



Climate change and migration

Understanding factors, developing opportunities in the Sahel Zone, West Africa and the Maghreb.

Xavier Aragall. Programme Manager of the Euromed Survey. European Institute of the Mediterranean (IEMed)

Amal El Ouassif. International Relations Specialist. Policy Center for the New South. Morocco

Anna Ferro. Researcher Migration and development. CeSPI- Centro Studi di Politica Internazionale. Italy

Matías Ibáñez. Programme Officer of the Sustainable Development and Regional Integration Department. European Institute of the Mediterranean (IEMed)



**FRIEDRICH NAUMANN
FOUNDATION** For Freedom.
Mediterranean Dialogue

IEMed.
European Institute of the Mediterranean

Climate change and migration:

Understanding factors,
developing opportunities in the Sahel Zone,
West Africa and the Maghreb.

Overview

Foreword	04
Introduction	06
Main findings	08
Policy proposals	10
I. Climatic variations in the regions: main elements at stake.	11
II. Climate change as a source of human displacements: the issues.	16
III. Climate change as a risk multiplier in human displacement across North Africa.	20
The perception of climate change's impact on livelihood and forced displacement in North Africa.	22
Potential scenarios of climate migration in North Africa.	27
Highlights on findings after the field mission in the Region of Sousse-Massa in the South of Morocco, an understanding the place of migration as an adaptation strategy to climate change.	29
IV. Climate change as risk multiplier in human displacement in West Africa and the Sahel region.	32
Human Mobility in West Africa and the Sahel.	33
The fishery sector in Senegal:an explosive mix of climate change, unauthorized fishing practices and illegal migration.	35
Perceptions on climate change in West Africa and the Shael.	36
Perception case studies in West Africa and Sahel countries.	38
Perception analysis from Afrobarometer survey.	39
Sahel: perceptions on climate change.	40
Sahel: perceptions on emigration.	45
West Africa: perceptions on climate change and emigration.	47
Likely trajectories of climate-induced mobility in West Africa and Sahel.	50
Institutional Bodies.	52
Contributors.	54
Bibliography.	56
Imprint	60

Foreword

In the last decade, it has become very clear that climate change is not a problem of the future. This threat multiplier is causing severe natural disasters, rising sea levels, desertification, and rising temperatures in every continent, reminding us that it is not only the global South that is experiencing and will be experiencing its direct effects. It is true, however, that some of the most severe impacts of climate change are indeed being felt in the Sahel, the Maghreb, and West Africa, where millions of people are facing increasing water scarcity, desertification, and land degradation, to name a few. These impacts have serious implications for human development, food security, and political stability, and are already driving a growing trend of migration across the region.

Although most migration is intraregional, migratory flows toward Europe will increase steadily at potentially unsustainable levels if climate change continues to affect basic resources such as water and food security. The UNHCR recently estimated that approximately 1.2 billion people are at risk of climate-related displacement. This displacement, which we have been able to already observe during research for this report, will in turn, be the cause of serious political instability in migrants' countries of origin and destination, as well as between them at the international level. It is therefore critical that awareness of climate change and its impact on human displacement is widely recognized and that it leads to more comprehensive and coordinated responses by policymakers and governing bodies. Current predictions indicate that mitigation and adaptation efforts must be further strengthened to give people a chance to live safely in a new climate reality. Economic development plays a critical role in this effort and helps ensure societies are resilient to climate change.

Migration is a human phenomenon that has always occurred for a variety of reasons. It is up to those in power to ensure that the way it happens remains a humane process and that human rights remain a priority. People forced to leave their homes and communities in search of more stable conditions and better opportunities are often demonized in political rhetoric and the media, but as climate change makes migration increasingly inevitable, it is as important as ever to be aware of its causes. We are confident that the information gathered in this report reflects these ideas while bringing more attention to this critical issue on all shores of the Mediterranean. Mitigating some of the worst effects of global warming is undoubtedly an issue on which we must act now. In doing so, we can help ensure a more sustainable and prosperous future for all.

David Henneberger
Head of Office Spain, Italy, Portugal
& Mediterranean Dialogue, Friedrich
Naumann Foundation for Freedom

Roger Albinyana
Managing Director, European
Institute of the Mediterranean
(IEMed)

Introduction

When taking into account the link between climate change and migration from a European perspective, the general idea that emerges is that climate change will have a direct impact on push factors that are already driving migrations today, leading to an expansion of migratory flows.

However, this relationship is more complex and deserves to be approached beyond this causal relation. In fact, when these factors are analysed in different regional contexts, different dynamics appear. As such, it appears that the extent of the impact of climate change on existing forms of mobility will vary, depending on the economic, political and social context of the countries involved, as well as their strategies to combat and adapt to it.

Current vulnerabilities (economic, social and political) in these regions might be exacerbated by climate change, but they shouldn't automatically trigger migratory flows. Human mobility as an adaptation strategy to climate change appears as the last choice. Migration is chosen only after other adaptation strategies have not succeeded. Moreover, it is currently still too early to verify with certainty the extent to which climate variations will impact on migrations, since the evidence so far has mainly been analysed in the short-term, which doesn't necessarily give insights into the longer-term effects of climate change on populations.

Therefore, this report, takes this complexity into account as a starting point, for three African regions that neighbour each other, who have a direct impact on the migratory system of the Euro-Mediterranean region. It starts by establishing a key element: the perception of climate change and its effects on migration. This is key because, as the report will show, there is no homogeneous perception, neither between regions, nor among different socio-economic profiles within these regions. We focus on perceptions as it is the first step to acknowledging a problem, and further introduce its management in the political agenda.

As far as climate change and its impact on migration is concerned, at the start of our research, we realised that it is first necessary to change the narrative by which climate change is associated with unprecedented and large-scale migratory movements. First, climate change is considered a "threat multiplier" with an impact on factors that generate inequality and vulnerability. However, until now, displacements of population based on these factors have mainly been within national borders. Secondly, a distinction must be made between sudden events, i.e. meteorological disasters, and long-term climatic variations (long set events), such as water shortages or sea level rise. Projections on human movements are made on the basis of long set events and show quite differentiated scenarios. Finally, before these changes cause large waves of international migrations, there will be strategies in place to adapt to them. Internal migration is considered an adaptation strategy, but there is still not enough knowledge and information to establish a direct relationship with international migration.

With regards to the areas in question, North Africa has been identified as one of the regions at the highest risk of water stress in the world. Indeed, countries along the Mediterranean Sea are exposed to high levels of climate vulnerability, which can be seen by recurrent and prolonged heat waves, drought, coastal flooding, and water stress. In turn, in the West Africa region, comprising of 16 countries, the majority of which belong to the category of least developed countries, climate change is considered to be multiplying the risks linked to urbanisation and coastal erosion. And in the Sahel region, despite its internal differences and variations among territories, most of its inhabitants depend on climate-sensitive activities. Taking all this into account, this report starts analysing the climatic variations in the aforementioned regions (North Africa, West Africa and the Sahel) and the main issues at stake, and it continues with the description of the key elements of climate change as a probable source of human displacement. Moving forward, the report offers a specific regional analysis focused on North Africa, West Africa and the Sahel. It initially describes the perception of the climate change-human movements binomial and then focuses on the likely scenarios of climate-induced mobility in those regions.

Main findings

- Although the observed changes on climatic conditions in the Mediterranean have exceeded the global means, there is still a **weak perception** on its current impact and future challenges on human movements in the region.
 - In the Sahel and West Africa regions, perceptions on climate change are influenced by a **combination of variables**, which affect people's choice of adaptation strategies in the **different contexts** in different ways.
 - The key factor that makes climate change one of the greatest threats of the 21st century is that it **negatively affects interlinked sectors** (agriculture, industry, water, tourism, sanitation, health, energy, environment and biodiversity).
 - **Slow-onset climate change** variations and its negative consequences, in combination with other instability drivers, will have a significant impact on people's livelihoods and will lead to a loss of agricultural and fishery productivity in highly exposed locations.
 - Human **mobility**, as a **form of adaptation** to the gradual and constant exposure to **slow-onset climate variations**, is one of the most common forms of internal climate-induced migration and will probably be a real issue at stake to be considered in future statistics and **public policy decision-making processes**.
 - Most research on **climate change** looks at the **short-term and doesn't necessarily inform on longer-term climate change effects on populations**: behind the figures of the climate migrants' scenarios for 2030, there is a combination of elements ranging from climate-related factors to a lack of adaptive measures, as well as socio-economic vulnerabilities.
 - Climate change is **today** a significant driver of **internal migration**, as it rarely takes place directly across borders, but human **mobility patterns and trends** are expected to take place **across the Sahel and North and West African regions within the next few years**.
-

NORTHERN AFRICA

- According to potential scenarios of climate migration in North Africa, climatic changes, in addition to **pre-existing social and economic vulnerabilities** in Northern African countries, will inevitably impact migration patterns and the likelihood of conflict occurrence.
- In **North Africa**, the dependence on rain-fed agriculture, along with low precipitation and the constant pressures on limited water resources, put the region at high risks of **water vulnerability**, therefore drought and the lack of water came at the top of the climate drivers of migration.
- The history of internal migration in North Africa was always one that is driven by the development gap between the **rural and urban areas**. Thus, it is too complex to state the exact share of climate change in migration in rural areas of North Africa.
- The **drivers of climate migration** leading to the projected scenarios evolve around **water scarcity**, altered crop productivity, repeated episodes of heat, as well as extreme weather events.
- Most of the Northern African countries have national strategies on limiting climate change effects, but actions on mitigating climate change effects on **forced displacement** remain limited.

WESTERN AFRICA AND THE SAHEL

- As a general framework, **intra-regional migration is dominant** in West Africa and the Sahel, compared to migration to Europe, and will probably stay as such.
- In the **Sahel region**, the majority of current inhabitants live in rural areas and depend on farming and rainfed agriculture, raising livestock and other rural climate-sensitive activities.
- In **West Africa**, climate change is multiplying the risks linked to urbanisation and coastal erosion, water and air contamination and floods.
- **Addressing the adverse effects** of climate change and adaptation measures necessarily implies an integrated development perspective defined by the interaction with pre-existing socio-economic fragilities that, in many Western and Sahelian African countries, constitute the complex root causes of migration.
- When **environmental degradation** severely (and directly or indirectly) impacts on livelihoods and household economic activities, with no alternative income strategy or adaptation measures often at hand, people will more likely consider migrating as a last resort.
- **Political**, but also **cultural, social and economic leadership** and mobilisation are important for driving adaptation and raising the **adaptive capacity** of the population.

POLICY AGENDA

- The body of knowledge available on climate change **perception** is still limited at the international level. But it is a crucial indicator to evaluate the degree of **public awareness and commitment to facing climate change**. Furthermore, it will be a key factor in deciding the likelihood of **adequate policies to be adopted** in connection with climate change mitigation and adaptation.
- **Addressing the adverse effects** of climate change and adaptation measures intrinsically implies an **integrated development perspective**, defined by the interaction with pre-existing **socio-economic fragilities**.
- Adaptation measures on **agriculture**: in all three regions, agriculture has a strategic **importance**, as it is considered among the main job providers and a key contributor to GDP, which makes climate change a central variable potentially affecting **push factors**.
- As long as rural areas will be particularly affected, **cities will become a space of opportunity**, which means the rural exodus to urban areas will be (and already is) a constant in the region, generating serious pressures on cities' resources and planning. In this sense, cities, which are already a key element for **managing climate change**, will also be important in **future mobility scenarios**.

Policy proposals

Regional and national policy makers should incorporate the climate change-human mobility nexus into migration policy planning, design, and implementation:

- Sharing evidence-based data and information with relevant stakeholders on how the effects of climate change and environmental degradation will impact future mobility trends and scenarios in the region.
- Considering the **regional institutions** as essential actors to addressing the multi-dimensional challenges of the climate change-human mobility nexus.
- Acknowledging the **multicausality behind migration flows** and particularly the current impact of climate change as an **aggravating factor** of already existing social and economic hardship.
- Enhancing **coordination mechanisms** between ministries for policy coherence across the migration, environment, and climate change nexus.

- EU policies, strategies and programming in the **EU external dimension** should incorporate mobility in the context of climate change into EU's Mobility Partnerships and EU cooperation frameworks.

- EU migration cooperation policy and programmes should reflect how migratory patterns respond to the **complex interaction** between demographics, institutional and democratic weaknesses, economic and social imbalances, violent conflict, environmental degradation and climate change.

Regional and national policy makers should avert and address the causes of climate-induced forced displacement by fostering resilience-building strategies to fight against the environmental stressors causing displacement and mobility:

- Considering the **differences in vulnerabilities** across affected regions to provide a stronger basis for adaptive practices that would enable people to stay in viable livelihood systems.
- Ensuring that both **sending and receiving areas** are adequately prepared to ensure the resilience of those who remain and those who arrive.
- Addressing the needs of **trapped and immobile populations**.

-
- Future EU mobility frameworks and migration partnerships should envisage **innovative tools** and solutions that help **decrease climate vulnerability** and enhance climate resilience and adaptation capacities of affected communities.

Regional and national policy makers should integrate in its policy agenda human mobility as a form of adaptation to climate change:

- Raising **awareness** of migration as an adaptation strategy to climate change among partner governments (national and local), civil society, academia, and/or the private sector.
- Supporting **adaptation practices** by developing solutions to manage displacements associated with the negative effects of climate change.
- Strengthening the capabilities of **rural communities** to manage their resources and empowering farmers and rural actors to participate in determining and implementing adaptation policies.
- Skill partnerships and circular migration schemes could be further developed to foster safe **migration pathways** as adaptation strategies in the context of climate change adversities.

-
- The EU institutions should **recognise and promote migration as an adaptation** strategy in climate vulnerable territories by developing programmes and actions to help affected communities to migrate safely as a way to cope with climate change-related challenges.

Local, regional and national policy makers should consider the increasing rates of urbanisation and rural to urban migration:

- Addressing the linkages between **migration, rapid urbanisation** and the impacts of **climate change**.
- Prioritising the requirements to foster **urban environmental and climate-smart sustainability**.
- Planning advanced **public service provision**: air, water and land pollution, affordable housing programs, employment opportunities for increasing numbers of people.

-
- EU institutions should promote urban climate resilience by **developing capacity-building** programmes for local authorities to help them develop holistic strategies that take into account the needs of the population and displaced people encompassing the water, energy and food sectors.

Climatic variations in the regions: main elements at stake.

There is still a weak perception on its present impact and future challenges on human movements in the region.

1. Vvaa, (2021) *Towards sustainable and mutually-beneficial migration partnerships in the south Mediterranean*. EuroMeSCo-EMM-5

2. MedECC (2020) *Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report* [Cramer, W., Guiot, J., Marini, K. (eds.)] Union for the Mediterranean, Plan Bleu, UNEP/MAP, Marseille, France,

The Euromed Survey¹ of 2021 invited respondents from southern Mediterranean countries to assess the main drivers of outwards irregular migration, for both migrants transiting through their country and for citizens from their own country. For the latter, more than two-thirds of respondents (67%) ranked “Lack of socio-economic perspectives” as the primary driving factor, followed by “Conflicts and instability” and “Joining family/residents living abroad.” On the other hand, respondents were less inclined to choose “Lack of socio-economic perspective” as the first determinant of irregular migrations when considering migrants transiting through their country, prioritising instead conflict and instability as the main pushing factor. The impact of climate change was not considered as an important driver in either case.

Although the observed change on climatic conditions in the Mediterranean have exceeded the global means, and the climatic forecasts inform of the Mediterranean as a region especially affected by climate change projec-

tions², there is still a weak perception on its present impact and future challenges on human movements in the region.

This is probably because the region is mostly affected by slow-onset events that is, long-term risks and impacts associated with increasing temperatures, desertification, land and forest degradation, ocean acidification, sea level rise, and salinisation (Coop 26) and there is less awareness on the link of migration to these events. Other factors are related to the fact that mobility implications (the degradation of land, water and livelihood insecurity) will probably be very context-specific (IOM SDGn°13).

Countries along the Mediterranean Sea are exposed to high levels of climate vulnerability, as shown by recurrent and prolonged heat waves, drought, coastal flooding and water stress. **Maghreb** countries are no exception. Algeria, Libya, and Tunisia are below the water scarcity threshold set by the Food and Agriculture Organization (FAO), while Morocco is close to the severe water stress threshold. In countries where agriculture and tourism are key to the development of economic activity, the impact of climate change can be tremendous on the socio-economic dynamics. In the wider region of the Middle East and North Africa, countries can lose up to 13% of GDP for a raise of the mean global temperature to 4,8C° by 2100. (Kompas et al., 2018). In Morocco, the impact of climate change on the GDP could translate into a loss of 3% by 2050 (Ouraich and Tyner, 2018).

The World Bank classifies the Middle East and North Africa as one of the regions at the highest risk of water

stress in the world. The situation can be explained by a list of factors, among which those strictly linked with climate change effects, such as rising sea levels and salinisation, in addition to factors related to the excessive use of water resources.

Agriculture has a strategic importance in the socio-economic fabric of North African countries, as it is considered among the main job providers and a key contributor to the GDP of Northern African countries. For instance, in Morocco agriculture accounted to more than 15% of the GDP in 2018 and provided 40% employment at the country level in the same year. However, agriculture is also among the sectors that drain most of the available water supplies. The dependence on rain-fed agriculture, along with low precipitation and the constant pressures on existing limited water resources put the region at high risks of water vulnerability, with the associated impact of this vulnerability on the livelihood of the population working in the agricultural sector. Other sectors key to the economic development of the region, such as the fishery and forest sectors are also at risk of deteriorating climate conditions, with fish stocks fished at unsustainable levels and declining available maritime resources due to the vulnerability of small pelagic species, to increased water temperature in the Mediterranean Sea.

The **West Africa subregion** comprises of 16 countries, the majority belonging to the category of the least developed countries (IOM, 2021) while Nigeria, Ghana and Ivory Coast represent the largest economies, accounting for one-quarter of Africa's GDP (Gross Domestic Product) in 2020

- although still facing internal development challenges and social inequalities. Agriculture is prevalent and the largest part of the rural population depends on land and rain-fed agriculture (de Longueville et al., 2020, p. 1). Projections place West Africa among the most strongly affected regions by future environmental changes (Brüning and Piguet, 2018).

One third of the region's population lives in the coastal areas of West Africa, which is characterised by its wetlands, fishing economy, reserves of oil and gas and touristic potential. Rapid urbanisation, however, puts pressure on the demand of water and land, as well as other natural resources. At the same time, there is an important coastal degradation related to human-made infrastructures. Climate change is multiplying the problems and risks, particularly those related to urbanisation and coastal erosion. Thus, these coastal regions are facing an important environmental degradation affecting people, through floods, air and water contamination, houses and infrastructure, as well as the fragile ecosystems and habitats in the region (Croitoru, L, Miranda. JJ. and Sarraf M., 2019).

The **Sahel region** is a semi-arid transition zone that spans over 6.000 kilometers and different countries from East to West Africa, covering diverse geographic and agro-ecological systems, home to more than 400 million people. Despite its internal differences and variations among territories, the region is a sum of potential and current humanitarian risks: many Sahelian countries rank low on almost all of the human development indicators, and recent border closures and reduced activities due

In North Africa, dependence on rain-fed agriculture, along with low precipitation and constant pressures on existing limited water resources put the region at high risk of water vulnerability.

In West Africa, climate change is multiplying the problems and risks, particularly those related to urbanisation and coastal erosion.

In the Sahel region, the majority of current inhabitants live in rural areas and depend on farming and rainfed agriculture, pastoralism and other rural climate sensitive activities.

to COVID-19 further pushed many into poverty. Projections suggest that the Sahel countries will likely double their population by 2050 (UN, 2019).

The majority of current Sahel inhabitants live in rural areas (approximately 79%, UNEP, 2011) depend on farming and rainfed agriculture, livestock farming and other rural climate-sensitive activities that employ the majority of the countries' workforce and contribute to national GDPs. The graphs "1" in the annex section illustrate how economically and socially-dependent on agriculture some Sahelian countries are, revealing their vulnerability to erratic climatic modifications. In Chad, Niger, Mali and Guinea-Bissau, the sector of agriculture, forestry and fishing accounts between 30-46% of the GDP, while on average in Central and West

Africa it accounts for 23%. Moreover, the percentage of male employment in agriculture accounts on average 46.9% in Central and West Africa, while in Chad, Niger, Mali, Eritrea and Guinea-Bissau, it reaches between 57-76%. The worsening of the effects of climate change on local environments and economic systems in these countries will likely impact large segments of the population with low adaptation capacity (Klepp, 2017).

*Agricultural work in the Dadès Valley, Morocco.
Andrea Delbo, Shutterstock.*



Climate change as a source of human displacements: the issues.

Due to its nature of “threat multiplier”, climate change has the potential to exacerbate other drivers of instability such as water, food, energy or health insecurity, and ultimately lead to political tensions, development risks and migration challenges.

Due to its nature of “*threat multiplier*”, climate change has the potential to exacerbate other drivers of instability, such as water, food, energy or health insecurity, and ultimately lead to political tensions, development risks and migration challenges. Since it is a future destabilising agent, climate and environmental change have already become a real factor with a significant impact on the increasing numbers of climate-induced human displacements and population mobility across the world.

Indeed, climate-related environmental stressors have already been identified as the first annual cause of internal displacement worldwide according to the UN Secretary-General High-Level Panel on Internal Displacement (2021). The UN Intergovernmental Panel on Climate Change’s 2022 Assessment Report has confirmed this same climate-migration nexus by stressing that “*climate change and weather extremes are increasingly driving displacement in all regions around the world*” (IPCC, 2022), including in both the Northern and Wes-

tern African region. Titled “*Climate Change 2022: Impacts, Adaptation and Vulnerability*”, the 2022 IPCC Assessment Report underlines that about 3.3 billion people are currently living in regions with a high exposure to the vulnerability of climate change effects (IPCC, 2022).

Similarly, the Internal Displacement Monitoring Centre (IDMC), emphasised that 23.7 million internal displacements occurred worldwide last year as a cause of climate and environmental push factors (IDMC, 2022), while in 2021, natural catastrophes accounted up to 95% of the total number of human displacements in a human displacement-related scenario (IDMC, 2021). All in all, last year, over 100 million people were forcefully displaced within their own borders (UNDP, 2022).

Nevertheless, if global emissions continue to rise and climate summit targets are constantly ignored by countries, the numbers of forcibly displaced people will continue to increase and thousands of families will be forced to move, either internally or internationally, in search of a better future that provides them with proper livelihoods, living conditions and human security. Along the same lines, the World Bank’s Groundswell Report (2021) describes three potential scenarios on how climate and environmental stressors could affect mobility flows and trends in 2050 by taking into account the progress made on sustainable development goals and the reduction of global emissions. According to expert predictions, this situation is expected to worsen in the coming years in all three scenarios presented a more climate-friendly one (best scenario possible), a more

inclusive development one, and a pessimistic one. In the most pessimistic scenario, climate change is expected to displace up to 216 million people across the globe by 2050. Looking at our regions of research, the report predicts that up to 13 million people will be forced to flee from their homes across North Africa in search of a better future, approximately 6% of the total population (Clement et al. 2021). In this context, climate migrants will account for up to 46% of the total number of people of forced internal displacement in the region. In a similar vein, the World Bank's Groundswell Report predicts very negative scenarios in the neighbouring Sahel and Western Africa regions, as a total of 86 million people could be forced to move within national borders by 2050.

Climate-related environmental stressors are already identified as the first annual cause of internal displacement worldwide and predictions foresee different scenarios expecting millions of displaced people.

Human mobility as a form of adaptation will be a real issue at stake to be considered in future statistics and public policy decision-making processes.

These predictions are particularly important for both regions, as they have been portrayed as real hotspots of climate-induced mobility. According to several studies and reports, climate and environmental change-related adversities, such as severe desertification and long droughts in arable and farming areas, sea level rise, soil degradation, sand storms, fluctuations in annual precipitation rates, high heat or rising temperatures are expected to worsen and intensify (Rigaud et al., 2018) (MedEcc, 2021). These slow-onset climate change variations and its negative consequences, in combination with other instability drivers, will have a significant impact on people's livelihoods and the loss of agricultural and fishery productivity in highly exposed locations. As a last resort, this



Fishing boats in Yarakh, Senegal.
Noah Cuni, FNF.

situation will lead to people having to move once all means of subsistence have been exhausted (Mixed Migration Centre, 2020), as a population's sanitary, socioeconomic or political security has deteriorated so far that there is no longer the possibility to adapt to the changing conditions. This form of human mobility as a form of adaptation will be a real issue at stake to be considered in future statistics and public policy decision-making processes.

It is true that human displacement induced by climate and environmental variations have been a common characteristic of many rural and nomadic pastoral communities in Northern Africa, the Sahel and Western Africa. Moving to neighbouring arable lands during the agricultural off-season has always served as an adaptive mechanism in the face of climate risks (Warner et al. 2016). Pastoral nomadism has also long been a tradition in the Middle East and the Sahelian neighbouring lands, relocating the livestock to areas with an abundance of food, water, and space. However, the biggest difference to today's situation is that if climate and environmental variations continue to put pressure on food, natural and water resources, these common human displacements will be affected to such an extent that, rather than being a common rural and nomadic practice, they will have become an obligation to migrate permanently as a form of adaptation. In this scenario of the adverse effects of climate stressors, there will be no possible way for farmers and nomadic people to return to their homes and lands once the pastoral movements or the agricultural season are over (World Bank, 2014).

Moreover, disaster displacement due to sudden onset climate hazards such as hurricanes, torrential storms or natural catastrophes, which often involves a large number of displaced people, will continue to intensify in the face of increasing climatic extreme events. Only in 2020, disasters, conflicts, and weather-related events caused 40.5 million new internal displacements globally, of which, 30.7 million were displaced by natural disasters, becoming the biggest cause of displacement worldwide, ahead of conflict and disaster-related scenarios (IDMC, 2021).

Despite the fact that climate change is today a significant driver of internal migration, as it rarely takes place directly across borders (Clement et al., 2021), human mobility patterns and trends are expected to take place across the Sahel and North and West African regions in the next few years (Mixed Migration Center, 2020). This will particularly be the case if climate-related environmental stressors continue to increase in the next few years, while exacerbating drivers of human insecurity, such as political and socio-economic instability, development gaps and scarcity of natural resources, food and water supplies.

Given the information and data presented, and the fact that the climate change-forced displacement nexus has been widely recognised by the international community, academia, civil society and governments all around the world, immediate action should be taken by African leaders and the international community. This should be done mainly through a reinforced development cooperation and external action, in order to address and limit all the harmful

Displacement due to sudden onset climate hazards, which often involves large number of displaced people, will continue to intensify in the eyes of increasing climatic extreme events.

Climate change is today a significant driver of internal migration, as it rarely takes place directly across borders, but human mobility patterns and trends are expected to take place across the Sahel and North and West African regions in the next years.

related challenges described above. In particular, policymakers should incorporate the climate change-human mobility nexus into policy design and implementation processes in the areas of migration and climate change adaptation.

In this context, the European Commission's Staff Working Document "*Addressing displacement and migration related to disasters, climate change and environmental degradation*" has not only recognised the role that environmental disasters and climate change play in North Africa and the Sahel as key drivers of forced displacement, but also called to the necessity of incorporating the climate change and forced displacement nexus in prevention, preparedness and response policy planning and implementation (European Commission, 2022), both in development cooperation and national adaptation programmes.

If inequalities continue to grow and the socioeconomic development gaps in the countries most affected by climate change are not tackled, while greenhouse emissions continue to rise, the World Bank's worst-case scenario predictions will become a reality. Similarly, the IOM's report "*Climate change and migration in vulnerable countries*" underlies the fact that countries with a lower degree of socio-economic and political development, and weak public policy structures, will find it more difficult to cope with the challenges posed by climate change adaptation and human mobility and thus, will experience greater human mobilisation in the years ahead (IOM, 2019). As such, the role of international cooperation and public policy at national and regional

levels is crucial at this global cross-roads and must focus once and for all on the climate-forced displacement nexus and its problems.

Countries with a lower degree of socio-economic and political development, and weak public policy structures, will find it more difficult to cope with the challenges posed by climate change adaptation and human mobility.



Climate change as risk multiplier in human displacement across North Africa

Behind the figures of the climate migrants' scenarios for 2030 there is a combination of elements ranging from climate related factors to lack of adaptative measures and socio-economic vulnerabilities.

The history of internal migration in North Africa was always one that is driven by the development gap between the rural and urban area. Thus, it is complex to state the exact share of climate change in migration in rural areas of North Africa.

Studies done at the level of academia and international specialised institutions such as the Inter-Governmental Panel on Climate Change and the World Bank attempted to analyse the links between human mobility and climate change, but the task appears challenging, because of the lack of data and the difficulty to predict human behaviour. However, a set of observations come out in most of the studies: climate change is playing a growing role in driving people out of their home cities, particularly in vulnerable parts of the world, where adaptation measures and resilience are under constraints. As far as the region of North Africa is concerned, the most optimistic scenario predicts 4,5 Million climate migrants by 2050. The intermediate scenario is about 9,9 Million while the pessimistic forecasts estimate that the number of displaced northern African population due to climate change will be at 13 million by 2050 (World Bank, 2021). Behind these figures are a combination of aspects ranging from climate related factors to lack of adaptative measures and socio-economic vulnerabilities.

As far as slow onset climate events are concerned, water scarcity is considered as the main driver to internal climate migration in North Africa. People are likely moving from coastal and inland areas where water is scarce, typically the northeast coasts of Tunisia, northwest coast of Algeria and southern parts of Morocco, towards cities and regions where water availability is better, mainly urban centres and capitals (Casablanca-Rabat corridor, Tunis, and Algiers). In most of rural areas in North Africa, rainfed agriculture remains the dominating pattern. In general, farmers in plains benefit the most from rainfall and ground water, most of the crops designated to local consumption are usually produced in these areas, while agriculture production is less in semi-arid and desert areas that rely on cattle farming.

Across the region of North Africa, economic divergence persists at the levels of development of public service provision and infrastructure between rural and urban areas. Most of employment in rural areas is informal and consists of farming and agricultu-

ral activities. Hence, the livelihood of the often-vulnerable employment the countryside is dependent on rainfall, that is in its turn widely affected by climate change consequences.

The history of internal migration in North Africa was always one that is driven by the development gap between the rural an urban area. Governments policies to invest in cities, have created a noticeable difference in terms of access to quality infrastructures and services. Thus, the first massive waves of rural exodus happened in response to raising employment opportunities in cities and modernisation of the economy. (Bilgili and Marchand 2016).

It is complex to state the exact share of climate change in migration in rural areas of North Africa. However, field-based surveys have shown that climate change and slow onset event lead to more migration. (Adoho and Wodon 2014). A regression analysis based on two indices (1. drought: modeled by the households' perception of dryness and warmth, and 2. Floods based on households' perception of excess water and floods) demonstrate that worsening climate conditions led to higher temporary and permanent migration. Interpretation of the 2010/2011 National Survey for Morocco bring additional evidence on the impact of structural weather changes such as water scarcity and reduced available crops on the decision to migrate. In Egypt similar findings were reported, with the lack of water and difficulties to cultivate the main crops such as rice, in addition to the hardship incurred by female migrants from the need to help their husbands with the harvest collection, as hiring agriculture workers became expensive due to the lack of

agricultural production and women had to increase their help in the agricultural activity, which later led to their migration to cities. (Grant et al. 2014). In Algeria, respondents evoked worsening climate conditions such as drought, as a contributing factor along with other drivers like violence, particularly for older migrants who have witnessed the 1992-1999 civil war. Across all the answers collected by the study surveys, drought and lack of water came at the top of the climate drivers of migration. However, the respondents seemed to rank climate drivers as second to other general economic conditions, such as unemployment and lack of financial resources, which leads to another important aspect in the climate change-migration nexus: The issue of perception. The latter can be critical in the sense that it reflects the degree of awareness of the effects of climate change on the daily lives of populations. It also captures the importance that decision makers in a given country attribute to climate change and to the emergency to act on its implications on the affected populations.

Across all the answers collected by study surveys in the region, drought and lack of water came at the top of the climate drivers of migration.



Cityscape of Giza Residential Neighbourhood. Egypt. Baloncici, Shutterstock.

THE PERCEPTION OF CLIMATE CHANGE IMPACT ON LIVELIHOOD AND FORCED DISPLACEMENT IN NORTH AFRICA.

Migration is perceived as a last resort solution, after all adaptation attempts proved inefficient.

Climate change is seen as the tree that hides the forest of social and economic hardship represented by the lack of adequate food, education, and employment opportunities.

Populations' perception of climate change in link to livelihood and means of production.

On the concept of perception, there are at least two dimensions to be considered. First, the population's perception of climate change and its impact on the livelihood and economic activities, and second the perception of the decision makers of the issue of climate change. In surveys conducted by Mohamed and Squires (2018); Wodon and Liverani (2014), water scarcity, desertification and land degradation were associated by the interviewed population with increased mobility. More than 70% of the respondents in Morocco and Algeria perceived changes in the rain seasons as more erratic and temperatures higher. In Egypt, women respondents also linked the decision to migrate with hardening living conditions, as they had to work more to help their husbands for harvest collection, because hiring external help became very expensive. Hence, the families decided to leave the primary residency in the sake for better living conditions.

One common feature that was reported by most participants is that migration is perceived as a last resort solution, after all adaptation attempts proved inefficient. Climate change is seen as the tree that hides the forest of social and economic hardship represented by the lack of adequate food, education, and employment opportunities. For instance, a respondent from Morocco reported that prior to moving out of their hometown, her father had to sell furniture such as mattresses, bed, and other supplies in order to secure basic needs³. In other contexts, perceived degradation of the climate was only one factor among

others, such as the fear of violence, that was reported by elder migrants in Algeria who fled their villages due to worsening safety conditions in the 1992-1999 civil war⁴.

Surveys conducted by *Afrobarometer* – a research network conducting public attitude surveys- sheds the light on a generally laxist perception of climate change effects in North Africa compared to other regions of the continent.

In a survey that covered 34 African countries, when Moroccans were asked whether the climate conditions for growing crops got worse, only 16% responded with “yes” while in Uganda for instance, 86% responded that weather conditions were worse than before. Morocco is also among very few countries (Senegal, Botswana, and Zimbabwe) whose citizens said that the weather conditions got better, in opposition to 30 countries where the respondents perceived the weather

Despite the interesting findings on climate change literacy and awareness from one side, and vulnerability of populations on the other side, attempts to establish a clear correlation between these indicators seems complex, as different countries display different patterns.

conditions to be worse than before. Moroccans were also near the bottom in terms of perceptions of climate conditions for agricultural production, as only 18% perceived the conditions to have worsened for agricultural productions. On the general awareness of the thematic of climate change, across the 34 surveyed countries⁵, an average of 58% of awareness of climate change issues is observed among respondents. In Tunisia 33% stated to be familiar with the term and 54% of Moroccan respondents were acquainted with the concept. Unsurprisingly there are disparities in the levels of awareness and information about climate change, with women, residents of rural areas and less educated respondents constituting the bulk of respondents who did not know about climate change. However, what is more striking is that across all countries, farmers appeared to have very limited knowledge of the concept of climate change, which raises questions about raising awareness on climate change among the categories of farmers and rural population that are most exposed to the negative effects of climate change.

Despite the interesting findings on climate change literacy and awareness from one side, and vulnerability of populations on the other side, attempts to establish a clear correlation between these indicators seems complex, as different countries display different patterns. For instance, Mauritius has high level of climate change literacy although the country faces less vulnerability in comparison to other countries. However, Niger and Sudan for example have high levels of vulnerability and low awareness of the effects of climate change.

The results of the Barometer survey can be open to various interpretations. The fact Moroccans tend to perceive the least the impact of climate change on their daily life, despite a level of literacy that is in the African average can be explained by the fact that the surveys published in 2019 were conducted between the period 2013-2015, through May 2018. Climate conditions have changed since. According to local and international experts, 2022 is the driest year that Morocco is witnessing in the last 30 years, the dams are experiencing an unprecedented level of water scarcity and delayed rainfalls have impacted the agricultural season⁶. Hence, the findings of the Afro Barometer, not only for Morocco but for other countries in the MENA regions would need to be updated by recent data.

Regarding the public perception of climate change, the body of knowledge available on this matter is still limited at the international level. Although it is a crucial indicator to evaluate the degree of public awareness and commitment to the matters of climate change and will decide the likelihood of adequate policies to be adopted in link with climate change mitigation and adaptation.

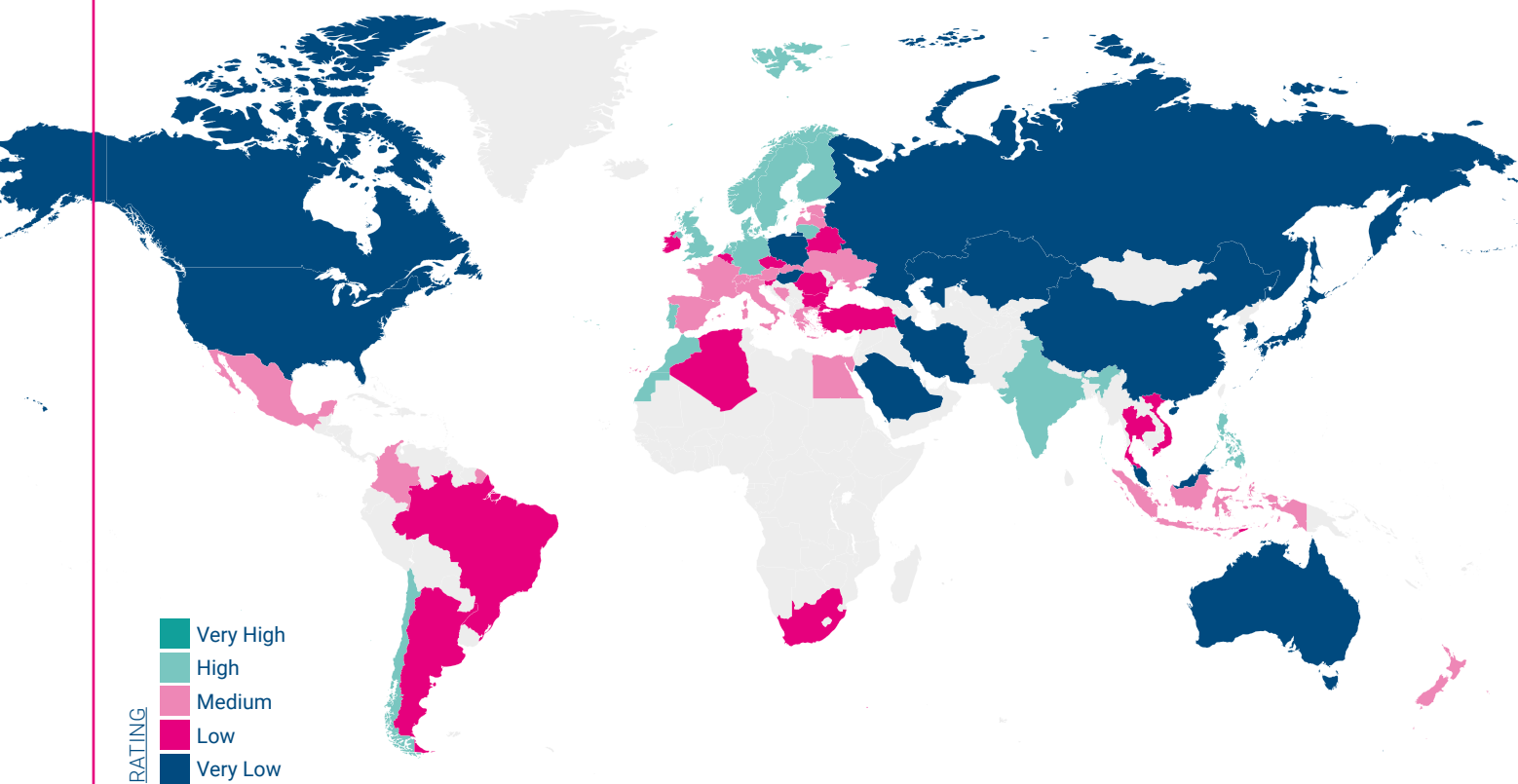
Although it is a crucial indicator to evaluate the degree of public awareness and commitment to face it, the body of knowledge available on climate change is still limited at the international level.

3. Wodon.Q, Liverani, A, George.J, Bounoux. N, "Climate Change and Migration Evidence from the Middle East and North Africa", World Bank. PP 30-50.

4. Ibid. PP 30-50.

5. Selormey.E, Zupork.M, Lionel Osse.D and Logan.C, "Change ahead Experience and awareness of climate change in Africa", Afrobarometer,2019.

6. Haskouri.K, "Morocco is experiencing its worst drought in 30 years", Hespress English.



The map highlights the ranking of countries according to their performance in terms of climate protection according to the indicators of greenhouse gas emission reduction, renewable energies, energy use and climate policies). Source: Germanwatch 2021

[Perception of climate change impact on migration at the level of policy making](#)

One way to measure the perception of decision makers on climate change related issues is through the consideration that is given to the matter in public policies, official communications, and actual practice. At the level of official discourses, most Northern African countries display commitments to the reduction of greenhouse gas emissions. For instance, Morocco which hosted the 22nd Conference of Parties (COP22) on climate change in 2016 committed to a target of a conditional 45,5% emissions' reduction by 2050 and unconditional target of 18.3% by the same horizon. Algeria committed to a reduction of 22% of greenhouse gas emissions by 2030 pending international funding⁷. In

Egypt that is hosting the 27th United Nations Conference of Parties on Climate Change, agriculture and energy is deemed as responsible for the largest amounts of greenhouse gas emissions, and the government officially announced a commitment to the reduction of carbon emissions by 33% in the electricity sector, 65% in the gas and oil sector and 7% in the transport sector by 2030, according to the Nationally determined Contributions report⁸.

The 2022 Climate Change Performance Index (CCPI)⁹ ranked Morocco along with Scandinavian countries (Denmark, Sweden, and Norway) among the top performers in terms of climate protection, mainly thanks to considerable efforts in renewable energies and climate policies as displayed in the figures below. Algeria on the other end of

7. Tirchine. A, "L'Algérie réduira ses émissions de gaz à effet de serre de 22%", *L'Expression, le quotidien*.

8. Egyptian Ministry of Electricity and Renewable Energy, "Egypt's First Updated Nationally Determined Contributions".

9. Climate Change Performance Index 2022 (CCPI)

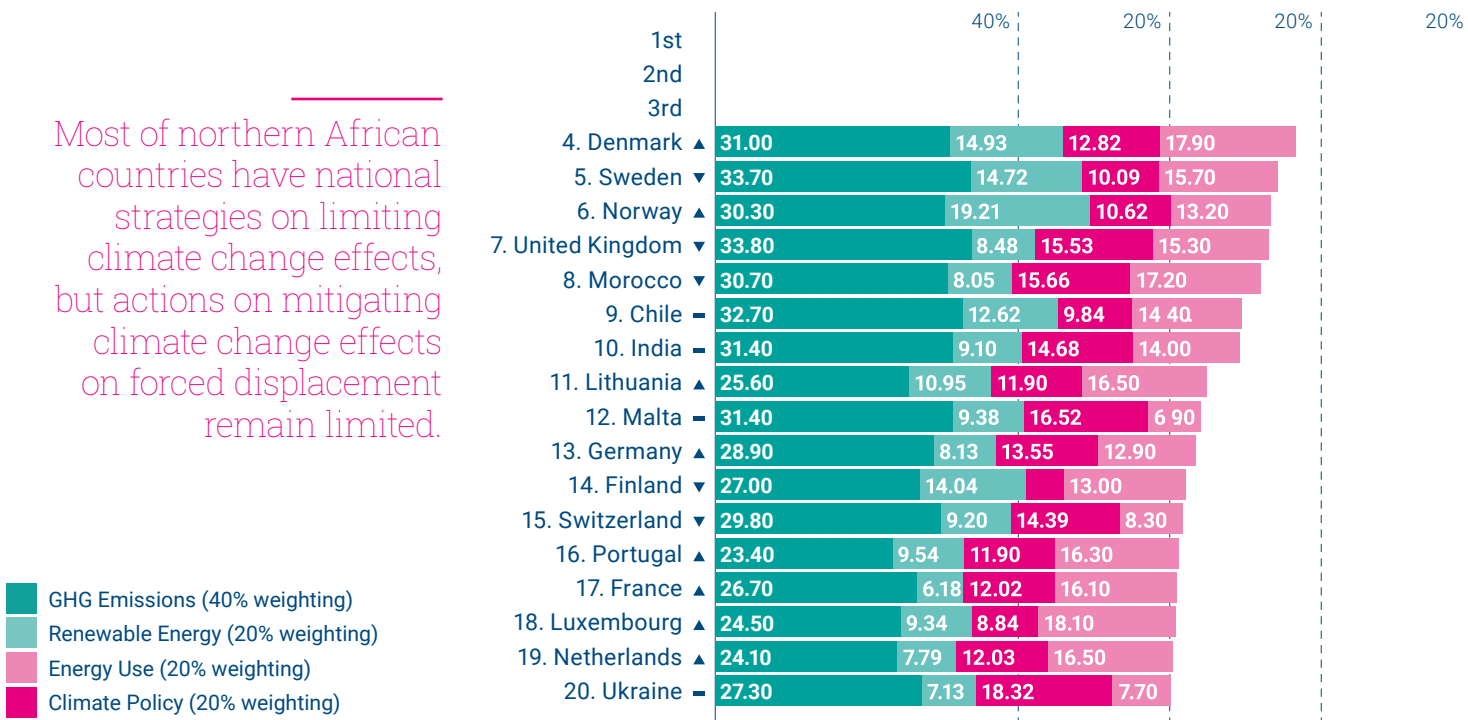
the spectrum ranked among the lowest performs alongside Latvia Croatia and Belarus. The indicators used to measure the countries performance in climate protection include (Greenhouse gas emissions, renewable energies, energy use and climate policies).

The above-mentioned elements highlight discrepancies among northern African countries in terms of policy design in link to climate change aspects, in addition to unavailability of sufficient data on climate change policies, as only Algeria and Morocco are listed among the countries for which the CCPI has data to list.

Most of northern African countries have national strategies on limiting climate change effects, but actions on

mitigating climate change effects on forced displacement remain limited. In Algeria, following the ratification of the Paris Agreement in 2016, a national plan on climate 2020-2030 has been adopted including 155 activities aiming at reducing greenhouse gas emissions and strengthening adaptation measures to climate change. Morocco has a similar framework called the National Climate Plan supplemented by regional climate plans directed at 7 of the 12 regions of Morocco. The official communication on the National Climate Plan refers to resilience through adaptation of agricultural practices to the risks of climate change and accelerated transition towards renewable energies. Egypt's National Strategy for Adaptation to Climate Change and Disaster Risk Reduction-2011

Most of northern African countries have national strategies on limiting climate change effects, but actions on mitigating climate change effects on forced displacement remain limited.



This map Gap retrieved from the Climate Change Performance Index 2022 presents the assessment of countries according to their performance in Greenhouse gas emissions, renewable energies, energy use and climate policies. The first, second and third places remain vacant as no country qualify for a very high ranking. Source: Germanwatch 2021

mentions forced displacement as potential social impact of climate change. Particularly, the migration of labour from marginal and coastal zones towards urban centres. In the National Strategy, migration is also viewed as a possible adaptation to climate change effects, as the government intend to improve agricultural policies to allow farmers to move internally and adapt their activities to changing climate conditions. Migration that is induced by climate change is also brought in link with increasing risks of health hazards such as psychological disorders and infectious disease in addition to issues of overpopulation and density according to the National Strategy for Adaptation to Climate Change and Disaster Risk Reduction of Egypt. The government, in partnership with the International Organisation of Migration has put in place in 2010 a pilot project on the assessment and implementation of a strategy aimed at addressing the impact of sea level rise on human mobility in Egypt. The program included developing policies related to human security and migration in link with climate change. The running technical group consisted of representatives from the IOM, the Ministry of Manpower and Immigration, the Environment Affairs Authority, the Ministry of Water Resources and Irrigation, Alexandria University, Friends of the Environment Society in Alexandria, and the United Nations International Strategy for Disaster Reduction. Suggested actions included plans for direct support in rehabilitation for affected populations, protection of the rural communities and support of their capabilities to adapt to expected trends in climate change, particularly in link with land use, plant, and animal production. Improving adaptation capacities, strengthening the capabilities

of rural communities to manage their resources and output, and empowering rural communities to participate in determining and implementing national policies of adaptation and coping with disasters and crises. The assessment of the National Strategy for Adaptation to Climate Change and Disaster Risk Reduction is yet to be displayed publicly.

POTENTIAL SCENARIOS OF CLIMATE MIGRATION IN NORTH AFRICA.

All scenarios depart from the same base reference 2020, the variables that determine the evolutions paths are: inclusive development pathways, global emissions' reduction and their impact on easing pressures on means of production and livelihood.

The World Bank Groundswell report 2021, entitled "Acting on Internal Climate Migration", presented three scenarios of possible internal migration trajectories in North Africa. In the three scenarios, internal displacement due to climate change is expected to rise in the region by 2050.

In the pessimistic scenario, forcibly displaced persons due to climate change are expected to reach 13 million (6% of the total population) of the studied countries: Algeria, Egypt, Libya, Morocco, and Tunisia. The realistic scenario projects 9.9 million forcibly displaced by 2050 and the most eco-friendly scenario projects 4.5 million climate migrants by 2050. Knowing that all scenarios depart from the same base reference of 2020, the variables that determine the evolution paths are: inclusive development pathways, reduction of global emissions and their impact on easing pressures on the means of production and livelihood.

In all three scenarios, forced displacement induced by climate change is expected to grow. However, in the pessimistic outlook, greenhouse gas emissions are higher, and inequalities are more salient climate migrants will make up 46% of the total numbers of internal migration in the region.

In the inclusive scenario, greenhouse gas emissions are still increasing, but countries have engaged in equitable and inclusive development pathways that reduced the gap in education and social-economic opportunities between rural and urban inhabitants. In this scenario, from 2030 most of internal migration will be due to climate change, as displacement caused by inequalities would have been better

addressed ensuring a more equitable development for rural and urban areas alike. In the more climate-friendly scenarios in which countries worked effectively towards the reduction of greenhouse gas emissions, internal migration due to climate change is smaller in numbers compared to the internal mobility caused by other social, economic, and political circumstances.

The following graphic highlights the expected evolution of climate migration shares in internal migration, depending on the adopted scenario.

The drivers of climate migration leading to the scenarios exposed above evolve around water scarcity, altered crop productivity, repeated heat episodes, as well as extreme weather events. Immediate and long-term implications of these climate change events translate into increased internal mobility, pressures on urban centres (Cairo in Egypt, Casablanca in Morocco...) along with increasing tensions on the provision of public services.

In the more climate friendly scenarios in which countries worked effectively towards the reduction of greenhouse gas emissions, internal migration due to climate change is less in numbers compared to internal mobility caused by other social, economic, and political circumstances.

The tendencies of exacerbating climate displacement can be reversed, and climate migration reduced by 80%, if adequate investments are made in adaptation and resilience according to the groundswell report.

The IOM report *What are the future climate scenarios in North and West Africa?* emphasises that North Africa is a “climate change hotspot”. Increased heat waves and decreased water supply, particularly surface water, which is the main resource of irrigation for agriculture. This directly impacts the livelihood of farmers and potentially leads to forced displacement due to loss of labour productivity in rural areas.

The aforementioned climate conditions, in addition to pre-existing social and economic vulnerabilities in northern African countries will inevitably impact migration patterns and the likelihood of conflict occurrence.

The drivers of climate migration leading to the projected scenarios evolve around water scarcity, altered crop productivity, repeated heat episodes as well as extreme weather events.

1. Projected number of internal climate migrants in North Africa in three scenarios, 2020–2050.

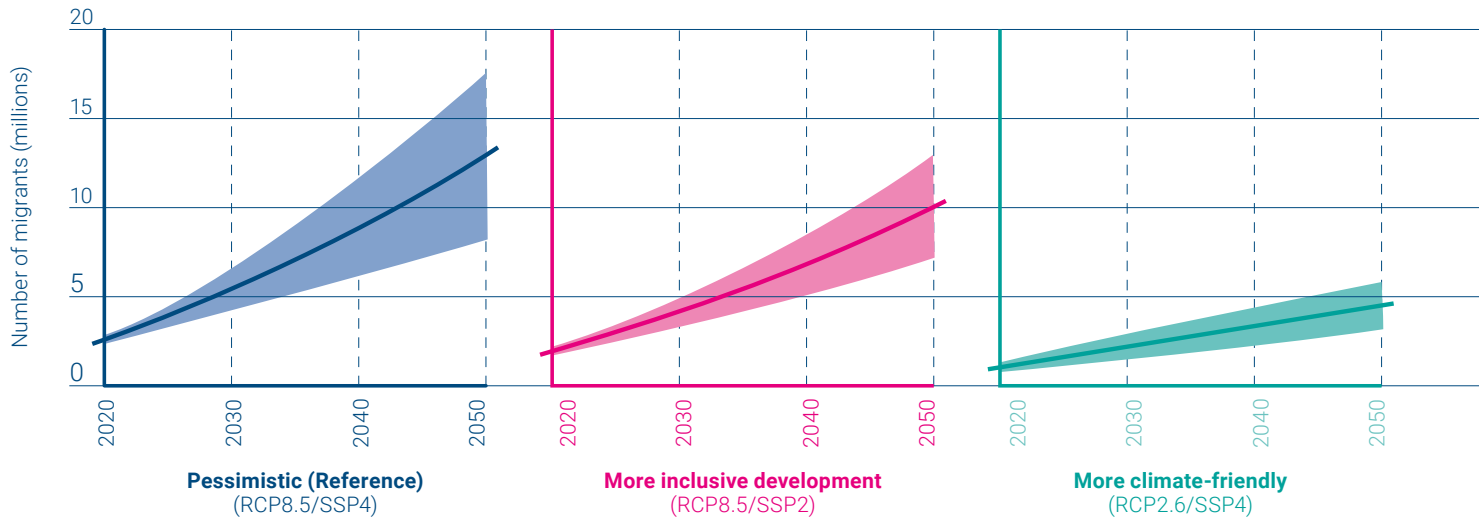
Graphic retrieved from the Groundswell report Part II: Acting on Internal Climate Migration.

Dark lines represent the average runs for each scenario. The softer area around the central trend line represent the confidence intervals, which reflect the degree of agreement among the four models runs used to provide estimates for each scenario. Narrower confidence intervals indicate greater agreement among the model runs for each scenario. The confidence intervals get larger with each successive time interval due both to momentum that builds over time for each model run, and to increasing divergence among models as the climate change signal increases.

2. Projected number of climate and other internal migrants in North Africa in three scenarios, 2020–2050. Graphic retrieved from the Groundswell report Part II: Acting on Internal Climate Migration.

The whiskers on the climate migrant bars represent the 95th percentile confidence interval for the four model runs for each scenario. There are no confidence intervals for other internal migrants because only a single development trajectory is used.

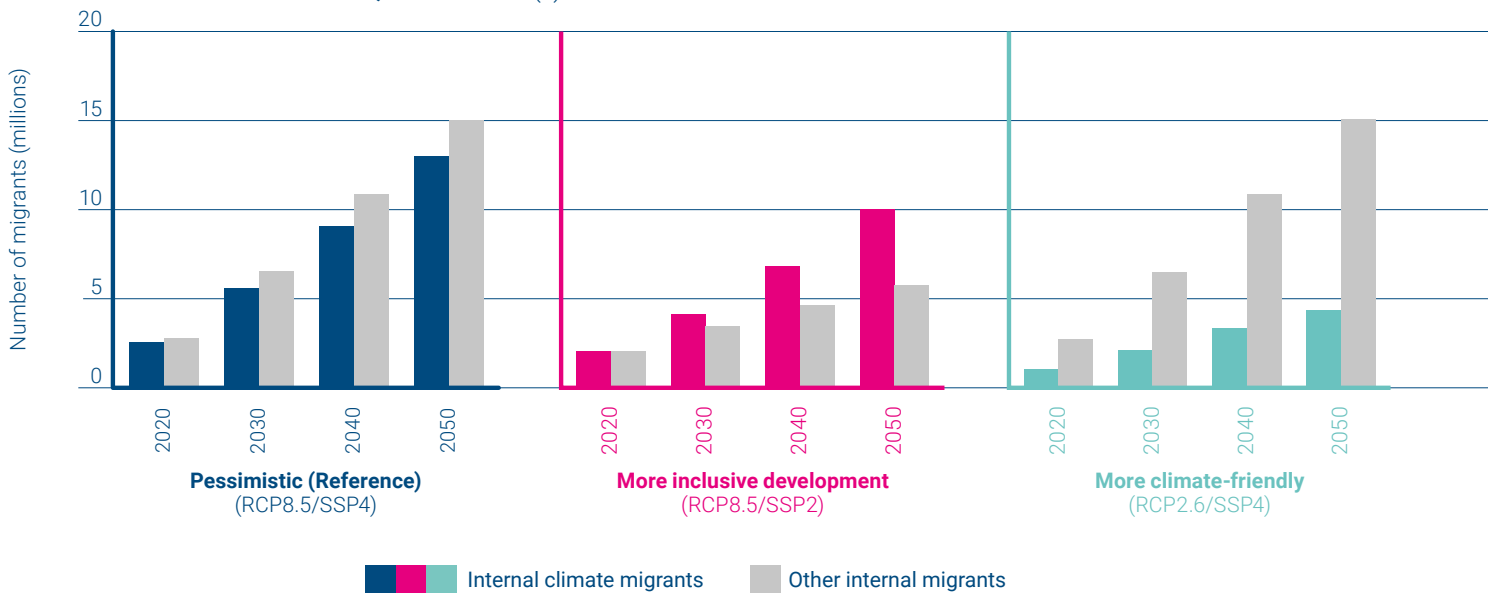
Projected number of internal climate migrants in North Africa in three scenarios, 2020–2050. (1)



Climate migrants as a percentage of the total population

year	2020	2030	2040	2050
year	1.4	2.8	4.3	6.0
%	1.1	2.0	3.0	4.2
%	0.6	1.1	1.6	2.1

Projected number of climate and other internal migrants in North Africa in three scenarios, 2020–2050. (2)



HIGHLIGHTS ON FINDINGS AFTER THE FILED MISSION IN THE REGION OF SOUSSE-MASSA IN THE SOUTH OF MOROCCO, ON UNDERSTANDING THE PLACE OF MIGRATION AS AN ADAPTATION STRATEGY TO CLIMATE CHANGE.

The fact-finding mission was consisted of interviewing different stakeholders ranging from migrants from rural areas working in farms in the region of Chtouka Ait Baha, Azrou, Khmais Amira and fish factories in Azrou and Ait Melloul. The interviews were also conducted with representatives from the Environmental Department of the Prefecture of Agadir -La Wilaya- as well as the Regional Council on Environment and Sustainable Development.

Key findings

- Displacement due to harsh environmental conditions is not new nor recent. Different profiles met confirm having left the rural areas due to drought, in the eighties for people born in the sixties and in 2002 to 2014 for younger generations.

“What was hard is to work all year but without being paid. You have the impression that you work for free. I could not go to school because I worked as shepherd for 150 MAD /15 \$ a year back in the eighties... drought is when there is no water, but you are 11 brothers and sisters in the household”. Mustapha, born in 1962 in a village near Marrakech and living currently in Azrou, Agadir.

- Most of interviewed people confirmed that drought combined with other conditions such as: multiple family members and not having ownership of land nor sheep has led them to seek living abroad. Bigger farmers could manage staying in their land and benefiting from the help of the government to face drought.

“I have sent my small daughter to look for water along with the neighbor, they went to different wells looking for water. I could not sleep, I was worried for my daughter, because she stayed until very late in the night. Then in the morning after I decided to leave to the city of Agadir, where my brother lives. I told him we could not have access to water. Before leaving, we used to have different years, some were good in terms of rainfalls and water availability, and some were not good. But since 2003, drought became very often”. Aged 65, father to 8. Originally from the mountains of Essaouira, zawyt Imahssar currently living as shepherd in Ait Melloul, Agadir.

- There is a common agreement that drought and water shortage are not new factors to the region of Sousse Massa. From across generations all interviewed persons confirmed having been exposed to extreme drought in their lives (60s, 80s and 2000). However, since 2004, the drought has been more and more acute, leaving entire villages with only elder people left in, living from the money sent by young men and women working in nearby cities.

- Most of youngsters fleeing drought and lack of opportunities in rural areas of Sousse go first to Casablanca to work in cafes and small shops. The living conditions in Casablanca, as well as the necessity to leave away from family for longer periods, in low paid jobs brought them back to the region, to work this time in farming, their initial activity back home, but for bigger farmers and in farms run by foreign investors or big Moroccan farms.

- Leaving the village does not mean the end of the curse of climate change. In the recent decades, the region of Chtouka Ait Baha in the Sousse came to be known as a praised place for people who would like to work in farming. It is the only place in the region where water is available and a tradition of cultiva

The conditions of women working in agriculture and the impact of climate change on their lives.

- Most interviewed women reported harsh working conditions, harassment and lack of clarity in the process of recruitment and work. Although the region has multinational farms employing women according to national regulation, many women work in the informal sector, when they are picked the morning at 5 am and returned at 4 pm.

"I came to Chtouka because I heard that you can easily find work in this region, no matter where you are from, however when I came here the situation is not as I expected it. We work for long hours, and are paid 75MAD a day, with a rent of 450 MAD a month, I can't return back to my home city".

Fadila, 30 years old, a woman from Rabat living in Chtouka and working in agriculture.

"Until 2014, we were able to find work in farms easily, but it is no longer the case. The only thing I am sure of is that I can eat the day I work, or the day I am picked by the responsible of the farm to work, otherwise, I have had days where I would go to the station waiting for farm responsible to pick me for, but they would not, they tell us that there is not enough activity because of the drought. If no water, then no crops, then we need to downgrade the manpower for the season. I would then return to my room wondering if I will manage to have food for the day". Khadija, 50, woman working in farms in Chtouka, originally from Khemissat.

- Interviews with the responsible from the prefecture of Agadir as well as the Regional Council for Environment and Sustainable Development, all agreed that the region of Sousse has always known waves of drought. The phenomenon is not recent. However, the frequency of drought combined to prolonged heat and longer hot seasons are the highlighter of the impact of the climate change in the region. Nonetheless, at the national level, the Region of Sousse is pioneer. It is among the very first regions of

Morocco to have The Territorial Plan to address Global Warming of Sousse Massa (PTRC-SM). The objective of then plan is to coordinate all the actions taken in combatting the effects of climate change, with the coordination of efforts from multiple actors, of which we were able to see the level of coordination and expertise during different meetings throughout the field mission. Most of youngsters fleeing drought and lack of opportunities in rural areas of Sousse go first to Casablanca to work in cafes and small shops. The living conditions in Casablanca, as well as the necessity to leave away from family for longer periods, in low paid jobs brought them back to the region, to work this time in farming, their initial activity back home, but for bigger farmers and in farms run by foreign investors or big Moroccan farms.

- The region of Sousse is also pioneer in the construction of a seawater desalination unit for the irrigation of 15,000 ha of early crops cultivated by 1,500 farmers in the Chtouka plain and the supply of drinking water to Greater Agadir. All these measures have been highlighted by different interviews.
- Regarding the perception of climate change, the responsible of different administration displayed a strong knowledge and awareness about the effects of climate change on the region, particularly drought, prolonged seasons of heat that no longer respect the usual summer, winter divisions as well as more seasons of drought than before.
- Interviewed persons on the other hand did not know what the concept of climate change was, despite the fact that they work in agriculture. More than 50% heard the term for the first time and others thought climate change is more linked with the change in temperature with more heat than usual.

Climate change as risk multiplier in human displacement in West Africa and the Sahel region.

Migration represents one amongst different options of climate change adjustment. Climate-related phenomena can overall either inhibit or induce migration within and out of Africa.

West Africa and the Sahel are considered the most mobile regions and amongst the most vulnerable to climate change effects (IPCC, 2022). Today's climatic context and trends in the areas confirm their vulnerability to environmental changes¹⁰ and their interaction with existing dimensions of fragility (poverty and diffuse inequalities, limited development, climate-dependent livelihoods), often intensifying conflicts and undermining security, therefore possibly affecting the decision whether to stay or to migrate. Environmental push factors have long existed in the regions, and they are not the sole cause of migration today, being deeply interlinked to other motivations.

Migration as an adaptation action to perceived and effective climate induced changes is debated; the discussion is open as to whether migration represents a form of successful and positive adaptation or an indicator of the failures and limits to adaptation in site (Melde et al. 2017; Warner, 2009). Migration represents one amongst the different options of climate change adjustment¹¹ and climate-related phenomena can overall either inhibit or induce migration within and out of Africa¹².

10. The Sahel and Western Africa regions observed a warming of 0.5–0.8 °C over the period 1979 to 2010, with warmer day and nighttime temperatures. Warming in this region is more significant than the average over the rest of Africa (New et al. 2006; Collins et al. 2011; Mouhamed et al. 2013; Nicholson et al. 2013).

11. Adaptation actions in the Sahel were explored by Epule Eupile et. al. (2021) according to four categories: technically related adaptation options, indigenous problem-solving adaptation options (including migration), socially related problem-solving options and economics related adaptation options.

12. Depending on the intensity of shocks, the income dependency from climate sensitive activities and the capacity to actually leave (Wesselbaum, 2020).

13. They differ whether pastoral herd movements involve only shepherds or entire families/social groups.

14. In the 1950s, many pastoralists became semi-sedentary, limiting their movement around boreholes installed by the French colonial administration and began to combine pastoral practices with rainfed subsistence crop production (Adriansen 2008).

HUMAN MOBILITY IN WEST AFRICA AND THE SAHEL.

Human mobility in West Africa and the Sahel has long represented an essential practice and source of livelihood.

In West Africa subregion most of the movements internal and intra-regional. 70% of West African migrants migrated to another West African country.

Human mobility in West Africa and the Sahel has long represented an essential practice and source of livelihood, including transhumance and nomadism¹³, circular or seasonal, cross-border, rural-to-urban and long-distance migration. Intra-regional migration has been a cultural and historical feature for local populations and economies, long before becoming one of the diversification strategies to today's changing climatic conditions. Pastoralism was a dominant lifestyle in the past in the Sahara and its Sahelian perimeter; today it remains an essential part of life in the Sahel, while it also somewhat evolved into occasional sedentarism¹⁴ and diversified livelihoods (OECD, 2014, p. 142).

Climate change shocks in the form of droughts dominated in the Sahel in the period 1975-1985¹⁵ (while reducing afterwards) and, generally, the most frequent adaptation actions during those years refer primarily to income diversification of livelihoods and water harnessing and secondary to migration (Epule Epule, 2022). At the same time, other studies underlined that droughts could indeed reduce the ability of Sahelian populations to migrate due to the lack of necessary resources to actually move (Raphael et al. 2016).

Based on the traditional economic and socio-cultural dynamism of the region,

no single country within the West African and Sahelian systems acts as a magnet (Agadjanian, 2016, p. 16).

The West Africa subregion has always been a center of mobility, being the one with most of the internal and intra-regional movements with 7.4 million migrants in the region (almost 3% of the regional population) from other West African countries (IOM, 2021) (¹⁶). In 2019, 70% of West African migrants migrated to another West African country (UN DESA, 2020). The pandemic's socio-economic effects and the Covid-19 restrictions limited regular channels of mobility, with significant impact on irregular migration in the region. The IOM Displacement Tracking Matrix informs that 96% of all migration flows from West Africa in 2019 and 2020 were still towards another country in West Africa (IOM, 2021).

To note, within the ECOWAS (Economic Community of West African States) sub-regional community - that includes part of the Sahel and West Africa¹⁷ - human mobility is a crucial component of regional integration as embodied by the "Free Movement of Persons, Residence and Establishment" protocol (1979)¹⁸. The protocol grants ECOWAS citizens the right to legally enter each country and stay visa-free¹⁹, while also including the

15. These findings are based on a scientific peer review literature of publications from 1975-2015 addressing adaptation to climate change in various Sahel countries; 414 adaptation actions were analyzed. The two strategies mentioned here for the Sahel recorded the highest frequencies.

16. <https://www.unhcr.org/49e47c8f11.pdf>

17. Established in 1975 to promote economic integration, macroeconomic harmonization, free trade and private sector promotion among the 15 west African constituting countries (Benin, Burkina Faso, Cape Vert, Ivory Coast, the Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Sierra Leone, Senegal and Togo). After 1979 different free movement protocols followed.

18. 1979 Protocol A/P.1/5/79 (http://ecowas.akomantoso.com/_lang/en-GB/doc/_iri/akn/ecowas/statement/protocol/1979-05-29/A_P1_5_79/eng@/!main)

19. For up to 90 days.

right of establishment and residency - although not yet effectively implemented. While the de facto free movement within the ECOWAS region²⁰ has indeed contributed to reducing the migratory pressure beyond ECOWAS borders and towards Europe (ECOWAS Commission, 2008²¹; Andersson, 2016; Idrissa, 2019; Bisong 2019), part of the current debate on mobility induced by climate change in the Sahel and West Africa points at how the increase of cross-border disaster-displacement could possibly find the needed protection schemes in the existing free movement agreements (Wood, 2019).

For the Eastern region, since 1999 the EAC (East African Community) has been re-established, addressing measures and protocols to achieve free movement of persons and labour²². In terms of refugee management, the EAC hosts a large number of refugees from nearby conflict areas as in the Great Lakes region and the Horn of Africa.

Climate conditions today in the studied regions²³ can largely influence all types of mobility as meteorological variability and environmental degradation can particularly impact on farmers and pastoralists activities and rural communities, possibly insisting on or activating social conflicts and competition due to a more limited access to water, land and other natural resources (Cepero et al. 2021, p. 40).

Human mobility is a crucial component of the ECOWAS regional integration. Free movement within the ECOWAS region has indeed contributed to reducing the migratory pressure beyond ECOWAS borders and towards Europe.

20. Due to its tradition of mobility, its porous crossing borders and the lack of controls and widespread corruption.

21. <https://www.unhcr.org/49e47c8f11.pdf>

22. As specified in the Treaty for the Establishment of the East African Community (<https://www.eac.int/immigration>).

23. Especially related to increased drought frequency and severity and rainfall seasonal variations.

THE FISHERY SECTOR IN SENEGAL: AN EXPLOSIVE MIX OF CLIMATE CHANGE, UNAUTHORIZED FISHING PRACTICES AND ILLEGAL MIGRATION.

In November 2022, the Friedrich Naumann Foundation for Freedom organized a field trip to Senegal to meet stakeholders and visit sites linked to environmental degradation and climatic variability, in particular two fishermen spots and communities (at the ports of Yarakh, Thiaroy and Mbao). These case studies in Senegal are a fitting example of how climate change interconnects with other existing features, exacerbating critical outcomes that originate from other dynamics.

The fishery sector in Senegal is already and will be hit by climate change. Fishing communities, ecosystems, and landing sites are affected by the rising of sea level with consequent coastal erosion, by changed fish location and fish migration patterns due to water climate variability and temperatures rising, by heavy rainfall and floods, not to mention water pollution, due to uncontrolled vessels in the area.

At the same time, overfishing, unreported and unregulated fishing, and mostly unauthorised industrial fleets represent a distinct threat for many Senegalese households and for the country's economy. The Senegalese Government developed a national Climate Change Adaptation Plan specifically for marine fisheries (since 2012) and a National Action Plan to combat irregular and illegal fishing (since 2015), although with limited successful results.

One of the **adaptation strategies** employed by many Senegalese – and among them, by many young fishermen out of job - is to consider **migration to Europe** as a viable option. Already in 2006, due to **push factors** (as the absence of economic opportunities, to family and societal pressures, political instability in the region, and impacts of overfishing) and to **pull factors** (as rumors of a Spanish attitude to regularise irregular migrants, within a surging economy framework), approximately 32.000 persons took the West African sea route trying to reach the Canary Islands.

Looking at the current situation in Senegal, it seems that history is repeating itself. Fishermen communities are angry and concerned because of the lack of fish in closer territorial waters and because of their inability to compete with foreign vessels in deeper waters. As far back as 2006, poverty, youth unemployment, migratory pressure, and lack of perspectives of the future represent the same push factors.

The case of the fishermen communities in Senegal offers a clear understanding of the multicausality behind migration flows and the current impact of climate change as a concurrent aggravating factor of social and economic hardship.

PERCEPTIONS ON CLIMATE CHANGE IN WEST AFRICA AND THE SHAEL.

Studies on the Sahel and West Africa regions show that perceptions on climate change are influenced by a combination of variables differently affecting people's choice of adaptation strategies in the different contexts.

If climate change is considered human caused, this implies that human behaviors can generate corrective responses and mitigation strategies, encouraging policy support and personal action.

For mobile and immobile populations, the perceptions of climate change²⁵ are particularly relevant in the context of the socio-economic reasons affecting the impacts of weather variability and all interlinked concerns and risks connected to individual and family safety, access to natural resources and the consequences over income generation capacity²⁶.

Perceptions are subjective experiences and understandings of objective circumstances. The perception of the magnitude and progression of climate change varies a lot between nations and people and on the local challenges people face in case of seasonal climate variations, episodic climate crises, and long-term climate modifications. Perceptions are a critical factor influencing both policy and mostly individual/family/community decisions to interpret and face environmental changes induced by climate.

For the scope of this article, Sahelian and West African studies on climate change perceptions were explored through literature review and the *Afrobarometer* survey.

Studies on the Sahel and West Africa regions show that perceptions on climate change are influenced by a combination of variables affecting people's choice of adaptation strategies in the different contexts differently.

The literature on climate change perceptions²⁷ in the Sahel and West Africa regions are scattered and not always converging. Nevertheless, quite often, agropastoral and farmer groups studied seem to be roughly aware of current variations in temperature and rainfall patterns, while their perceptions either do not match well with the corresponding official facts and data, or they tend to consider other economic, political, and social - rather than climate - factors as the main reasons for change²⁸. Some examples are reported in the next paragraph to illustrate the variety of findings and offer a detailed insight into different contexts, bearing in mind that the information mostly relies on case studies²⁹, size-limited according to the territorial area and the target population examined.

Sahel and West Africa regions perceptions on climate change either do not match with corresponding official facts and data, or tend to consider other economic, political, and social - rather than climate - factors as the main reasons for change.

25. The way it takes place and its impacts on each human and natural habitat.

26. Especially regarding farming or breeding activities.

27. Subjective measures using perception data have been used to study resilience, but there is limited evidence on their validity and use for policy and practice (Beauchamp et al. 2019).

28. As for the case of Burkina Faso, "farmers perceive shifts in **climate** differently depending on their location and agroclimatic zone. As a result, different adaptation strategies are implemented by farmers according to the climatic, societal, and economic context" (Alvar-Beltrán et al. 2020) and in Niger "the level of adaptation was significantly determined by soil fertility, climate change information, food production, and number of strategies adopted" (Matsalabi et al. 2020).

29. Mostly qualitative scholarly articles including interviews and focus groups, but also some village household questionnaire surveys analyzing data with descriptive statistics and regression models.

Variables affecting perceptions on climate change (CC) in Shael and West Africa (author's list based on literature review).

1. The severity and frequency of weather events (safety).
 2. Economic and socio-political factors.
 3. Cultural and religious systems.
 4. Farming experience, farm and household size.
 5. Access to climate change information; awareness on climate change risks.
 6. Income dependence on climate sensitive activities.
 7. Increased availability of/access to agricultural/public/community support services.
 8. The onset effects of CC on local economic systems (safety).
 9. Local context factors (rural-urban dimensions; land availability or scarcity; local social-ethnic rivalry).
 10. Individual factors (gender, education, income).
 11. Nature of agro-ecological zone, cultivated surface, soil fertility, annual revenue, livestock ratio, ruminant herd size.
 12. Expected degree of resilience to climate changes.
 13. Capacity to mobilise other sources of income; to variate methods in food production and adopt alternative strategies.
 14. Capacity to anticipate and weaken climate change impacts.
-

PERCEPTION CASE STUDIES IN WEST AFRICA AND SAHEL COUNTRIES.

- Among sedentary farmers in central Senegal (Mertz et al., 2009) **change** in land use and livelihood strategies is driven by adaptation to a range of factors of which **climate** appears not to be the most important.
- Perceptions on rainfall and temperatures among farmers in the Sahelian and Sudanian zones in Burkina Faso are not aligned with recorded annual data (Zampaligre et al., 2014).
- Farmers and pastorals based in semi-arid villages in the north of Senegal attributed causes of perceived changes in rainfall not directly to a changing climate, but more typically to divine domain (Dieye and Roy, 2012).
- Most farmers interviewed in Niger were aware of climate change mainly due to information access via local radios, while other factors (such as education, soil fertility, crop production) influenced climate change adaptation (Matsalabi et. al, 2019)
- The majority of the 400 farmers interviewed in Mali consider to be more vulnerable due to climate changes³⁰ whose drivers are either unknown or due to God's will, deforestation, and human behavior. Age, education level, farm size and mostly gender resulted in the main factors influencing farmers' perceptions. Adaptation measures adopted include the diversification of crops and seasonal migration (Sanogo et al. 2015)
- In Senegal, farmers in the Saloum perceive climate variability impact in terms of land degradation, but the main underlying causes are recognized in the state interventions in recent extensification of agriculture (Mbow et al., 2008).
- Local population in Benin perceive that human actions impact more than climate change in agroforestry ecosystems; depending on the level of education, most respondents have no idea on the likely impacts of climate change on the related ecosystem services³¹ (Djihouessi, 2022).
- A survey among 360 cattle farmers in Benin on the determinants of **climate change perceptions underlines that**: breeding experience, level of education, household size, membership to a breeders' organisation, and cattle herd size affect the different **perceptions** (Idrissou et al. 2021).

³⁰. Evinced in drought frequency, temperature and water availability.

³¹. Including: plant and animal production, mitigation of erosion risks, regulation of soil fertility and improvement of soil water retention.

PERCEPTION ANALYSIS FROM AFROBAROMETER SURVEY.

Afrobarometer conducts a public attitude survey in 35 African countries on different aspects of democracy, economy and society³². For the scope of this article, a data analysis based on Afrobarometer survey findings (Round 7 - 2016/18 and Round 8 - 2019/20³³) on “climate change” as a topic is outlined, targeting the countries belonging to the Sahel³⁴ and West Africa³⁵ regions.

The analysis³⁶ underlines that, within each region, climate change is not equally, nor similarly perceived, not only among the countries analysed, but also between subgroups (as urban and rural respondents). The knowledge and awareness on climate change tend to differ according to the education and gender of respondents. Not everybody has a negative opinion on climate changes and some phenomena such as droughts are worrying people more than rainfalls. The analysis overall suggests that climate change perceptions and impacts examination shall more likely be local context based and, *vice versa*, that the individual experience of local climatic changes can have significant impact on occurring climate change perceptions and beliefs³⁷.

These findings are aligned with other studies showing that the worsening perceptions of agricultural conditions are a predictor for climate change risk perception and a trigger to activate personal responses and behaviors (González, Sánchez, 2022). Moreover, climate change literacy³⁸ – the awareness and informed knowledge on the causes and consequences of environmental variations and land degradation – appears to be one among the challenges to be tackled in promoting adaptation measures, behaviors and policies.

32. Afrobarometer uses national probability samples that are representative cross-section of all citizens of voting age in a given country. Samples include between 1.200 to 2.400 persons (<https://www.afrobarometer.org/surveys-and-methods/sampling/>)

33. Unfortunately, more recent survey findings (R8. 2019-21) are available only for two questions on climate.

34. Data are available for: Burkina Faso, Cameroon, the Gambia, Mali, Niger, Nigeria, Senegal, Sudan.

35. Data are available for: Benin, Burkina Faso, Cape Vert, Ivory Coast, The Gambia, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo.

36. Limitations of this study include the partial data availability (for all target countries, time series and variables), the lack of access to other parallel sources related to recorded data (as on rainfall, draughts, temperatures or migrations).

37. As other studies highlight that many communities in Africa understand climate change not as a global phenomenon but a local one (Godfrey et al. 2010).

38. The average national climate change literacy rate in Africa is 37% (in Europe and North America rates are generally over 80%); climate change literacy varies among countries (62% in Uganda and 23% in Tunisia) and within countries (in Nigeria, from 71% in Kwara to 5% in Kano) (Simpson et al., 2021; Johnston, 2019).

SAHEL: PERCEPTIONS ON CLIMATE CHANGE.

The significant proportion of those that never heard of climate change suggests that climate change awareness and access to proper information are not overall widespread and that not everybody in the region is in the condition to properly evaluate environmental and climate changes, taking subsequent decisions.

Based on Round 8 2019/21 survey, the 56%³⁹ of the Sahelian respondents heard about climate, although with variations (see graphs on the next page)⁴⁰. Significant is the proportion of those that never heard of climate change (42%), suggesting that climate change awareness and access to proper information are not overall widespread and that not everybody in the region is in the condition to properly evaluate environmental and climate changes, taking subsequent decisions. Emigration does not appear as a viable option nor a concrete and realistic plan in most Sahelian countries (especially for rural respondents), with no differences among those who perceive climate conditions are/are not worsening.

Considering the Sahelian countries according to the urban/rural variable, the percentage of urban respondents that heard of climate change (62.4%) is higher compared to the percentage of rural respondents who had heard of it (in the Sahel region and in most single countries)⁴². This might suggest that public campaigns, media infor-

mation and general knowledge should better reach target populations in rural areas and that urban residents tend to display a more widespread knowledge.

According to the gender of respondents, the percentage of women who had never heard of climate change in each Sahelian country is much higher compared to the percentage of men who had never heard of it⁴³. Almost 51% of women in Sahel countries heard of climate change while 47% never did, compared to the 66% of men who had heard of climate change, while 31% never did. Nigeria is the country where the highest percentages are of men (61.3%) and women (73%) who had heard of climate change. In Mali, Gambia and Senegal the highest portion of men and women who had heard of climate change.

According to the education of Sahelian respondents, the increasing school level⁴⁴ tend to correspond to an increasing awareness of climate change; on the opposite, the lower the school level is, the higher is the proportion of those that never heard of climate change⁴⁵.

Climate change literacy varies substantially across African countries, as well as within countries. The climate change literacy rate is 66% in Mauritius and 62% in Uganda, but only 25% in Mozambique and 23% in Tunisia.

39. The data for Sahel (in this case 56%) is the mean of the eight Sahelian countries' values available in the dataset (R8 2019/21).

40. The 68% of the respondents in Gambia and 65% in Senegal are aware of climate change, while 67% of Nigerians are not. In some countries (Cameroon, Niger and Nigeria) the

percentage of those aware of climate change decreased from 2016/18 to 2019/21, while it increased in Burkina Faso, Senegal and the Gambia

41. Data include: Burkina Faso, Cameroon, the Gambia, Mali, Niger, Nigeria, Senegal, Sudan.

42. The awareness of climate change appears to be very weak in Nigeria at both urban (61%) and mostly rural level (71%).

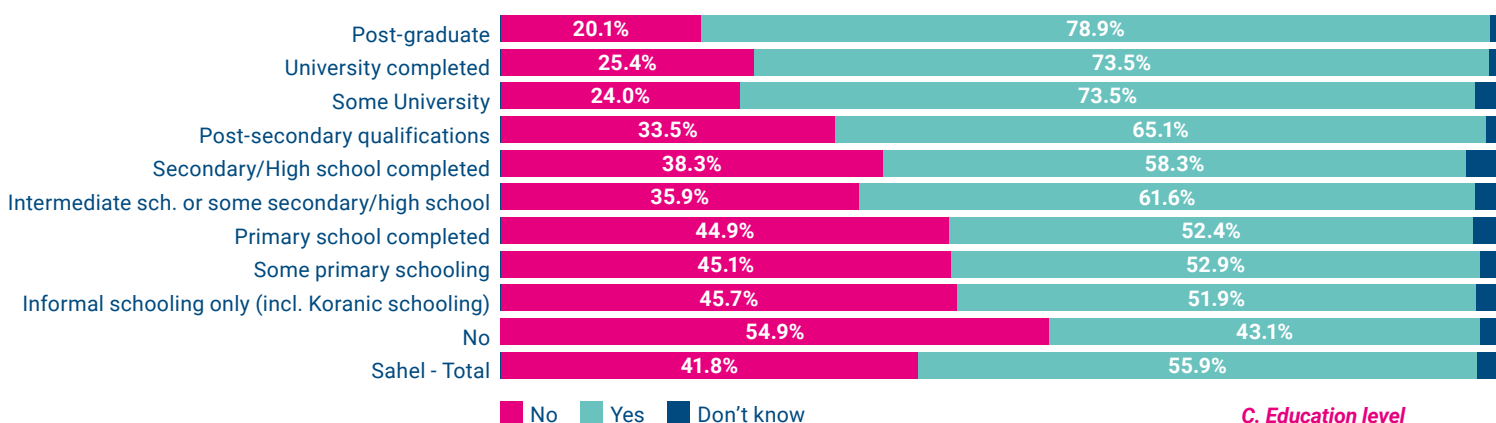
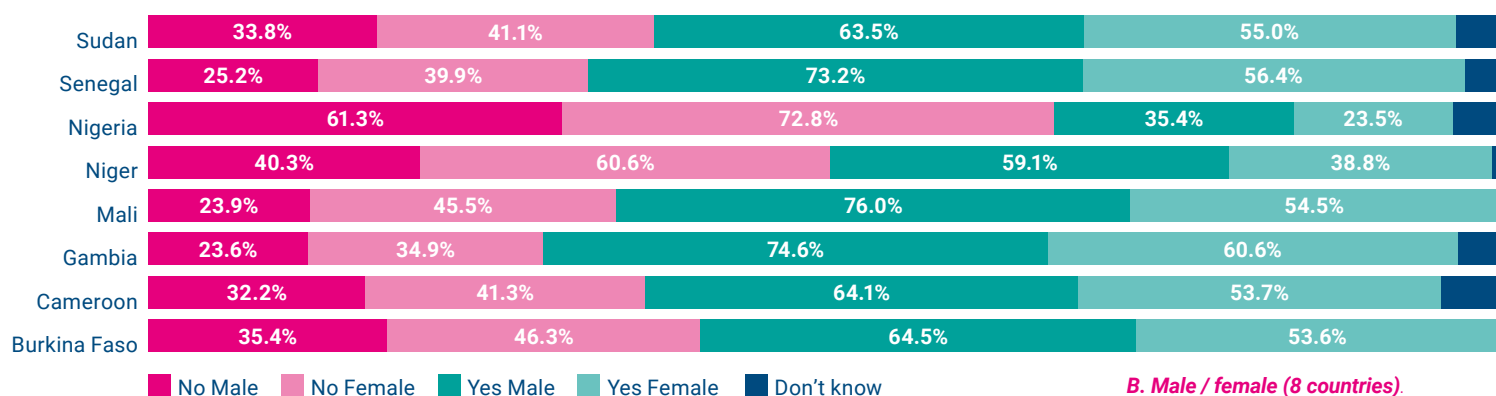
43. More in detail, in Mali and Niger the percentage gap between women that have never heard of climate change compared to

men that have never heard is particularly high (20-21% percentage points).

44. From no education, to primary, secondary and post-secondary.

45. This applies to all Sahelian countries here considered but two: the percentage of those with no education that actually heard of climate change in Niger (63,6%) and Nigeria (45%) resembles the percentage of those with primary/secondary education that are aware of climate change.

Sahel- Climate Change
1. Have you heard about climate change?



Round 8 - 2019/21

1A. Question. Have you heard about climate change or haven't you had the chance to hear about this yet? (100% = Y/N/D for each round).

1B. Question. Have you heard about climate change or haven't you had the chance to hear about this yet? Crossed by variable: male/female.

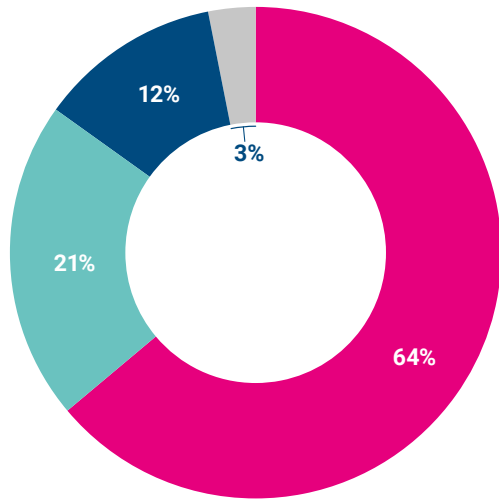
Answers "Don't Know" are not included in the graph. (100% = male Y/N; 100% female Y/N for each country)

Round 7 - 2019/21

1C. Question. Have you heard about climate change or haven't you had the chance to hear about this yet? Crossed by variable: condensed education level

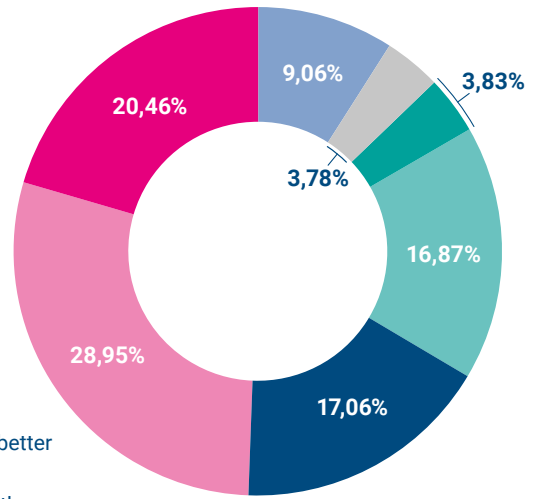
Answers "Don't Know" and "missing" are not included in the graph (100% Sahel; 100% No education; 100% Informal; 100% Some Primary; 100% Primary; 100% Intermediate; 100% Secondary; 100% Secondary; 100% Post-secondary; 100% Some university; 100% University; 100% Post graduate).

2. Meaning



- Negative changes in the weather
- Positive changes in the weather
- Other changes in the weather
- Don't know

3. Compared to 10 years ago



- Much better
- Better
- About the same
- Worse
- Much worse
- No experience
- Don't know

Round 7 - 2016/18

- 2. Question:** What does the phrase "climate change" mean to you?
- 3. Question:** In your experience, would you say climate conditions for agricultural production in your area have gotten better, gotten worse, or stayed about the same over the last 10 years, or haven't you heard enough to say?

Positive effects induced by climate change are probably linked to an under-estimation or misinformation on short and long-term impacts or to new opportunities generated by environmental-socio-economic modifications occurred.

The majority of Sahelians (64%) associates climate change to negative changes in the weather - especially in Burkina Faso⁴⁶, in Mali⁴⁷ and in Senegal⁴⁸. Nevertheless 21% of Sahelian respondents sees positive changes in weather patterns: in particular in Nigeria⁴⁹, Niger⁵⁰ and Senegal⁵¹. Considering positive effects induced by climate change could possibly refer to an under-estimation or mis-information on short- and long-term impacts or to new opportunities generated by environmental-socio-economic modifications occurred⁵².

Almost 50% of the Sahelian respondents declare that climate conditions today have overall worsened compared to ten years ago, with negative impacts

on agricultural production, especially in Burkina Faso (69%), Niger (67%) and Mali (60%). At the same time 20% perceive that climate conditions are overall better today, especially among 37% of respondents in Senegal (equally based in rural and urban contexts).

The perception of the worsened conditions today is particularly evident in the rural context in the Gambia (60%), Mali (63%) and Niger (68%), compared to the urban areas. In Nigeria, compared to the other countries, the percentage of urban and rural respondents that consider climate conditions to be the same is higher; less significant is the percentage of those considering climate conditions to have worsened (see graph "3" in the annex section).

46. Among urban (80,5%) and rural (84,5%) respondents in Burkina Faso.

47. Among urban (70,7%) and rural (74,8%) respondents in Mali.

48. Among urban (73,8%) and rural (62%) respondents in Senegal.

49. Among urban (26,2%) and rural (30,8%) respondents in Nigeria.

50. Among urban (27,1%) and rural (25,7%) respondents in Niger.

51. Among urban (16%) and rural (28,6%) respondents in Senegal.

52. Gradual changes in weather conditions can also open up to new opportunities for cultivation and incite agricultural encroachment onto pastoral land, although possibly creating social conflicts (Benjaminsen et al., 2012; Ba and Benjaminsen, 2009). For instance, a study (Montcho et al., 2022) on perceptions and adaptation strategies towards climate variability among 900 dairy farmers in Benin, Burkina

Faso, Niger and Mali analyzed the perceived changes in rainfall and temperatures but also the adaptation strategies subsequently adopted (as the improved fodder quality and plants to improve milk production and milk conservation).

53. In the case of Senegal, Niger and the Gambia more in the urban area compared to the rural area.

54. 73,6% at urban level and 85,6% at rural level.

55. Particularly true for the 63,8% of rural and the 55,8% urban respondents in Senegal.

Comparing the findings of two survey rounds, the most widespread perception (61-62%) sees climate change as negatively affecting people's lives, while a part of respondents considers induced effects to be positive.

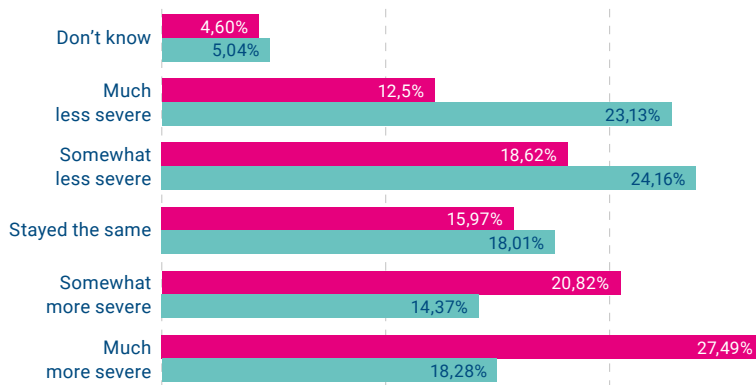
Considering the way that climate change is affecting life in the different countries, the worsening of life conditions is almost equally perceived in the rural and urban contexts (see graphs "4" in the annex section): this is particularly evident in Mali. To note, 29% of all Sahelian respondents consider that changes induced by climate in their country are "much and somewhat" better, particularly in Niger where 35.4% of respondents declare climate change has improved life.

Neither gender, nor the current employment status appear as significant variables in differently perceiving the impact of climate change in the country.

In general, climate change is perceived more largely affecting droughts than rain floods, with significant variations among countries and between urban and rural areas (see graphs "5" in the annex section). Almost 48% of respondents perceive the severity of droughts has overall increased in the last ten years - mostly among 53% of rural respondents and more specifically among rural residents in Burkina Faso (75%), Niger (68%), Mali (67%). On the other hand, 31% consider droughts to be less severe; droughts are considered to be decreasing in the last ten years especially among urban respondents in Nigeria (37%), Senegal (60%) e Sudan (46%).

Almost 48% of respondents think floodings were less severe, while on the contrary 30% perceive floodings have worsened and 14% think they stayed the same. The increased severity of floodings is particularly perceived by urban respondents in Niger (53,8%).

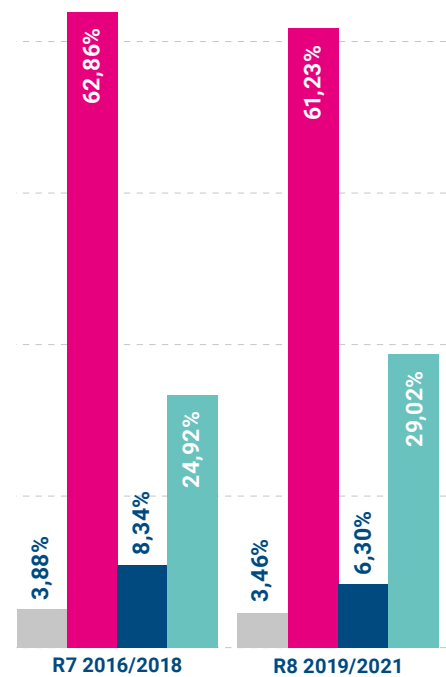
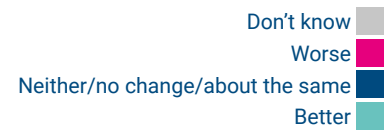
Sahel- Climate Change
5. Severity of droughts and floodings



Round 7 - 2016/18

5. Question: In your experience, over the past 10 years, has there been any change in the severity of droughts in the area where you live? Have they become more severe, less severe, or stayed about the same?
Answers "Don't know" and "Refuse to answer" are not included in the graph. Answers "much severe" and "somewhat severe" were summed as answers "much less severe" and "less severe".

Sahel- Climate Change
4. Affecting country



Round 7 - 2016/18 and Round 8 - 2019/21

4. Question: Do you think climate change is making life in [country] better or worse, or haven't you heard enough to say?
Data include: Burkina Faso, Cameroon, the Gambia, Mali, Niger, Nigeria, Senegal, Sudan. (Answers "Much better" and "Somewhat better" were summed together into "Better"; "Much worst" and "Somewhat worst" were summed together into "Worst").

In most Sahelian countries the main cause of climate change is ascribed to human activities (45,51%) and less to natural processes (36%). In Niger only perceptions are vice versa considering natural processes (58%) determining changes in climate compared to human activities (29%). If climate change is considered human caused, this implies that human behaviors can generate corrective responses and mitigation strategies, encouraging policy support and personal action (van Valkengoed and Steg, 2019).

Almost 70% of respondents agree that climate change needs to be stopped; a part (45%) considers that ordinary people can play a role to reduce climate changes, while 24% has a negative perception that nothing can be done (see also graph "6" in the annex section). An impassive/inactive attitude to contrasting climate change is reported (26%) that is particularly evident in countries like Sudan (42%).

If climate change is considered human caused, this implies that human behaviors can generate corrective responses and mitigation strategies, encouraging policy support and personal action

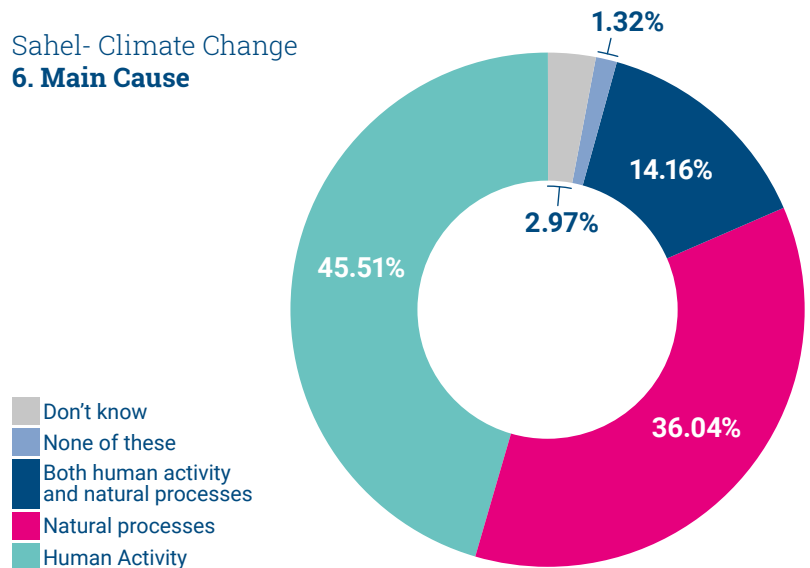
56. More manifestly in Gambia (64,8%) and in Sudan (57,2%).

57. Especially in Senegal (55,1%).

58. With the highest percentages in Niger (21,9%) and in Mali (20,5%).

59. Among those considering climate change has made life worse, the highest percentages of the ones truly planning to migrate are in Mali (24,7%), Senegal (18%) and Niger (22,9%) (R7 2026/18).

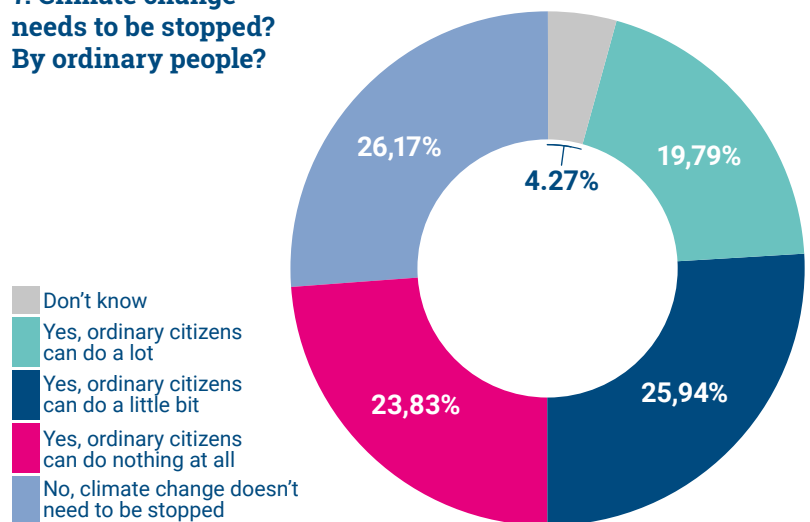
Sahel- Climate Change 6. Main Cause



Round 7 - 2016/18

6. Question: People have different ideas about what causes climate change. What about you? Which of the following do you think is the main cause of climate change, or haven't you heard enough to say?

Sahel- Climate Change 7. Climate change needs to be stopped? By ordinary people?



Round 7 - 2016/18

7. Question. Do you think that climate change needs to be stopped? [If yes] How much do you think that ordinary (Country citizens) can do to stop climate change?

SAHEL: PERCEPTIONS ON EMIGRATION

Emigration does not seem the predominant option or choice in most Sahelian countries two thirds of respondents are not considering it, mostly people from rural areas.

No significant evidence suggests that people thinking that climate change has made life worse are also truly planning to migrate.

Emigration does not seem as the predominant option or choice in most Sahelian countries: 63% of respondents are not considering it, mostly people from rural areas, while 37% are somehow considering it (see also graph and table “7” in the annex section). In more detail, 80% of respondents from Mali, 76% from Burkina Faso and 73% from Niger are not considering emigration. To note, these latter ones are among the countries where climate change tends to be negatively perceived and negatively affecting lives (as analyzed in the previous section).

On the other side, the strongest interest for emigration is reported among urban respondents in Sudan (54%), Senegal (43.8%), Cameroon (49.5%) and Nigeria (42.5%) and among rural respondents in Gambia (58.8%).

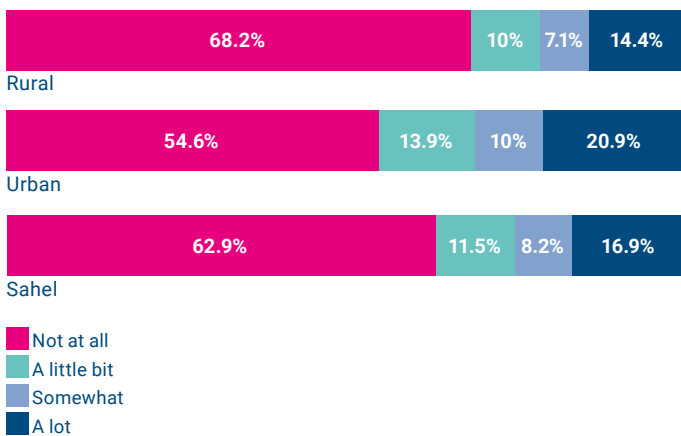
The largest part of respondents in the Sahel is not considering or making current plans to migrate, with no significant differences between the urban and rural dimension. Half of the

respondents (50.8%) declare not to be currently making plans to emigrate⁵⁶, while almost 37% of the sample is possibly considering it in the next few years⁵⁷. Almost 11% is actually making preparations to move⁵⁸.

Moreover, crossing the category of those “making current plans (like getting a visa)” with the variable “how much climate change is affecting your country”, no significant evidence suggests that people thinking that climate change has made life worse are also truly planning to migrate⁵⁹. This could indicate that climate change is not the sole driver of (planning) migration.

A reasonable assumption on framing migrant decisions derived from the literature review (Stark and Bloom, 1985; Konseiga, 2007; Vinke et al., 2022) suggests that, when financial resources and food are still available, smallholder farmers will more likely and firstly try to adapt their farming methods or invest in technologies, before seeking alternative sources of income, which includes migration.

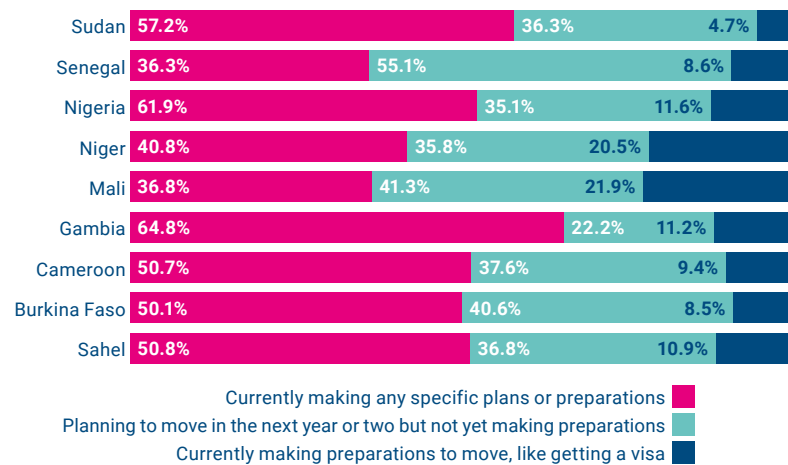
Sahel- Climate Change 8. Considered emigration



Round 7 - 2016/18

8. Question. How much, if at all, have you considered moving to another country to live? Answers “Refused” and “Don’t know” are not included in the graph.

9. Plans to emigrate



9. Question. How much planning or preparation have you done in order to move to another country to live? Answers “Do not know” and “Refused” are not included in the graph.

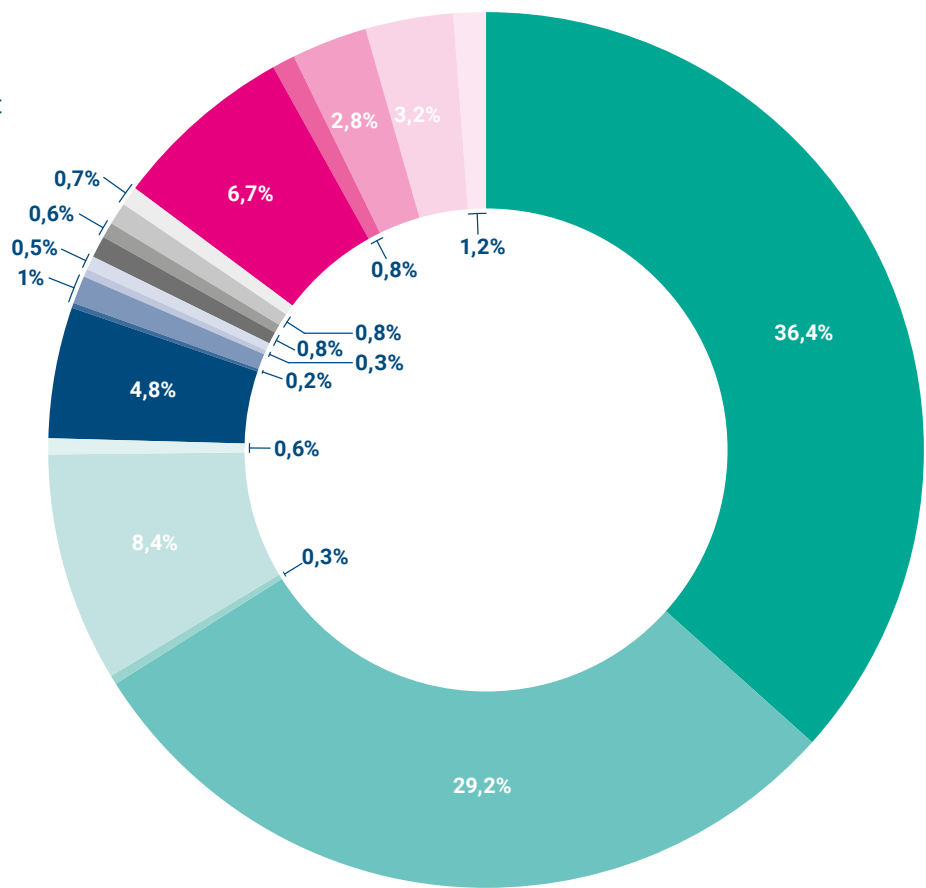
The most important reasons affecting the decision to migrate among Sahelian respondents primarily refer to finding work (36,4%) and economic hardship (29,2%). Natural disasters (0,2%) are not overall mentioned as a significant push factor.

When crossing the “reasons to migrate” with the variable “how much climate change is affecting your country”, in general no significant correlations appear (see also graph and table “10” in the annex section). While emigration decisions happen for a mix of factors but mainly economic, it is not easy to distinguish the impact of climate modifications in the local environment for income generation activities.

When crossing the “reasons to migrate” with the variable “how much climate change is affecting your country”, in general no significant correlations appear.

Sahel- Climate Change 10. Reason to emigrate

- Find work
- Economic hardship
- Lower taxes at destination
- Poverty
- Poor infrastructure/services
- Better business prospects
- Natural Disasters
- Better democratic environment
- Political persecution
- Religious persecution
- Civil war
- Crime
- Better schools
- Better medical services
- To pursue an education
- To accompany family members who are moving for work
- To join spouse/family members who have already migrated
- Travel / tourism / adventure / experience other cultures
- Other



Round 7 - 2016/18
10. Question. There are several reasons why people leave their home to live in another country for an extended period of time. What about you? What is the most important reason why you would consider moving from [country]?
 Answer "Refused" and "Don't know" are not included in the graph.

WEST AFRICA: PERCEPTIONS ON CLIMATE CHANGE AND EMIGRATION

Almost the 70% of the West African respondents perceives climate change has worsened life conditions. And half of respondents consider that climate conditions have worsened in the last ten years, especially with negative impacts on the agricultural production.

Considering the fourteen West African countries analysed through the Afrobarometer survey⁶⁰, almost 58% of respondents have heard about climate change, but still 40% have never heard of it⁶¹. Among urban respondents, 64.5% have heard of climate change⁶², while among rural respondents almost 53% have heard of climate change. In terms of gender, 65% of male respondents heard of climate change, compared to 50% of female respondents that heard of it⁶³. From an education split, the increasing of the school level positively correlates to the increasing percentage of respondents that heard about climate change.

Almost 70% of the West African respondents perceive climate change has worsened life conditions, while 22% think life has turned better. No significant differences appear based on the gender and urban/rural variables, while in some countries the percentage of rural respondents thinking life conditions worsened is higher (*approx. 10 points*) compared to their urban counterparts, especially in Mali, Cape Verde and Liberia.

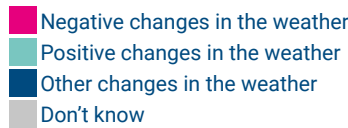
Round 8 - 2019/21

1. Question: Have you heard about climate change or haven't you had the chance to hear about this yet.
2. Question: Do you think climate change is making life in [country] better or worse, or haven't you heard enough to say? (Answers "Much better" and "Somewhat better" were summed together into "Better"; "Much worst" and "Somewhat worst" were summed together into "Worst").

1. Have you heard about climate change?



2. Affecting country



60. Data include: Benin, Burkina Faso, Cape Vert, Ivory Coast, Gambia, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo.

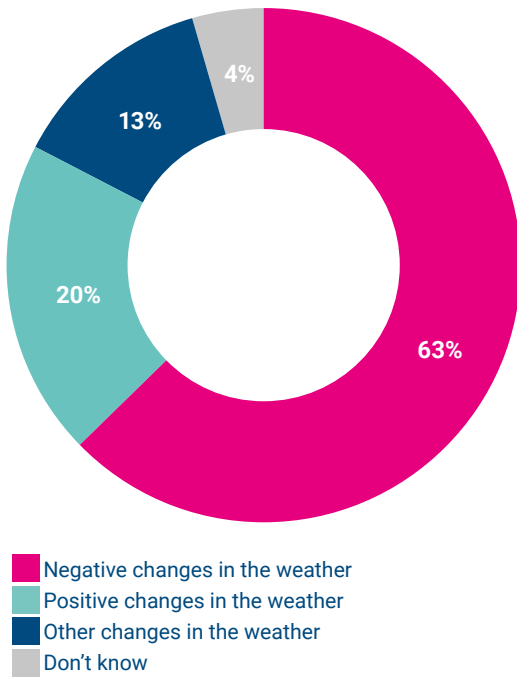
61. Especially 67% respondents from Nigeria.

62. Especially 84,5% of urban respondents in Liberia.

63. This percentage grows up to 80% of men and 73% of women in Liberia, and 82% of men and 67% of women in Cape Vert.

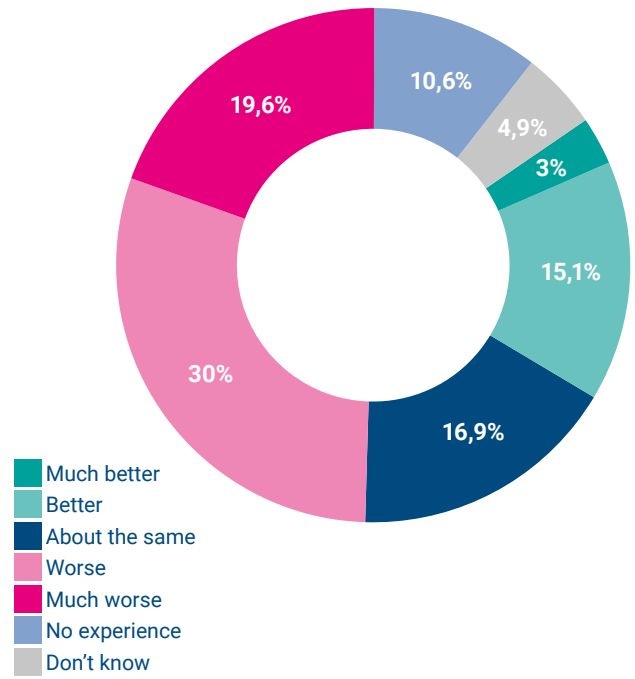
West Africa - Climate Change

3. Meaning



West Africa - Climate Change

4. Compared to 10 years ago



Round 7 - 2016/18

- 3. Question: What does the phrase "climate change" mean to you?
- 4. Question: In your experience, would you say climate conditions for agricultural production in your area have gotten better, gotten worse, or stayed about the same over the last 10 years, or haven't you heard enough to say?

Climate change signifies negative changes in the weather for 63% of respondents, while 20% sees positive changes.

Half of the respondents from West Africa think that climate conditions have worsened in the last ten years, especially with negative impacts on the agricultural production⁶⁴; this is more evident among rural (56%) compared to urban respondents (45%). Still 20% consider that positive changes occurred. Rural citizens in Gambia and Togo are particularly perceiving negative changes in the last ten years (compared to their urban counterparts)⁶⁵.

The severity of droughts is more seriously perceived as worsening by 48% of respondents⁶⁶, in comparison to increasing flooding (that is worryingly almost 30% of respondents). Most respondents of five West African out of fourteen (namely Ghana, Liberia, Nigeria, Senegal e Sierra Leone) perceive droughts problems are actually diminishing.

Most respondents consider human activities as the main cause of climate changes (48%) compared to natural processes (33%).

Most respondents (71%) consider it necessary to stop climate change, although only 48% are positively convinced that ordinary citizens can concretely do something.

Almost 60% of respondents from West Africa are not considering emigration, while 40%⁶⁷ are. Those mostly willing to migrate are from Cape Verde, Liberia, Gambia and Togo. Those less willing to migrate are from Burkina Faso, Mali and Ivory Coast. More precisely, 55% of respondents did not do plan to migrate while 10% are actively trying to arrange their emigration.

Significant changes in climate variables in combination with other socio-environmental-economic changes will likely and negatively affect household farming/food systems and livelihoods, especially in fragile contexts.

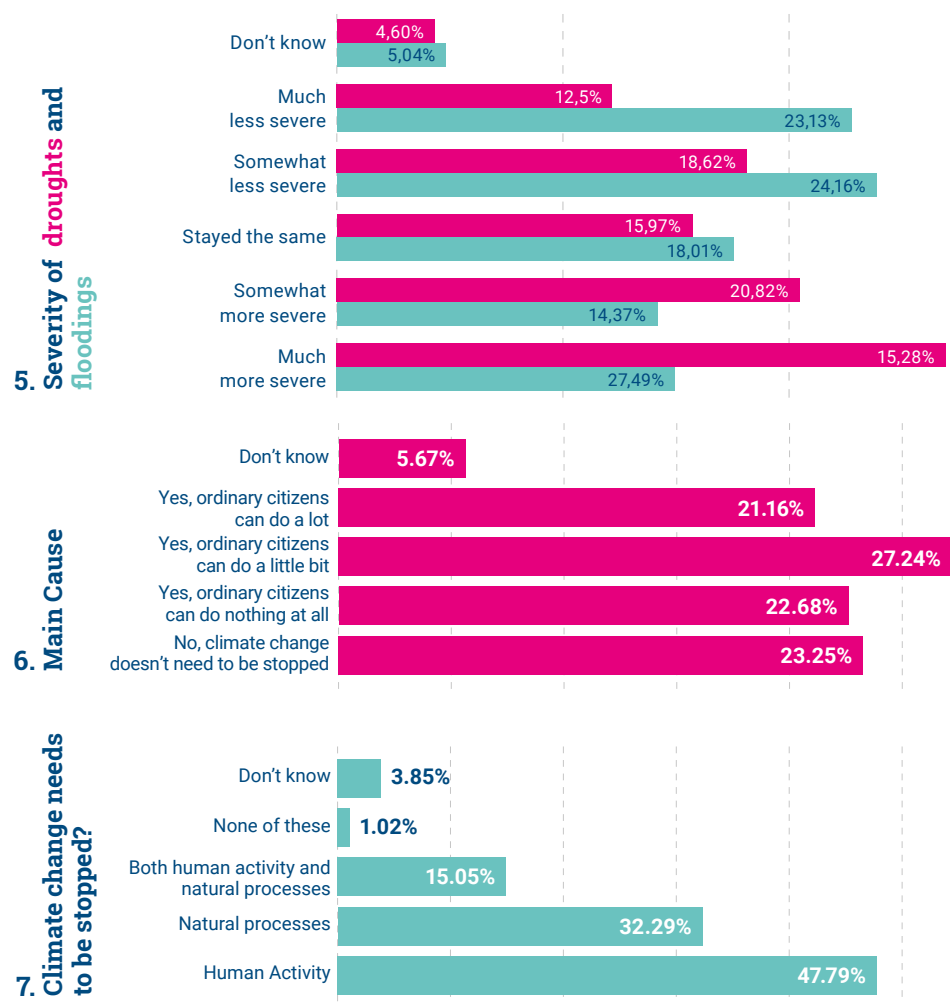
Round 7 - 2016/18

5. Question: In your experience, over the past 10 years, has there been any change in the severity of droughts/floods in the area where you live? Have they become more severe, less severe, or stayed about the same?

6. Question: People have different ideas about what causes climate change. What about you? Which of the following do you think is the main cause of climate change, or haven't you heard enough to say?

7. Question: Do you think that climate change needs to be stopped? [If yes] How much do you think that ordinary [Country citizens] can do to stop climate change?

West Africa - Climate Change



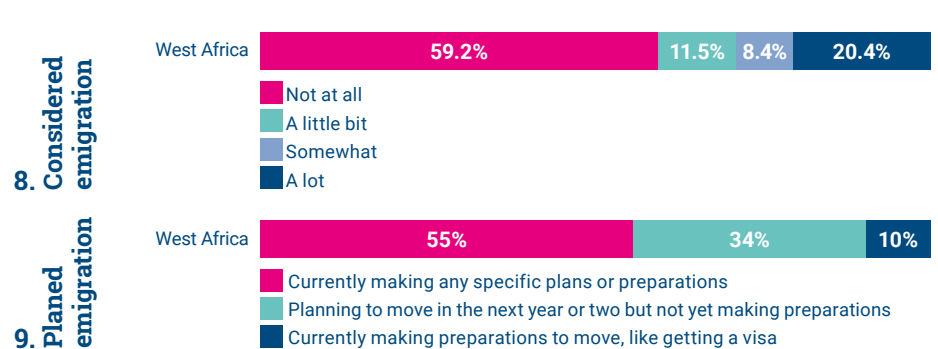
Round 7 - 2016/18

8. Question. How much, if at all, have you considered moving to another country to live? Answers "Refused" and "Don't know" are not included in the graph

9. Question. How much planning or preparation have you done in order to move to another country to live?

Answers "Do not know" and "Refused" are not included in the graph. years, or haven't you heard enough to say?

West Africa - Climate Change



64. Especially true for the 71% of respondents from Cape Vert.

65. With the largest gap (16-17 percentage points) between rural and urban respondents.

66. Between 65-75% of respondents in Burkina Faso, Cape Vert, Togo, Mali and Niger and mostly and largely rural citizens.

67. Summing responses: a little, somewhat and a lot.

LIKELY TRAJECTORIES OF CLIMATE-INDUCED MOBILITY IN WEST AFRICA AND SAHEL

Migration trajectories and patterns induced by climate can modify existing forms of mobility or produce new ones.

Disaster displacement due to natural or environmental catastrophes (as extreme droughts or floodings) can involve large populations that tend to move internally or towards nearby borders.

Different studies agree that significant changes in climate variables,⁶⁸ in combination with other socio-environmental-economic changes⁶⁹ will likely and negatively affect household farming/food systems and livelihoods, especially in fragile contexts as the Sahel and West Africa (Seo and Mendelsohn, 2007a, b; Ringler et al. 2010, Matsalabi et al. 2019).

Migration trajectories and patterns induced by the climate can modify existing forms of mobility or produce new ones⁷⁰ as a consequence of local and regional declining of rural agricultural and coastal fishery productivity, changing nomadic pastoral routes, and the increase in floods, landslides and other natural disasters.

Internal and intra-African migration from **rural to urban areas** is an existing feature and a form of “circular migration” for income diversification, often along social networks or kinship ties. Climate changes can increase this practice in the regions, emphasizing existing trends in massive urban growth in Africa⁷¹ and also a shortening of local manpower in rural areas.

Seasonal labour migration can easily increase, as is for instance happening for border communities (as in Burkina Faso and Senegal) and among farmers affected by rainfall changes (as in Niger). Moving to neighboring countries and during the agricultural

off-season is an important climate change coping mechanism for many rural residents in the Sahelian and West African countries to find alternative sources of income that will likely enlarge (Warner et al. 2016; OHCHR and PDD, 2018).

Nomadism will be largely affected by ecosystem changes, both in its traditional patterns and routes and in the likely conflicts generated with sedentary populations. In the Sahel, access to decreasing fertile land/pastures and water is stirring the competition between farmers – who from their side try to expand cultivations to make up for reduced crop yields - and some 50 million pastoral herding animals (IOM 2021). These social tensions are indeed interlinked with group ethnic and religious diversities in a context of socio-economic poverty and deprivation; this can easily lead to increased **displacement movements** where human security is strictly associated to limited access to scarce natural resources and rights protection (as exemplified by the case on Nigeria⁷²).

Disaster displacement due to natural or environmental catastrophes (such as extreme droughts or floods) can involve large populations that tend to move internally or towards nearby borders. Based on the increasing recurrence of climatic extreme events, disaster displacement to border areas

68. In particular temperature and rainfall and more generally the slow-onset processes that can have effects over a long period of time (<https://unfccc.int/wim-excom/areas-of-work/slow-onset-events>).

69. As increased population density, vegetation changes, droughts, increased food demand, market opportunities, and social instability to access scarce resources.

70. Including: temporary or permanent; forced or voluntary; internal, cross-border, long distance or international.

71. Urban population growth in Africa is projected to reach 60% by 2050 (UN-DESA, 2014).

72. An example are the conflicts in Nigeria in 2019 between Fulani pastoralists and Hausa farmers that produced almost 17,000 people displaced. (IDMC, 2020a, p. 18).

is expected to rise. For instance, in 2018, 80% of Nigeria was affected by flooding, resulting in 613.000 internal displacements (IDMC, 2019a, p. 119; IOM, 2021). In addition, in Nigeria, as in other Sahelian and West African countries, people already displaced for natural disasters or other reasons often find themselves in climate change “hotspots”, further exposed to secondary displacement and unable to return home⁷³ IDMC, 2020; IDMC, 2019b, p. 20).

As general framework, **intra-regional migration** is dominant in West Africa and the Sahel, compared to migration to Europe⁷⁴, and will probably stay alike (Borderon et al., 2018).

Overall, while climate change is projected to increase internal and cross-border displacement, particularly within the Sahel and West Africa, migration induced by environmental degradation is more questioned and less evident. The influence of (direct and indirect) climate causes on mass migration from Africa (especially to Europe) in the near future is overall expected to be limited (Borderon et al., 2018). Differences exist among contexts and outcomes depending on the interplay of a mix of factors (such as individual age, gender, economic status and education, availability of alternative resources, the duration/severity of environmental pressure, political stability etc.).



Wetland drying out.
Jody Davies, Pixabay.

As general framework, intra-regional migration is dominant in West Africa and the Sahel, compared to migration to Europe, and will probably stay alike.

73. In 2020, as reported by the IDMC's Global Report on Internal Displacement, "countries in the East and Horn of Africa experienced one of the wettest rainy seasons in 40 years. Flooding along the White Nile basin forced many people already displaced by conflict to flee again" (p. 15) (<https://www.internal-displacement.org/global-report/grid2020/downloads/2020-IDMC-GRID-sub-saharan-africa.pdf>)

74. Intra-African migrations since 2010 have increased by +43.6% compared to +26.0% for Africa-Europe migrations; and as percentage of total stock of emigrants, 71,7% African emigrants are living in West Africa and 71% in East Africa (Africa Europe Foundation Debate, 2022; https://www.un.org/en/development/desa/population/events/pdf/expert/28/EGM_Joseph_Teye_ppt.pdf).

Ecowas

In April 2022 in Ghana, the fifteen Ministers of Environment of ECOWAS Member States signed and validated the ECOWAS Regional Climate Strategy⁷⁵. This political commitment to climate change mitigation and adaptation actions and to strengthen regional climate change resilience aims at involving the regional institutions, Member States, the involved partners and civil society actors. Among the specific objectives of the Strategy one (no. 2) is particularly addressed at developing anticipation capacity and informed decision making to manage current and future climate risks. Additionally, in consideration of how diversely natural disasters and extreme weather events affect different populations and their vulnerabilities (as women, children, elders, disables), the gender limitations of the approaches to Disaster Risk Management (DRR) and Climate Change Adaptation (CCA) brought to the ECOWAS Disaster Risk Reduction Gender Strategy and Action Plan (2020-2030) (ECOWAS DRR GSAP) Among supporting gender-responsive resilience-building through regional and national level programming (including for instance advocacy and public awareness campaigns and data Sharing Protocols).

African Union

The African Union developed the “AU Climate Change and Resilient Development Strategy and Action Plan” for the period 2022-2032 to coordinate and support the Continent’s response to climate change and to allow the realization of Africa’s Agenda 2063. The AU strategy identifies different areas of intervention; when considering the multilevel governance arrangements, suggested actions include the awareness raising and contextualising issues for citizens to improve local stewardship and participation in codesigning of solutions, and the mainstreaming of climate-resilient development objectives across all areas of governance and into all local development and sector plans.

75. <https://www.expertisefrance.fr/documents/20182/703453/EN+Press+kit+ECOWAS+Regional+Climate+Strategy+April+2022+-+Final/aadf6c09-82aa-6efa-e241-c5984c8c103b>

Contributors

XAVIER ARAGALL.

Programme Manager of the Euromed Survey and Migrations. European Institute of the Mediterranean (IEMed)

Xavier has coordinated the organisation of seminars on comparative migration policies and migrations in the Mediterranean, and the research projects “Immigration and the Euro-Mediterranean Area: Keys to Policy and Trends” and “Role of Immigrant Communities in the Euromed Relations” and books on migration management. He has been Coordinator of the Migration Programmes, member of the scientific team of the Euromed Survey (2010-2019), and at present is EuroMeSCo Migration and Survey Officer, responsible for coordinating the fieldwork, questionnaire design and quantitative analysis of the results.

AMAL EL OUASSIF.

International Relations Specialist.
Policy Center for the New South.
Morocco

Amal El Ouassif is an International Relations Specialist and migration expert at the Policy Center for the New South, a Moroccan Think Tank based in Rabat. She is also a PhD student pursuing a thesis on: “The place of migration as an adaptation strategy to climate change: the Case of the Souss-Massa Region in Morocco”. Prior to this, she worked as a program coordinator at the Westminster Foundation for Democracy and served as a consultant in development policies with the office of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in Morocco.

ANNA FERRO.

Researcher Migration and development.
CeSPI- Centro Studi di Politica Internazionale.
Italy

Anna Ferro is a senior researcher and international consultant with + 20 years of work experience in Europe, Africa and the Middle East in migration, diaspora engagement, and development, stably collaborating with CeSPI - a think tank based in Italy. Among her current research interests are climate change and migration in the Sahel; migration, remittances and development; policies and practices of diaspora engagement; EU migration and asylum management system; and human mobility in the Western Balkans.

MATÍAS IBÁÑEZ SALES.

Programme & Research Officer, Department of Sustainable Development and Regional Integration, European Institute of the Mediterranean (IEMed)

Lawyer, researcher and political scientist, Matías has an extensive working experience in cooperation policy for sustainable development. Prior to joining the IEMed, Matías worked at the IOM’s Regional Office for Central America, North America and the Caribbean in Costa Rica (2021), the International Migration Division of the OECD (2019-2020), and the Office of a Spanish MEP at the European Parliament, where he provided legal and technical support on foreign and trade policy issues (2017-2018).

Matias holds a BA in Law and Political Science from the University of Valencia (Spain) and a Master’s degree in Human Rights & Humanitarian Action from Sciences Po – Paris School of International Affairs (France).

Bibliography

- Adriansen, HK., "Understanding pastoral mobility: the case of Senegalese Fulani", in *Geographical Journal* 174(3), pp. 207–222, 2008
- Africa Europe Foundation Debate, *Africa and Europe Facts and Figures on African Migrations*, #TalkingAfricaEurope, 2022, https://mo.ibrahim.foundation/sites/default/files/2022-02/aef_summit_african-migrations.pdf
- Agadjanian, V., "Research on International Migration within Sub-Saharan Africa: Foci, Approaches, and Challenges", in *The Sociological Quarterly*, 49(3), pp. 407-421, 2016
- Alvar-Beltrán, J., Dao, A., Dalla Marta, A., Heureux, A., Sanou, J., and Orlandini, S. "Farmers' Perceptions of Climate Change and Agricultural Adaptation in Burkina Faso", in *Atmosphere*, 11(8), 827, 2020
- Andersson, R. 2016. "Europe's Failed 'Fight' against Irregular Migration: Ethnographic Notes on a Counterproductive Industry." *Journal of Ethnic and Migration Studies* 42 (7): 1055–1075. doi:10.1080/1369183X.2016.1139446.
- Beauchamp, E., Abdella, J., Fisher, S., McPeak, J., Patnaik, H., Koulibaly, P., Cissé, D., Touré, M., Bocoum, A., Ndao, M., Deme, Y., & Gueye, B. (2019), "Resilience from the ground up: how are local resilience perceptions and global frameworks aligned?", in *Disasters*, 43, S295–S317
- Benjaminsen, Tor A., Alinon, K., Buhaug, H. and Tove Buseth, J., "Does climate change drive land-use conflicts in the Sahel?", in *Journal of Peace Research*, 2012, <http://jpr.sagepub.com/content/49/1/97>
- Benjaminsen, Tor A., Ba, B., "Farmer–herder conflicts, pastoral marginalisation and corruption: a case study from the inland Niger delta of Mali", in *The geographical journal*, Volume175, Issue1, 2009
- Bisong, A. 2019. "Trans-Regional Institutional Cooperation as Multilevel Governance: ECOWAS Migration Policy and the EU", in *Journal of Ethnic and Migration Studies* 45: 1294–1309.
- Borderon M., Sakdapolrak P., Muttarak R., Kebede E., Pagogna R., and Sporer E. *A systematic review of empirical evidence on migration influenced by environmental change in Africa*, IIASA Working Paper, Laxenburg, Austria: WP-18-003, 2018
- Brüning, L., Piguet, E. (2018), "Changements environnementaux et migration en Afrique de l'Ouest: Une revue des études de cas", in *Revue Belge de Géographie*, 1: 1–26.
- Bukari, K. N., Sow, P., and Scheffran, J., *Real or Hyped? Linkages Between Environmental / Climate Change and Conflicts – The Case of Farmers and Fulani Pastoralists in Ghana*, Springer International Publishing, 2019 https://doi.org.ezproxy.uniroma1.it/10.1007/978-3-319-92828-9_9

- Cepero O. P., Desmidt, S., Detges, A., Tondel, F., Van Ackern, P., Foong, A., and Volkholz J., *Climate Change, Development and Security in the Central Sahel*, Cascades, Report June 2021 (<https://www.cascades.eu/wp-content/uploads/2021/06/Climate-Change-Development-and-Security-in-the-Central-Sahel.pdf>)
- ClimaSouth, Politique nationale changements climatiques en Algérie.
- Climate Change Performance Index 2022 (CCPI). Egyptian Ministry of Electricity and Renewable Energy, "Egypt's First Updated Nationally Determined Contribution"
- Collins, J.M., "Temperature Variability over Africa", in *Journal of Climate*, 24, pp. 3649–3666, 2011
- De Longueville, F., Ozer, P., Gemenne, F., Jonas, N., "Comparing climate change perceptions and meteorological data in rural West Africa to improve the understanding of household decisions to migrate", in *Climatic Change*, 160, p. 123-141, 2020
- Dieye, A. M., Roy, D. P., "A study of rural Senegalese attitudes and perceptions of their behavior to changes in the climate", in *Environmental Management*; 50 5, pp. 929-941, NOV 2012,
- Djihouessi, M. B., Degan, A., Yekanbessoun, N. M., Sossou, M., Sossa, F., Adanguidi, J., and Aina, M. P., "Inventory of agroecosystem services and perceptions of potential implications due to climate change: A case study from Benin in West Africa", in *Environmental Impact Assessment Review*, 95, 2022
- Ecowas Commission, 33rd Ordinary Session of the Head of State and Government, Ecowas Common Approach On Migration, Ouagadougou, 18 January, 2008 (<https://www.unhcr.org/49e47c8f11.pdf>)
- Edem E. Selormey, Mavis Zupork Dome, Lionel Osse. and Carolyn Logan. (2019). "Change ahead Experience and awareness of climate change in Africa", Afrobarometer.
- Epule Epule, T., Chehbouni, A., and Dhiba, D., "Recent Climate Change Adaptation Strategies in the Sahel: A Critical Review", in Stuart A. Harris, ed. In *The Nature, Causes, Effects and Mitigation of Climate Change on the Environment*, London: IntechOpen, 2022
- European Parliament, Policy Department for External Relations, Directorate General for External Policies of the Union *Study: Intra-African Migration*, Requested by the DEVE committee, PE 603.514 - October 2020, [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/603514/EXPO_STU\(2020\)603514_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/603514/EXPO_STU(2020)603514_EN.pdf)
- Failler, P., Tournon-Gardic, G., Sadio, O., Traoré, M., "Perception of natural habitat changes of West African marine protected areas", in *Ocean & Coastal Management*, Volume 187, 2020
- Franck Adoho and Quentin Wodon. (2014). Perceptions of Climate Change, Weather shocks, and impacts on households. Chapter 4 in *Climate Change and Migration Evidence from the Middle East and North Africa*. edited by Q. Wodon, A. Liverani, G. Joseph, and N. Bounoux. World Bank Study. Washington, DC: World Bank.
- Gahi, Z.N., Kablan, M.K.A., Kpan, O.J.G., Dongo, k., Badolo, M., "Analysis of stakeholder perceptions and practices related to climate change adaptation in Burkina Faso", in *African Crop Science Journal*, Vol. 28, No. 4, pp. 543 – 553, 2020.
- Godfrey A., LeRoux-Rutledge E., Cooke S., Burton M. *Africa Talks Climate: The public understanding of climate change in ten countries*, BBC World Service Trust., 2010 (https://www.academia.edu/2153258/Africa_Talks_Climate_The_public_understanding_of_climate_change_in_ten_countries_Executive_Summary).
- González J. B., Sánchez A. Multilevel predictors of climate change beliefs in Africa, in *PLoS ONE*, 2022, 17(4): e0266387. <https://doi.org/10.1371/journal.pone.0266387>
- Haskouri, Kholoud. (2022). "Morocco is experiencing its worst drought in 30 years", Hesperess English.
- Idrissa, A., *Dialogue in Divergence—The Impact of EU Migration Policy on West African Integration: The Cases of Nigeria, Mali, and Niger*, FES Paper, Friedrich Ebert Foundation, Bonn and Berlin, 2019
- Idrissou, Y., Assani, A. S.; Baco, M. Nasser; Alkoiret Traoré, I., "Determinants of Cattle Farmers' Perception of Climate Change in the Dry and Subhumid Tropical Zones of Benin (West Africa)", in *African Handbook of Climate Change Adaptation*, pp. 197-212, Springer International Publishing, 2021.
- **Internal Displacement Monitoring Centre (IDMC):**
 - 2019a Global Report on Internal Displacement 2019. IDMC, Geneva. www.internaldisplacement.org/sites/default/files/publications/documents/2019-IDMC-GRID.pdf.
 - 2019b African Report on Internal Displacement 2019. IDMC, Geneva. www.internaldisplacement.org/sites/default/files/publications/documents/201912-Africa-report.pdf.
 - 2020 Nigeria: Country information. Country profile and data set. www.internaldisplacement.org/countries/nigeria.
- International Organization for Migration (IOM), *Environmental Migration, Disaster Displacement and Planned Relocation in West Africa*, IOM Geneva, 2021. (https://environmentalmigration.iom.int/sites/g/files/tmzbd11411/files/documents/environmental-migration-disaster-displacement-in-west-africa_final.pdf)
- IPCC, 2022, *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press

- Johnston, J.D. (2020), "Climate Change Literacy to Combat Climate Change and Its Impacts", in: Leal Filho, W., Azul, A.M., Brandli, L., Özuyar, P.G., Wall, T. (eds), *Climate Action. Encyclopedia of the UN Sustainable Development Goals*, Springer, Cham. https://doi.org/10.1007/978-3-319-95885-9_31 KNOMAD. Changes on Mobility Patterns in West Africa, Working Paper 14, 2016
- Klepp, S., *Climate Change and Migration*, The Oxford Research Encyclopedia, Climate Science, 2017
- Kompas Tom, Pham Van Ha and Tuong Nhu Che. (2018). The Effects of Climate Change on GDP by Country and the Global Economic Gains From Complying With the Paris Climate Accord. AGU, Advancing Earth and Space Science.
- Konseiga, A. "Household migration decisions as survival strategy: the case of Burkina Faso", in *Journal of African Economies*, 16(2), pp. 198–233, 2007 <https://doi.org/10.1093/jae/ejl025>
- Kyle, Emerick, Nadeen, ElAshmawy and Heba, El-Sahn. (2022). The road to COP27: Tackling climate change in Egypt. Abdelatif Jameel Poverty Lab (JPAL).
- Mahesh Kumar Gaur and Victor R. Squires. (2017). Climate Variability Impacts on Land Use and Livelihoods in Drylands. ResearchGate.
- Matsalabi Ado, A., Savadogo, P., Kanak Pervez, A. K. M., Mudimu, G. T., "Farmers' perceptions and adaptation strategies to climate risks and their determinants: insights from a farming community of Aguié district in Niger", in *GeoJournal: Spatially Integrated Social Sciences and Humanities*. 85(4):1075-1095, 2020
- Mbow, C., Mertz, O., Diouf, A., Rasmussen, K., and Reenberg, A., "The history of environmental change and adaptation in eastern Saloum—Senegal—Driving forces and perceptions", in *Global and Planetary Change*, 64(3), 210–221, 2008 <https://doi-org.ezproxy.uniroma1.it/10.1016/j.gloplacha.2008.09.008>
- Melde, S., Laczko, F., Gemenne F., (eds.), *Making migration work for adaptation results from the MECLIP global research*, IOM (International Organization for Migration), 2017 https://publications.iom.int/system/files/pdf/meclepe_comparative_report.pdf
- Mertz, O., Mbow, C., Reenberg, A., Diouf, A., "Farmers' Perceptions of Climate Change and Agricultural Adaptation Strategies in Rural Sahel", in *Environmental Management*, May 2009 43(5):804-816)
- Montcho M, Padonou EA, Montcho M, Mutua MN, Sinsin B., "Perception and adaptation strategies of dairy farmers towards climate variability and change in West Africa", in *Climatic Change*, 170(3/4):1-21, 2022
- Mouhamed, L.; Traoré, S.; Alhassane, A.; Sarr, B., "Evolution of Some Observed Climate Extremes in the West African Sahel", in *Weather and Climate Extremes*, 1, 19–25, 2013
- New, M., Hewitson, B., Stephenson, D.B., Tsiga, A., Kruger, A., Manhique, A., Mbambalala, E., "Evidence of Trends in Daily Climate Extremes over Southern and West Africa", in *Journal of Geophysical Research*, 111, 2006
- Nicholson, S.E., Nash, D.J., Chase, B.M., Grab, S.W., Shanahan, T.M., Verschuren, D., Asrat, A., Lézine, A.-M., Umer, M., "Temperature Variability over Africa during the Last 2000 Years", in *The Holocene*, 23, pp. 1085–1094, 2013
- Nkiaka, E., Lovett, J. C., "Strengthening the science-policy interface for climate adaptation: stakeholder perceptions in Cameroon", in *Regional Environmental Change*, 19(4), pp. 1047–1057, 2019 <https://doi-org.ezproxy.uniroma1.it/10.1007/s10113-018-1441-4>
- OECD (Organisation for Economic Co-operation and Development), OECD and Sahel and West Africa Club, *An Atlas of the Sahara-Sahel: Geography, Economics and Security. Geography, Economics and Security, Nomadism and mobility in the Sahara-Sahel*, 2014, https://read.oecd-ilibrary.org/agriculture-and-food/an-atlas-of-the-sahara-sahel/nomadism-and-mobility-in-the-sahara-sahel_9789264222359-9-en#page2
- OHCHR (Office of the High Commissioner for Human Rights) and PDD (Platform on Disaster Displacement), "The Slow onset effects of climate change and human rights protection of cross-border migrants," 22 March 2018, paragraph 95.
- Ouraich, Ismail; Tyner, Wallace E. (2018). Moroccan agriculture, climate change, and the Moroccan Green Plan: A CGE analysis. Research in Agricultural and Applied Economics.
- Ozge Bilgili and Katrin Marchand. (2016). Protection and Migration: Thematic Input Paper for Agadir Regional Thematic Exchange Meeting. United Nations University Migration Newtork.
- Raimond, C., Bakaira, M., Doua, S. A., and Garine, E. (2020), *Whose Climate, Whose Changes? Various Views from Rural Northern Cameroon*, Springer International Publishing. https://doi-org.ezproxy.uniroma1.it/10.1007/978-3-030-37312-2_6
- Raphael J. Nawrotzki and Maria Bakhtsiyarava, "International Climate Migration: Evidence for the Climate Inhibitor Mechanism and the Agricultural Pathway," in *Population, Place and Space*, vol. 23 no. 4 (2016).
- Ringler, C., Zhu, T., Cai, X., Koo, J., and Wang, D. (2010), *Climate change impacts on food security in subSaharan Africa*, IFPRI discussion paper. Retrieved from <http://www.ifpri.org/sites/default/files/publications/ifpridp01042.pdf>.
- Sanogo, K., Binam, J., Bayala, J., Villamor, G. B., Kalinganire, A., and Dodiomon, S. (2017), "Farmers' perceptions of climate

change impacts on ecosystem services delivery of parklands in southern Mali”, in *Agroforestry Systems: An International Journal Incorporating Agroforestry Forum*, 91(2), 345–361. <https://doi-org.ezproxy.uniroma1.it/10.1007/s10457-016-9933-z>

- Seo, S. N., and Mendelsohn, R. O. (2007a). Climate change impacts on animal husbandry in Africa: A Ricardian analysis, World Bank policy research working paper.
- Seo, S. N., and Mendelsohn, R. O. (2007b). *The impact of climate change on livestock management in Africa: A structural Ricardian analysis*, Washington DC: World Bank Publications.
- Shukla, R., Agarwal, A., Gornott, C. et al., “Farmer typology to understand differentiated climate change adaptation in Himalaya”, in *Scientific Reports* 9, 20375 (2019). <https://doi.org/10.1038/s41598-019-56931-9>
- Simpson, N.P., Andrews, T.M., Krönke, M., Lennard C., Odoulami R., Ouweneel B., Steynor A., Trisos C.H. “Climate change literacy in Africa”, in *Nature Climate Change*, n. 11, pp. 937–944 (2021). <https://doi.org/10.1038/s41558-021-01171-x>
- Stark, O., Bloom. D. E., “The new economics of labor migration” In *The American Economic Review* 75 (1985), pp. 173-178.
- Sultan, Benjamin. (2020). Migration in West and North Africa and across the Mediterranean - Chapter 25. International Organization for Migration.
- Tamara Wood, *The Role Of Free Movement Of Persons Agreements In Addressing Disaster Displacement A Study Of Africa*, Platform on Disaster Displacement, May 2019 (https://disasterdisplacement.org/wp-content/uploads/2019/06/52846_PDD_FreeMovement_web-single_compressed.pdf)
- Tirchine, Ali. (2015). “L’Algérie réduira ses émissions de gaz à effet de serre de 22% », *L’Expression*, le quotidien.
- United Nations Environment Programme (UNEP), “Livelihood Security: Climate Change, Migration and Conflict in the Sahel,” 2011, pp. 16–17
- United Nations Food and Agriculture Organization, Morocco country strategic plan (2019–2021).
- United Nations, Department of Economic and Social Affairs (UNDESA), Population Division (2019), *World Population Prospects 2019*, 2019 (https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf)
- van Valkengoed A. M., Steg L., “Meta-analyses of factors motivating climate change adaptation behaviour”, in *Natural Climate Change* (2019), 9, pp. 158–163.
- Vinke, K., Rottmann, S., Gornott, C., Zabre, P., Nayna Schwerdtle, P., Sauerborn, “Is migration an effective adaptation to climate-related agricultural distress in sub-Saharan Africa?”, in *Population and Environment* (2022) 43:319–345 (<https://doi.org/10.1007/s11111-021-00393-7>)
- Viviane Clement, Kanta Kumari Rigaud, Alex de Sherbinin, Bryan Jones, Susana Adamo, Jacob Schewe, Nian Sadiq, and Elham Shabahat. (2021). Groundswell, Acting on Internal Climate Migration, Part II. World Bank Group.
- Warner, K., Ehrhart, C., de Sherbinin, A., Adamo S., “In Search of Shelter - Mapping the Effects of Climate Change on Human Migration and Displacement,” Care.org, 2009, https://www.care.org/wp-content/uploads/2020/05/CC-2009-CARE_In_Search_of_Shelter.pdf
- Warner, K., *Migration: Climate adaptation or failure to adapt? Findings from a global comparative field study*, February 2009, IOP Conference Series Earth and Environmental Science 6(56), DOI: 10.1088/1755-1307/6/56/562006
- Wesselbaum, D., “Revisiting the Climate Driver and Inhibitor Mechanisms of International Migration”, in *Climate and Development*, 10, 2020.
- Whitmarsh, L., Capstick, S., “Perceptions of climate change”, in Clayton, S., Manning, C., *Psychology and Climate Change*, Academic Press, 2018
- Wodon, Q., N. Burger, A. Grant, and A. Liverani. 2014. “Climate Change, Migration, and Adaptation in the MENA Region.” In *Climate Change and Migration: Evidence from the Middle East and North Africa*, edited by Q. Wodon, A. Liverani, G. Joseph, and N. Bougnoux. World Bank Study. Washington, DC: World Bank.
- Wood, T., *The role of free movement of persons agreements in addressing disaster displacement a study of Africa*, a study commissioned by the Platform on Disaster Displacement, 2019 (https://disasterdisplacement.org/wp-content/uploads/2019/06/52846_PDD_FreeMovement_web-single_compressed.pdf)
- World Bank Gorup. (2022). Egypt: US\$ 400 Million Project will Help to Improve and Decarbonize Logistics and Transportation Sectors.
- Zampaligré, N., Dossa, L. H., and Schlecht, E. (2014), “Climate change and variability: perception and adaptation strategies of pastoralists and agro-pastoralists across different zones of Burkina Faso”, in *Regional Environmental Change*, 14(2), 769–783. <https://doi.org/10.1007/S10113-013-0532-5>
- Zickgraf, C., Vigil, S., de Longueville, F., Ozer, P., Gemenne, F., “The Impact of Vulnerability and Resilience to Environmental Changes on Mobility Patterns in West Africa,” KNOMAD Working Paper 14 (2016) (<https://www.knomad.org/publication/impact-vulnerability-and-resilience-environmental-changes-mobility-patterns-west-africa>)

Imprint

**Friedrich Naumann Foundation
for Freedom**

Calle de Fortuny, 3, 1º izquierda
28010 Madrid, Spain
madrid@freiheit.org
www.freiheit.org/madrid

**European Institute
of the Mediterranean (IEMed)**

Carrer Girona, 20 , 1a planta
08010 Barcelona, Spain
info@iemed.org
www.iemed.org

Report

Authors: Xavier Aragall, Amal El Ouassif, Anna Ferro, Matías Ibáñez

Foreword

Authors: Roger Albinyana, David Henneberger

Editor: Valeria Sinisi García

Graphic design: Roger Castro (www.monzonbcn.com)

Finalisation of the manuscript: April 2021

Disclaimer: The present report is a joint publication by European Institute of the Mediterranean and Friedrich Naumann Foundation for Freedom Madrid. The opinion and views expressed here are those of the authors and interviewees alone and do not necessarily reflect those of the institution.

Cover pictures:

1. Agricultural work in the Dadès Valley, Morocco.
Andrea Delbo, Shutterstock
2. Fishing boats at the coast of Mbao, Senegal.
Noah Cuní, FNF

Climate change is already having a major impact on flight and displacement in the Euro-Mediterranean region as well as in its neighbouring southern regions. Direct consequences such as droughts, lack of drinking water, or degraded soils are driving people to flee in West Africa, the Sahel, and the Maghreb. In addition, climate change fuels distribution conflicts and thus indirectly causes armed conflicts and violence, which in turn lead to flight movements. This is where this report comes in, by emphasizing the urgency of political solutions in the topic area of "Climate change and migrations". Otherwise, humanitarian catastrophes will continue increasing as well as heated debates about migrants, refugees and asylum seekers in Europe.

This report combines analysis and proposals for action for policy makers concerning climate change and migrations involving countries of origin, transit and destination in the Euro-Mediterranean region. It starts analysing the climatic variations in North Africa, West Africa and the Sahel and the main issues at stake, and it continues with the description of the key elements of climate change as a probable source of human displacement. Moving forward, the report offers a specific regional analysis focused on North Africa, West Africa and the Sahel. It initially describes the perception of the climate change-human movements' binomial and then focuses on the likely scenarios of climate-induced mobility in those regions.



**FRIEDRICH NAUMANN
FOUNDATION** For Freedom.
Mediterranean Dialogue

Friedrich Naumann Foundation for Freedom (FNF) Madrid office

The Madrid office in Spain, Italy and Portugal seeks to strengthen cooperation and political dialogue between representatives from liberal political parties, scientific institutions and civil society organizations from Spain, Italy, Portugal, Germany and the European sphere. We are committed to help contribute to solutions for specific regional challenges in Southern Europe and highlight best practices from this ever more important region for the European integration process.

Moreover, through the Mediterranean Dialogue project, we establish a geostrategic dialogue to shift the attention from a problem-based look at the region to a positive, opportunity-oriented approach. By connecting liberal-minded people and institutions from around the Mediterranean, West Africa and Europe we contribute to cross-regional solutions in the fields of migration, economic cooperation, energy, human rights, the rule of law and integrated security.



The European Institute of the Mediterranean (IEMed)

The European Institute of the Mediterranean (IEMed), founded in 1989, is a consortium comprising the Catalan Government, the Spanish Ministry of Foreign Affairs and Cooperation and Barcelona City Council. It incorporates civil society through its Board of Trustees and its Advisory Council formed by Mediterranean universities, companies, organisations and personalities of renowned prestige.

In accordance with the principles of the Euro-Mediterranean Partnership's Barcelona Process, and with the objectives of the Union for the Mediterranean the aim of the IEMed is to foster actions and projects which contribute to mutual understanding, exchange and cooperation between the different Mediterranean countries, societies and cultures as well as to promote the progressive construction of a space of peace and stability, shared prosperity and dialogue between cultures and civilisations in the Mediterranean.