several challenges, primarily related to complex land tenure arrangements through chiefdoms, identity, perceptions of land grabbing, and dynamics of access to animal feed and water sources, as well as concerns of corruption and rent-seeking behaviour among chiefs and security officers. One study concluded that there was a need to reconsider the cattle ranching policy by better understanding the complexity of conflicts

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21 Land degradation neutrality is defined by the UNCCD as "a state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems."

and widening public consultation (Ahmed and Kuusaana 2021).

In 2023, in Mali, the government with support of the UNDP launched a six-year project aimed at enhancing climate security and the sustainable management of natural resources. The project is targeting the long-term sustainability of vulnerable productive areas in, for example, Bandiagara, Douentza, Mopti and San through nature-based solutions and the more peaceful management of natural resources. Through this initiative, Mali aims to reach its climate goals, as set out in the country's Nationally Determined Contribution under the Paris Agreement, which include achieving land degradation neutrality (UNDP 2023b).<sup>21</sup> Similarly, the Mali Climate Fund tries address the effects of climate change by investing in a green and resilient economy. Its theory of change is very much aligned with climate, peace and security objectives, and aims to enhance national capacities to better understand the middle ground between climate change, and socioeconomic and human factors, as well as address risks in the most vulnerable sectors, such as water management, agriculture, food security and energy (AEED 2023). Nigeria has been hosting an African Ministers' Council on Water (AMCOW) post-COP28 Stakeholders Dialogue in Abuja, where the Council's secretariat is headquartered, in early 2024 on operationalising data for sustainable water use (AMCOW 2024).

Some conservation efforts at the national level in Western Africa integrate climate adaptation, resilience, and peace and security objectives into efforts to conserve and protect the natural environment. For example, in Liberia, the UNDP and FAO work together with the Forestry Development Authority (FDA) to strengthen the management of community forests and protected areas in Liberia. Initiatives focus on improving the governance of community forest management bodies, building the capacities of forest regulatory institutions, empowering national civil society and non-governmental organisations, scaling natural resource management pilots, and promoting sustainable livelihood incentives for forest fringe communities (MPTF 2023).

Some national early warning initiatives in Western Africa include regular forecasting, such as the CGIAR collaboration with Vodafone, and the Council for Scientific and Industrial Research in Ghana, to provide real-time climate information to farmers and improve adaptation (Nguyen et al.

2020). The CGIAR is also promoting climate-smart agriculture across Western Africa, including the climate-proofing of value chains, supporting national agricultural investment plans and nationally determined contributions, and developing climate-smart agricultural investment plans. For example, in Mali, the CGIAR developed climate-smart models merging farming, forestry and herding, and diffused demand-driven practices and technologies through participatory processes to enable community-based adaptation. The CGIAR's Inclusive Climate Change Adaptation for a Sustainable Africa project aims to mainstream gender in climate policies, practices and negotiations (Nguyen et al. 2020).

#### LOCAL APPROACHES

Some evidence from peacebuilding programming at the local level in Western Africa suggests that climate resilience building contributes to a reduction in conflict and insecurity, and conversely peace allows for better access to and management of natural resources (Kurtz and Elsamahi 2023). For example, in Nigeria, Mercy Corps conducted a randomised impact evaluation of a programme to reduce conflict over natural resources between farmers and herders, mostly through mediation and conflict sensitivity training for local leaders. It concluded that mediation training had a positive effect on both leaders and their communities, with significant improvements to perceptions of security, but also a causal relation with a reduction in violence, including in farmer-herder conflicts (Reardon et al. 2021). Similarly, in Nigeria, research on collaborative projects between farmers and pastoralists found indicative evidence of improved trust between those conflicting groups (Mercy Corps 2019). These results are in line with other research, for example, on the violence reducing effects of community education with regard to land disputes in Liberia (Blattman et al. 2014; Kurtz and Elsamahi 2023).

In Burkina Faso, the organisation TreeAid provides an example of how forest conservation can be linked to conflict prevention and resolution, as well as reductions in poverty and hunger. Its forest governance programme supports local communities to protect and restore forestry by setting up forest management plans and committees, as well as supporting enterprise groups. The project has a strong focus on the inclusion and participation of women, as they have traditionally been marginalised from forestry management (TreeAid 2023). TreeAid also actively contributes to conflict man-



agement, particularly between communities and forest conservation agents, by facilitating dialogue between local officials, agropastoralists and other livelihood groups that depend on the forest (Tarif 2023). Similarly, in Senegal, local civil society organisations have established local consultative forums to create a platform for awareness-raising among communities on national forestry legislation, but also to enhance participatory dialogue around reforestation and environmental protection, and how this could be linked to strengthened economic resilience (Tarif 2023).

Other climate security interventions in Western Africa have focused on addressing gender issues related to climate vulnerability. For example, with support from the UNPBF, several projects in Mali and Niger aim to train women to contribute to local conflict prevention efforts around climate-induced natural resources conflicts in their communities. Through these endeavours, women have taken on the role of conflict mediators, resolving conflicts and benefiting from livelihood diversification opportunities including land ownership. These efforts have also facilitated the organisation of women-led cooperatives, enhancing women's participation in and leadership of local decision-making processes to reduce the impact of climate change on and related tensions in their communities (UNPBF 2023).

Western Africa has a wealth of indigenous knowledge and practice of land management, pastoralism and agriculture, which can help communities to build resilience against climate change impacts. In Ghana, long-standing indigenous farming practices help to mitigate the adverse effects of climate change (Gibson and Anderson 2023). Proka, for example, is a historical farming practice that involves the clearing land for cultivation. Instead of slashing and burning the brush, the sticks and leaves are left to rot, acting as an organic fertiliser that expedites vegetation regeneration while reducing the risk of wildfire (Awuah-Nyamekye 2019).

Over the past decade, the subregion of Liptako Gourma has been plagued by localised violent conflict, with climate change and environmental degradation one of the key drivers. Several initiatives aim to address the climate-conflict nexus in the subregion. For example, the EIP Trust Works environmental peacemaking project aims to integrate an understanding of the climate change, environmental and natural resource-related

dynamics involved in conflicts as entry point for dialogue and trust building. By identifying existing peace initiatives, the project wants to foster collaboration between conflicting parties around issues of shared interest (EIP 2023).

The French Development Agency (AFD) 3 Frontiers Project (P3F) aims to support agropastoral communities in Liptako Gourma to improve environmental protection, transhumance, and the prevention and resolution of conflicts related to natural resource management (Alliance Sahel 2020; Le Gret 2021). Furthermore, the Swiss Centre for Humanitarian Dialogue (HD) supports a network of around 2,000 agropastoral mediators across Mali, Burkina Faso, Niger and Mauritania to help settle local conflicts between farmers and pastoralists, and broker local agreements over the management of resources and demarcating corridors for safe movement of livestock (Centre for Humanitarian Dialogue 2019). A number of agropastoral associations active in Liptako Gourma also play an important role in the broader context of environmental peacemaking efforts.<sup>22</sup>

Large organisations are heavily engaged in the Liptako-Gourma subregion. In 2021, the World Bank launched a new USD 350 million project to support community-based recovery and stability, aimed at simultaneously addressing emergency and climate change needs, heightened pressures from forced displacement, competition over natural resources, and regional data monitoring gaps. In close collaboration with the subregional organisation *Autorité de développement Intégré de la région du Liptako-Gourma*, which was created in 1970, the project supports a regional peace and stability dialogue, while at the same time deploying community-centred development platforms to localise implementation (World Bank 2021a).

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22 In Liptako Gourma, these include the Association pour la Promotion de l'Élevage dans le sahel et la Savane, the Réseau des Organisations Paysannes et de Producteurs en Afrique de l'Ouest and the RBM.

## Lake Chad: Not a shrinking lake, but a fluctuating one

Lake Chad is an ecological miracle, a huge freshwater lake in an otherwise arid region. It is shared by Chad, Cameroon, Niger and Nigeria. The lake supplies water to around 50 million people and is the basis for the livelihoods of an estimated 20 million. All-in-all Lake Chad's river basin covers an area of more than eight per cent of the African continent.

While Lake Chad shrank dramatically in the 1970s and 1980s due to the combined effects of climate variability and unsustainable water management, such as irrigation and dam-building activities, Lake Chad is not currently shrinking. More recent research using satellite data has shown that overall – taking account of the combined surface water extent of the northern and southern pools, plus the total water storage, ground water and soil moisture – the lake is actually in a period of expansion and has been for the past two decades. Some evidence even suggests that total water volumes stored within the lake water and the aquifers beneath have been increasing more recently (Pham-Duc et al. 2020).

However, there is greater variability and uncertainty than ever before in recorded history, leading to fluctuations in the size of the northern pool, as well as greater unpredictability regarding when and how much rain may fall (Pham-Duc et al. 2020). The timing and duration of the rains also varies erratically, and there have been shifts in the timing of the season and increases in extreme weather events (Taylor et al. 2017). Moreover, because of the shallowness of the lake and higher ambient temperatures, vegetation cover is increasing, particularly in shallow areas. In turn, this is slowing water movement across the lake, hampering fishing activity and boat transport across the lake, and providing a misleading perception that large parts of the lake have disappeared or transformed into a vast swamp (Pham-Duc et al. 2020).

A 2019 climate security assessment identified four key climate-related security risks that emerge through the interaction of increasing climate variability and conflict (Vivekananda et al. 2019):

### **1. Climate and conflict undermine livelihoods:**

Prior to recent conflicts, there was a rich tapestry of cross-border trade. Moreover, people living around the lake relied on a range of livelihood systems that allowed them to switch between different activities (farming, fishing and pastoralism), as well as crops, grazing routes, fishing areas, depending on whether there was more or less water. The conflict has undermined these livelihood systems and decreased resilience.

### **2. Increased competition over natural resources:**

Natural resource conflicts are not a new phenomenon in the region, but the conflict has eroded existing conflict management systems and displacement has led to a clustering of people around urban centres. Together with the impact of climate change, this has led to more people competing over fewer resources in the area.

**3. Recruitment into armed groups:** Recruitment is a complex phenomenon. It takes place in the context of stark social and economic inequality, perceived lack of state legitimacy, increasingly vulnerable livelihoods, and the lure of financial incentives offered to potential recruits. Climate change compounds this risk as it undermines already fragile economies and livelihoods.

**4. Heavy-handed military responses:** While national militaries and the Multi-National Joint Task Force, working with community militias, have had some success in bringing relative peace to the region, their heavily militarised approaches have often undermined livelihoods by restricting movements and have often eroded state-citizen relationships.

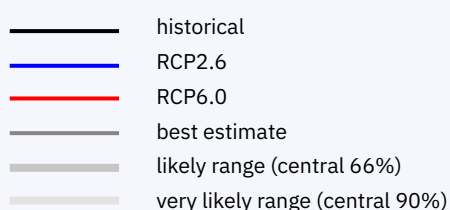
# Annex

## How to read the plots

The maps and plots included in this report provide an overview of projected climate change parameters and related sector-specific impacts in African regions until 2080 under two different climate change scenarios (RCPs). RCP2.6 represents a low emissions scenario that aims to keep global warming below 2°C above pre-industrial temperatures, while RCP6.0 represents a medium-to-high emissions scenario. Projections are provided up to 2080, with each year showing the mean value of a 31-year period.<sup>65</sup>

The **line plots** show climate impact projections averaged over the whole country, with the blue colour representing the RCP2.6 scenario and the red colour representing the RCP6.0 scenario. While the lines depict the best estimate (representing the multi-model median of 10 climate models), the shaded areas represent the likely range (strongly shaded area) and the very likely range (lightly shaded area), indicating the range of model agreement of at least 66 per cent and 90 per cent of all model projections, respectively.

## How to read the plots



The **map plots** display regionally explicit climate information under RCP2.6 and RCP6.0, in a spatial resolution of approximately 50 x 50 km. While the leftmost column represents the baseline period as found in the model data, the other three columns represent future projections in comparison to that baseline period. The colour values depict the multi-model median of the underlying models at each grid cell. The presence of a dot means that at least

75 per cent of the models agree on the sign of change depicted for the specific grid cell and scenario (i.e. whether an increase or a decrease can be expected). Conversely, the absence of a dot represents the lack of model agreement on the predicted change.

## UNCERTAINTIES IN CLIMATE CHANGE PROJECTIONS

It is important to acknowledge that uncertainties are always part of climate change projections. Uncertainties arise from a variety of factors, including natural variabilities, uncertainties in GHG emissions scenarios and differences in the models use. Consequently, no future (climate change) projection comes without some level of uncertainty. The levels of (un)certainties, however, differ. We present the results of 10 different global models. To indicate the (un)certainty of the projections, we consider model agreement. The more these models agree the higher the certainty, the more they disagree the lower the certainty. For example, if different models project a similar result under the same scenario, the projected changes demonstrate low levels of uncertainty. However, if the models project very different changes (in terms of range and even direction) under the same scenario, then the projections are uncertain.

Line plots and map plots depict uncertainty differently and cannot be compared. The line plots indicate the level of certainty through the shaded areas, depicting the likely (central 66 per cent) and very likely (central 90 per cent) range of all model projections. Generally, the smaller the shaded areas, the more certain the projections. The map plots depict the level of certainty through the presence or absence of dots. If dots are present, at least 75 per cent of all models agree on the direction of change or, in other words, on an increasing or a decreasing trend. If the dots are absent in a specific region or scenario, then model agreement within this specific region and scenario is below 75 per cent.

To simplify the interpretation of the projections, all line plots and map plots that are subject to high levels of uncertainty are marked with a symbol ( ).

This does not imply that these plots have no informational value, but rather draws attention to the limitations of such projections for future planning. Consequently, they should be very carefully interpreted when they are used for planning measures. In the case of high uncertainty, additional information will be provided on how to interpret the data.



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