



Climate Security, Great Power Competition, and Adversarial Geopolitics in North and West Africa

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ABOUT THE PROJECT

This interim report is part of the project, “Climate Security, Great Power Competition, and Adversarial Geopolitics in North and West Africa,” part of the Asymmetric Threat Analysis Center (ATAC), a joint program between START and UMD’s Applied Research Lab for Intelligence and Security (ARLIS). ATAC is funded by the Department of Defense under award no. HQ003421F0481. Any opinions, findings, and conclusions or recommendations expressed in this report are those of the authors and do not necessarily reflect the views of the Department of Defense.

ABOUT START

The National Consortium for the Study of Terrorism and Responses to Terrorism (START) is a university-based research, education and training center comprised of an international network of scholars committed to the scientific study of terrorism, responses to terrorism and related phenomena. Led by the University of Maryland, START is a Department of Homeland Security Emeritus Center of Excellence that is supported by multiple federal agencies and departments. START uses state-of-the-art theories, methods and data from the social and behavioral sciences to improve understanding of the origins, dynamics and effects of terrorism; the effectiveness and impacts of counterterrorism and CVE; and other matters of global and national security. For more information, visit www.start.umd.edu or contact START at infostart@umd.edu.

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Introduction

While the consequences of climate change and climate security issues have global ramifications, certain regions bear a disproportionate burden of extreme impacts due to geographical vulnerabilities. Often termed a “threat multiplier,” climate change exacerbates existing vulnerabilities and threats, amplifying the challenges faced by less developed countries and regions.¹ States with higher fragility are particularly susceptible to pronounced climate impacts, including droughts and variability in rainfall patterns. Developing nations frequently encounter significant barriers to adapting to climate change, as they are characterized by limited adaptive capacity stemming from weak governance structures and inadequate infrastructure. These limitations make it challenging for states in these regions to enhance resilience, mitigate impacts, and adapt to climate-related hazards. Moreover, these regions frequently experience livelihood insecurity as a result of climate change, compounded by fragile governance structures. This intersection of environmental and socioeconomic vulnerabilities gives rise to heightened security concerns, emphasizing the urgent need for comprehensive adaptation and resilience-building efforts.

As a result, discourse surrounding climate change has undergone a process of securitization among politicians, governmental actors, and scholars. Presently, the focus of climate literature has shifted towards highlighting its connection to vulnerability and security on a broad scale. The escalating impacts of climate change are well-established, leading to increasingly severe consequences. Consequently, there is less emphasis on proving the existence and scientific implications of climate change. Scholars are now examining climate change from a security perspective rather than solely through a scientific lens. This intersection is often referred to as the *climate-security nexus*, wherein climate change is recognized as a significant national security threat. Specifically, this nexus involves a complex interplay of political, economic, and human factors, demanding a holistic approach that accounts for how environmental changes intersect with political systems, human behavior, and broader societal dynamics.² Recognizing that the link between climate change and security is indirect, multi-faceted, and complex, there exists a relationship nonetheless. This acknowledgement extends to its potential risks to political, economic, and human security. As a result, addressing climate change now requires governmental responses that transcend conventional strategies, necessitating involvement from various sectors.

Understanding the ongoing discourse surrounding *climate security* holds significant relevance, particularly in regions like North and West Africa. These areas, characterized by their geographical positioning and limited adaptive capacity, are highly vulnerable to climate security challenges. According to the Intergovernmental Panel on Climate Change (IPCC), North and West Africa are among the regions most vulnerable to climate change. By the end of the century, North Africa is expected to experience a 90 percent increase in the number of hot days. In West Africa, temperatures are projected to rise by 2 degrees Celsius under mid-emission scenarios and could

¹ Calmon, Daniela, Chantal Jacovetti, and Massa Koné. 2021. “Agrarian Climate Justice as a Progressive Alternative to Climate Security: Mali at the Intersection of Natural Resource Conflicts.” *Third World Quarterly* 42 (12): 2785–2803. doi:10.1080/01436597.2021.1965870.

² Daoudy, Marwa. 2021. “Rethinking the Climate–Conflict Nexus: A Human–Environmental–Climate Security Approach.” *Global Environmental Politics*, June, 1–22. https://doi.org/10.1162/glep_a_00609.

increase by up to 5 degrees Celsius in high-emission scenarios.³ Referred to as “climate change hotspots,” these regions experience extreme heat and rainfall variability, leading to water scarcity and desertification.⁴ Given their heavy reliance on agriculture, which is highly sensitive to climate conditions, communities face heightened livelihood, food, and economic insecurity as extreme weather events disrupt agricultural production.⁵ Compounding these challenges is the limited adaptive capacity of North and West African states, stemming from weak governance, political instability, and regional tensions.⁶ The strain on governmental capacity and infrastructure is further exacerbated by rapid population growth, which is projected to continue escalating.⁷ These factors contribute to forced migration and changes in mobility patterns, exacerbating social unrest, conflict, and violence. Therefore, it is crucial to recognize climate-related risks in North and West Africa as threats to both national and global security, given the potential trajectory from climate change to conflict. Consequently, the securitization of climate change involves integrating climate considerations into national security strategies, leveraging military capabilities in adaptation responses, and engaging in diplomatic efforts to address insecurity and migration.⁸

This study will examine the *climate-security nexus* in North and West Africa, focusing on the interplay between climate change and insecurity, as well as the local, state, and national responses to these challenges. To do so, this paper is structured as follows: the first section introduces the *climate-security nexus*, with a particular focus on its relevance in North and West Africa. The second section outlines the research questions and objectives that guided the study, along with a detailed description of the methods employed by the research team to investigate these themes. The third section offers an in-depth analysis of how the *climate-security nexus* in North and West Africa is portrayed in both academic and policy literature, highlighting the gaps between these two domains and examining where their discourse and priorities converge and diverge. Finally, the paper concludes by discussing the implications of the research team’s findings and suggests avenues for future research.

³ Intergovernmental Panel on Climate Change (IPCC). “Africa.” Chapter. In *Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, 1285–1456. Cambridge: Cambridge University Press, 2023. <https://doi.org/10.1017/9781009325844.011>.

⁴ Diffenbaugh, Noah S., and Filippo Giorgi. 2012. “Climate Change Hotspots in the CMIP5 Global Climate Model Ensemble.” *Climatic Change* 114 (3–4): 813–22. <https://doi.org/10.1007/s10584-012-0570-x>.

⁵ Benjamin Sultan. What are the future climate scenarios in North and West Africa? Migration in West and North Africa and Across the Mediterranean: trends, risks, development and governance. <https://publications.iom.int/system/files/pdf/ch25-what-are-the-future-climate-scenarios.pdf>

⁶ Friedrich ebert Stiftung, Peace and Security Centre of Competence Sub-Saharan Africa, norwegian Institute of International Affairs (nuPI), and Stockholm International Peace Research Institute (SIPRI). 2023. “Regional Perspectives on Addressing Climate-related Security Risks.” Edited by Kheira Tarif. <https://www.sipri.org/sites/default/files/2023-03/fes-reportclimate-a4-03.pdf>.

⁷ Walther, O. (2021), “Urbanisation and demography in North and West Africa, 1950-2020”, *West African Papers*, No. 33, OECD Publishing, Paris, <https://doi.org/10.1787/4fa52e9c-en>.

⁸ United Nations Development Program. *Mapping of Climate Security Adaptations at Community Level in the Horn of Africa. Uppsala*” Life and Peace Institute. 2023. https://www.undp.org/sites/g/files/zskgke326/files/2023-05/undp-africa-mapping-climate-security-adaptations_2023.pdf

Research Questions, Objectives, and Methodological Approach

Research Questions and Objectives

To evaluate how climate security in North and West Africa is approached in both academic and policy literature, this project focuses on the following research questions:

- How are issues of climate security in North and West Africa approached in both academic scholarship and relevant policy materials? Are there differences between these approaches?
- What theoretical explanations in academic literature elucidate the link between climate change and conflict? What mediating factors are identified and recognized?
- What mitigation measures regarding climate security do academics propose? Are these suggestions implemented by policymakers, or do they diverge?
- What are the climate security priorities established by the states in North and West Africa, and how do these priorities accord with or diverge from the priorities of Western states regarding climate security in these regions?
- How do the climate-related priorities set by international organizations influence the strategies and actions of state and local actors? In what ways do these priorities align or diverge?

To evaluate these questions, the research team conducted systematic literature reviews of relevant policy and academic publications – seeking to comprehensively identify, synthesize, and illuminate emerging trends within the empirical and policy literature concerning climate security in North and West Africa. An in-depth examination of the *climate-security nexus* in these regions holds significant value, offering an analysis of existing research to foster a comprehensive understanding of the current knowledge landscape. Moreover, this approach facilitates the recognition of gaps within both literature and policy domains, highlighting the contrasts between the two. This process will be instrumental in shaping future research trajectories and policy agendas.

While climate change is commonly described as amplifying existing threats, the specific threats it multiplies and the factors contributing to their amplification are subjects of intense debate and often unclearly defined in discussions regarding the security implications of climate change.⁹ Therefore, this thorough literature review aims to uncover how these threats are articulated in current literature. By advancing knowledge, informing practical applications, and steering future research endeavors, this method establishes a vital connection between climate change and issues of security.

Methodological Approach

To conduct a comprehensive review of relevant academic and policy literature on climate security in North and West Africa, the research team adopted a multi-faceted approach. The core of the extraction effort was based on Boolean searches to pinpoint relevant literature related to climate change. The key included Boolean terms were “Climate Security,” “Climate Conflict,” “Environmental Security,” “Sustainability,” “Resiliency,” and “Climate Change,” combined with geographic identifiers, first with “North Africa” then with “West Africa.” Using these phrases as a starting point, the team conducted searches in both academic and policy databases, with 2019-2024 as the key period of focus to ensure relevant, timely results.

⁹ Henkin, Samuel D. and Madeline Romm. 2023. *Climate Security, Great Power Competition, and Adversarial Geopolitics in Southeast Asia*. College Park, MD: START.

In addition to using the regional identification phrases (“North Africa”) and (“West Africa”), the research team focused their extraction efforts on the countries in these geographic regions, as defined by the Department of Defense (DoD).¹⁰ Under the DoD definitional scheme, *West Africa* includes Benin, Burkina Faso, Cape Verde, Côte D’Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo, while *North Africa* includes Algeria, Libya, Mauritania, Morocco, and Tunisia. The North African countries in question are frequently referred to as the Maghreb region.

Academic Literature Extraction

The *academic* extraction process was straightforward, with the team utilizing SocIndex with Full Text. Searches were conducted using the specific Boolean phrases in closed quotation marks, seeking exact matches to the language in question. To further ensure relevance of the results, searches were restricted to articles published from 2019 to mid-2024, while also including some earlier articles determined to be pertinent due to being mentioned in the 2019-2024 extractions. To streamline the search process, the academic extraction focused exclusively on English-language, peer-reviewed articles. The extracted literature articles were systematically organized using Zotero software, where the articles were categorized according to key themes. The count of raw results from SocIndex for each Boolean search term, combined with each of the relevant geographic modifiers, are summed together and included in the first column of Table 1, below.

Table 1: Search Term Results

Boolean Search Terms	Total Results (Count)		
	Academic Extraction: <i>SocIndex</i>	Policy Extraction:	
		<i>Policy Commons</i>	<i>Policy File Index</i>
Climate Security	77	944	16
Climate Conflict	68	598	16
Environmental Security	79	1,359	5
Sustainability	654	1,704	6
Resiliency	54	877	3
Climate Change	524	1,032	32

The research team manually evaluated each article for relevance, omitting any papers deemed unrelated to climate security, broadly conceived. For example, if articles addressed climate change in these regions solely as a scientific phenomenon without recognizing it as a security issue, they were

¹⁰ See “United States Africa Command.”. <https://www.africom.mil/military-presence> .

excluded from the scope of research. Extracted articles were included in a Zotero library, and subsequently categorized to facilitate analysis.

Policy Landscape Scan and Literature Extraction

For the *policy* literature extraction, the team pursued an approach complementary to the academic extraction, though differing in specifics and complexity. The research team explored the utility of various databases and sources, disregarding some routes deemed impractical due to lack of relevant results and/or logistical constraints. Ultimately, the policy literature extraction involved multiple avenues of investigation, reflecting the more variegated nature of the policy materials landscape. This included systematic searches of policy databases using the above-identified Boolean phrases and geographic identifiers as starting points, as well as looking for pertinent materials from sources including selected non-governmental organizations (NGOs), Intergovernmental Organizations (IGOs), and governmental agencies and ministries in the countries of interest.

To ensure greater comparability with the academic extraction efforts, the research team conducted similar searches in both the Policy Commons¹¹ and Policy File Index¹² databases, utilizing the Boolean phrases described above, though without requiring exact matches to the selected phrases to not overly restrict the pool of potential results. In addition to limiting results to English-language publications in the 2019-2024 period for both databases, more restrictive search parameters were also utilized in the Policy Commons extraction, to make the pool of potential results more manageable for manual review. This included limiting results exclusively to publications produced in or regarding the countries in the geographic regions of focus (North and West Africa, as defined by the DoD), as well as a number of additional limiting parameters.¹³ A similar extraction was conducted in the Policy File Index, though searches were not restricted to any geographic region, other than through the use of the geographic modifiers. The count of raw results in both policy databases for each Boolean search term, combined with each of the relevant geographic modifiers, are summed together and included in the second and third columns of Table 1, above.¹⁴

As with the academic extraction, the research team manually reviewed the results of both the Policy Commons and Policy File Index searches for relevance – extracting articles if they recognized climate security, broadly conceived, as a policy issue, and if they pertained to at least one country listed in the DoD’s definitions for North and West Africa. The extracted articles were organized using the software Zotero, allowing researchers to classify the literature based on prominent themes and research questions.

Additionally, the research team reviewed and analyzed the Nationally Determined Contributions (NDC)/Intended Nationally Determined Contributions (INDC) documents that all countries but one (Libya) in the scope of the geographic study submitted as part of their participation in the Paris

¹¹ <https://policycommons.net/>

¹² <https://about.proquest.com/en/products-services/policyfile/>

¹³ Specifically, the main Policy Commons searches were conducted in the “Global Think Tanks” and “World Governments” modules, with publication types limited to “Acts, Decisions, Instruments,” “Assessment,” “Brief,” “Forecast,” “Report,” or “Summary,” and publisher type limited to “Government,” “IGO,” “Research Center,” or “Think Tank.”

¹⁴ The Policy Extraction columns represent the counts of results for Policy Commons and Policy File Index. Duplicate results sometimes appeared both within and across searches, and total counts were not always static over the course of the extraction, which took place roughly from May to August 2024.

Agreements.¹⁵ These searches were complemented by issue and subject-specific examination of relevant documents from different sources, conducted to add context to the analysis presented below. Both the review of the NDC/INDC documents and the issue-specific searches included English- and French-language materials, due to the prevalence of French in the region.

While these extraction efforts do not provide a comprehensive picture of all climate-related policies adopted by North and West African states, they allowed a systematic exploration of relevant climate-related policy developments in the regions of interest. From these methods, we have identified climate priorities of states in North and West Africa, as well as potential influences from international priorities and gaps between these perspectives.

Discussion: The Climate-Security Nexus in North and West Africa

Climate change, once viewed primarily as an environmental and scientific issue, is now increasingly recognized as a significant national security threat by both scholars and political leaders.¹⁶ In this climate-security nexus framework, it is understood that climate change can worsen and compound existing vulnerabilities in various regions. In areas particularly affected by climate change, increased environmental stress can exacerbate human, economic, and political instability, leading to heightened societal vulnerabilities and a greater risk of conflict, violence, and instability. The challenge of addressing climate is further complicated by the simultaneous occurrence of multiple climate-related hazards and their interaction with non-climatic risks, such as political instability, economic difficulties, and social inequalities. This interplay of risks amplifies the overall threat, making it more difficult to manage and mitigate the impacts. Recognizing climate change as a national security issue compels security and defense sectors to integrate environmental factors into their strategies and planning, reshaping approaches to address this complex and growing threat.¹⁷

Academic Literature Findings

The purpose of this desk-based research on climate security in North and West Africa is to provide a comprehensive understanding of the scholarly literature on the topic and identify the priority issues highlighted in this literature regarding climate security in North and West African states. Following the methodological approach laid out above (2.2.1 Academic Literature Extraction), this academic literature review aims to analyze how different political and economic systems shape responses to environmental changes and the propensity for instability or conflict arising from climate change-related threats. By examining and synthesizing academic studies on climate security within these regions, the research team can understand how scholars discuss and produce empirical evidence on the link between climate change and conflict, incorporating mediating factors such as governance, economic development, and social dynamics. This approach enables us to uncover and understand the underlying factors that exacerbate conflicts.

¹⁵ All of the countries in the specified regions of focus submitted either NDC and/or INDC documents as part of the process specified in the Paris Agreement, except for Libya. See <https://unfccc.int/NDCREG> for relevant documents, as well as North and West African States, below.

¹⁶ Romm, Madeline. 2024. Climate Security, Great Power Competition, and Adversarial Geopolitics in Southeast Asia: Conceptualization of Climate Security in Southeast Asia. College Park, MD: START.

¹⁷ Henkin, Samuel D. and Madeline Romm. 2023. Climate Security, Great Power Competition, and Adversarial Geopolitics in Southeast Asia. College Park, MD: START.

Security Consequences of North and West Africa's Climate Vulnerabilities

Acting as a “threat multiplier,” climate change is more likely to lead to conflict in regions already grappling with fragility and instability.¹⁸ Specifically, the trajectory from climate change to conflict is shaped by a state’s vulnerability, encompassing exposure to climate change, reliance on agriculture, and resilience.

According to the IPCC, vulnerability is defined as “the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.”¹⁹ North and West African states face heightened susceptibility to climate impacts, exacerbating their vulnerabilities. As climate change consequences escalate in these regions, livelihoods are increasingly compromised, impacting food security, water availability, public health, and overall resource accessibility. These exacerbating factors contribute to heightened conflict vulnerability.

Regions heavily reliant on agriculture are particularly at risk from climate change’s environmental impacts. Given that African communities predominantly depend on agricultural outputs for sustenance, the projected intensification of climate change will render these livelihoods increasingly unsustainable. Severe and recurrent droughts, alongside shifts in precipitation patterns, adversely affect crop yields and productivity. Rising temperatures further compound these challenges, altering water availability and exacerbating existing water shortages in North and West African states. Consequently, reduced irrigation and diminished agricultural output force the region to explore alternative livelihood options.²⁰

The pre-existing vulnerability of North and West Africa, marked by political, economic, and social instability, underscores their limited resilience to climate change and its security implications. Inadequate governance structures and political volatility hinder effective adaptation strategies and response efforts. Climate impacts strain already stretched resources, exacerbating issues like corruption, economic fragility, and social unrest.²¹ This compounded instability diminishes the region’s ability to adapt, further lowering resilience and escalating conflict vulnerability, ultimately leading to cascading effects such as increased migration. Overall, the heavy reliance on agriculture for sustenance and employment, coupled with exposure to climate impacts, resource scarcity, and limited adaptive capacity, reinforces the pathway from climate change to conflict in North and West African states.

¹⁸ Romm, Madeline. 2022. “A Climate of Terror? Climate Change as an Indirect Contributor to Terrorism.” College Park, MD: START (May).

¹⁹ Parry, M. L. (Martin L.). *Climate Change 2007: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. pp. 869–883. Cambridge, U.K. ; Cambridge University Press, 2007.

²⁰ Borderon, Marion, Patrick Sakdapolrak, Raya Muttarak, Endale Kebede, Raffaella Pagogna, and Eva Sporer. “Migration Influenced by Environmental Change in Africa: A Systematic Review of Empirical Evidence.” *Demographic Research* 41 (2019): 491–544. <https://doi.org/10.4054/DemRes.2019.41.18>.

²¹ Van Baalen, Sebastian, and Malin Mobjörk. “Climate Change and Violent Conflict in East Africa: Integrating Qualitative and Quantitative Research to Probe the Mechanisms.” *International Studies Review* 20, no. 4 (2018): 547–75. <https://doi.org/10.1093/isr/vix043>; Yeboah, Daniel Kojo Leon Brenya, Christian Pilegaard Hansen, Abdulai Abubakari, and Adzo Dzigbodi Doko. “Manufacturing Scarcity: Understanding the Causes of Conflicts Between Farmers and Herders in Asante Akim North Municipality of Ghana.” *African Security* 16, no. 2–3 (2023): 176–98.

Livelihood Insecurity

The majority of academic research extracted can be broadly categorized into two main pathways linking climate change to conflict. The first highlights worsening livelihood conditions as a primary factor contributing to increasing conflict vulnerability and is the subject of this subsection. (The second, related to climate-related mobility and migration, is discussed below in 3.1.3.)

This pathway from climate-related livelihood insecurity to conflict was first identified by van Baalen and Mobjork²² in their study of the climate-security nexus in East Africa. They define livelihood insecurity in the context of climate security as occurring when regions experience climate shocks and variability that negatively impact their livelihoods. This issue is particularly significant in areas heavily dependent on natural resources. When climate shocks reduce water availability, grazing lands, livestock, and cropland, it threatens survival. These climate-related impacts, combined with factors such as a history of conflict, political instability, and resource mismanagement, lead to livelihood insecurity and, consequently, conflicts over remaining resources or migration.²³ The literature on livelihood insecurity in North and West Africa identified three interrelated factors that increase the likelihood of conflict, water and food insecurity and loss of employment.

Climate shocks have significantly impacted water and food security, particularly in vulnerable regions. Rising temperatures, changing precipitation patterns, extreme weather events, and soil degradation are damaging crops, reducing the availability of water for irrigation, and causing erosion and desertification, which lowers soil fertility and exacerbates food insecurity.²⁴ These events also deplete water supplies and cause salinization, contaminating freshwater resources.²⁵ Food and water insecurity are deeply interconnected: water scarcity disrupts food production due to its impact on irrigation; agricultural runoff contaminates water; and water scarcity drives up food prices. Consequently, food and water security must be considered together. As climate change intensifies, fragile regions like North and West Africa will face severe livelihood challenges as natural resources diminish.

Much of the water security literature on North and West Africa focuses on hydro-meteorological hazards,²⁶ such as droughts, and their impact on water security. North and West Africa have suffered extensively from droughts and continue to do so as climate change worsens. This has diminished the regions' availability of water and freshwater resources, fueling water-related conflict. For instance, Ide et al. (2021)²⁷ assess this relationship by exploring how drought conditions can lead to non-violent, small-scale conflict, such as protests and demonstrations. Supporting the notion that climate change and its related risks are threat multipliers, they argue that droughts, coupled with other factors like existing grievances, amplify the threat of conflict. They explore several mediating factors

²² van Baalen, Sebastian, and Malin Mobjörk. "Climate Change and Violent Conflict in East Africa: Integrating Qualitative and Quantitative Research to Probe the Mechanisms." *International Studies Review* 20, no. 4 (2018): 547–75. <https://doi.org/10.1093/isr/vix043>.

²³ Ibid.

²⁴ US EPA, OAR. 2022. "Climate Change Impacts on Agriculture and Food Supply." Overviews and Factsheets. October 19, 2022. <https://www.epa.gov/climateimpacts/climate-change-impacts-agriculture-and-food-supply>.

²⁵ Kluger, Jeffrey. 2024. "Three-Quarters of the Earth Has Gotten Permanently Drier." TIME. December 10, 2024. <https://time.com/7201214/three-quarters-of-the-earth-has-gotten-permanently-drier/>.

²⁶ Ide, Tobias, Miguel Rodriguez Lopez, Christiane Fröhlich, and Jürgen Scheffran. "Pathways to Water Conflict during Drought in the MENA Region." *Journal of Peace Research* 58, no. 3 (2021): 568–82. <https://doi.org/10.1177/0022343320910777>.

²⁷ Ibid.

that contribute to grievances, hypothesizing that autocratic regimes, highly populated areas, and water cuts used as a mitigation strategy, all facilitate nonviolent conflict.²⁸

Ide et al. (2021)²⁹ find that droughts can trigger conflicts by exacerbating existing grievances and perceived discrimination. Despite the potential for repression, affected groups might protest due to longstanding tensions with the state or severe impacts on their livelihoods. The likelihood of protests in autocratic regimes is influenced by widespread sharing of grievances, the availability of protestors, and their connections within civic networks. In the case of Guercif, Morocco, where communities rely heavily on agriculture for employment and livelihood, access to ground water is crucial for crop irrigation in dry climates. However, disparities in groundwater access across socioeconomic levels, combined with the government's inadequately response to these issues, intensifies tensions during droughts. This often results in protests over inadequate access to water and unequal distribution of resources.

Moreover, in societies with existing divisions, drought-related insecurity and poverty can lead to widespread grievances. Droughts can intensify these grievances, and in authoritarian regimes, the political systems make it difficult for the resentment to be articulated. Water cuts, as a rationing measure, can trigger perceived inequalities in water access, aggravate perceptions of state indifference towards vulnerable groups, and escalate livelihood insecurity.³⁰ For example, in El Chatt, Algeria – an agricultural village already experiencing tensions between Arabs and Berbers due to marginalization – the introduction of water cuts during a drought for about one month amplified these tensions, resulting in protests and riots.³¹ Ultimately, confronting water insecurity requires solutions that address underlying grievances.

Other studies emphasize the critical importance of addressing water security, though from a different perspective. They argue that because the impacts of climate change are difficult to control and mitigate, efforts must focus on ensuring sustainable water management. This includes initiatives such as promoting water recycling for agricultural use,³² as practiced in Tunisia, and desalinating seawater, as implemented in Algeria.³³

In the last decade, climate scholars have increasingly investigated the pathway from water insecurity to violent conflict. These studies have found that droughts influence armed conflict in less-developed areas, particularly in agriculturally dependent regions,³⁴ regions experiencing political

²⁸ Ibid.

²⁹ Ibid.

³⁰ Ibid.

³¹ Ibid.

³² Alade, Adebisi David. "Water Resources and Sub-Sahara African Economy: Anthropogenic Climate Change, Wastewater, and Sustainable Development in Nigeria." *Journal of Social Development in Africa* 34, no. 2 (2019): 113–38.

³³ Anzera, Giuseppe, Giovanna Gianturco, and Mariella Nocenzi. "Sustainability and Hydropolitics in MENA Region: The Case of Water Management in Urban Areas." *Sociologia e Ricerca Sociale*, no. 127 (2022): 99–118. <https://doi.org/10.3280/SR2022-127006>.

³⁴ von Uexkull, Nina, Mihai Croicu, Hanne Fjelde, and Halvard Buhaug. "Civil Conflict Sensitivity to Growing-Season Drought." *Proceedings of the National Academy of Sciences - PNAS* 113, no. 44 (2016): 12391–96. <https://doi.org/10.1073/pnas.1607542113>.

marginalization,³⁵ areas lacking road and water infrastructure,³⁶ among groups with relatively equal power,³⁷ and regions undergoing rapid or significant political changes.³⁸ However, most literature focuses on small-scale, nonviolent conflict, as there is a more robust relationship in these scenarios. While the connection between water insecurity and conflict has been well-documented, there is also growing recognition of how climate-induced food insecurity can exacerbate tensions and lead to conflict.

Like water security, climate security scholars have linked food insecurity to conflict, primarily through the mechanism of rising food prices. Climate change drives up food prices through increased water scarcity, which significantly impacts agricultural productivity. Rising temperature and changes in precipitation patterns lead to frequent droughts, reducing crop yields and causing crop failures. These conditions necessitate more expensive irrigation methods and increase operational costs for farmers. Additionally, water shortages affect livestock health and feed availability, causing supply chain disruptions, further driving food prices higher. Therefore, North and West African communities face heightened food and livelihood insecurity as natural resources diminish.

Food insecurity is on the rise globally, with Sub-Saharan Africa, including West Africa, disproportionately affected. Specifically, 55 percent of children in Niger and 20 percent in Senegal suffer from malnutrition, while Sierra Leone is particularly hard hit by food insecurity. This situation is expected to worsen as climate change progresses.³⁹ The region grapples with escalating food prices and unemployment, exacerbated by rapid population growth and vulnerability to climate change. Projections indicate that achieving the 2030 UN Sustainable Development Goal 2, the goal to end hunger by making food systems more resilient and sustainable, is overly ambitious, as droughts, floods, cyclones, and rising temperatures and sea levels pose significant challenges to mitigating food prices and price volatility. Changing climate patterns threaten agricultural productivity by reducing growing seasons and arable land. Additionally, ocean acidification and warming adversely affect ecosystems, diminishing fish, meat, and dairy availability. In West Africa, fish production is expected to decline by 21 percent by 2050, leading to a corresponding halving of jobs in the fisheries sector. The region's heavy reliance on agriculture, coupled with inadequate irrigation, drainage, storage facilities, and transport infrastructure, compounds food insecurity issues. These factors not only impact nutrition but also hinder individual and national economic development efforts.⁴⁰

Rising food prices, often exacerbated by climatic shocks, have increasingly been linked to conflict, sparking significant protests across regions in Africa. Events like the Arab Spring in the Middle East and North Africa, as well as drought-related crises in sub-Saharan Africa, have been associated with

³⁵ Ide, Tobias. "Why Do Conflicts over Scarce Renewable Resources Turn Violent? A Qualitative Comparative Analysis." *Global Environmental Change* 33 (2015): 61–70. <https://doi.org/10.1016/j.gloenvcha.2015.04.008>; von Uexkull, Nina, Mihai Croicu, Hanne Fjelde, and Halvard Buhaug. "Civil Conflict Sensitivity to Growing-Season Drought." *Proceedings of the National Academy of Sciences - PNAS* 113, no. 44 (2016): 12391–96. <https://doi.org/10.1073/pnas.1607542113>.

³⁶ Detges, Adrien. "Local Conditions of Drought-Related Violence in Sub-Saharan Africa: The Role of Road and Water Infrastructures." *Journal of Peace Research* 53, no. 5 (2016): 696–710. <https://doi.org/10.1177/0022343316651922>.

³⁷ Ide, Tobias. "Why Do Conflicts over Scarce Renewable Resources Turn Violent? A Qualitative Comparative Analysis." *Global Environmental Change* 33 (2015): 61–70. <https://doi.org/10.1016/j.gloenvcha.2015.04.008>

³⁸Ibid.

³⁹ Ujunwa, Augustine, Chinwe Okoyeuzu, and Ebere Ume Kalu. "Armed Conflict and Food Security in West Africa: Socioeconomic Perspective." *International Journal of Social Economics* 46, no. 2 (2019): 182–98. <https://doi.org/10.1108/IJSE-11-2017-0538>.

⁴⁰ "Climate Change and Food Security in Sub-Saharan Africa." *Population and Development Review* 48, no. 4 (2022): 1217–20. <https://doi.org/10.1111/padr.12528>.

spikes in global food prices.⁴¹ These price surges are often driven by climate change, which disrupts agricultural production, reduces crop yields, and intensifies food insecurity.⁴² Rezaeedyakenari et al. (2020)⁴³ examine the impact of food insecurity on interactions between civilians and rebel groups, asserting that price volatility makes joining insurgent groups more appealing and affects how civilians are treated. Rebel groups depend on food for their sustenance, leading them to resort to violence to secure remaining food supplies. This creates incentives for civilians to join rebel or criminal groups for access to food, money, and security. The study finds that food insecurity increases the likelihood of insurgents committing violence against civilians, with regions rich in agricultural land, notably clustered in West Africa, particularly vulnerable to civilian victimization during periods of high food insecurity.⁴⁴ These findings underscore the importance of recognizing climate change consequences, such as food insecurity, as a national security threat, where spikes in food prices incentivize non-state actors to resort to violence. Other studies echo similar concerns, noting that climate change, social injustices, land rights, food insecurity, extremism, and weak governance are all risk factors for armed conflict.⁴⁵ Moreover, there exists a cyclical relationship where armed conflict in West Africa can contribute to worsening food insecurity and environmental degradation.⁴⁶

As a result of climate shocks and variabilities, communities in North and West Africa are increasingly dealing employment insecurity. Individuals, especially fishermen, are losing their jobs or sources of income, which is directly impacting their livelihoods. North and West African states are experiencing significant challenges to small-scale coastal fisheries due to a combination of socioeconomic and climate change stressors, which are negatively affecting fish stocks. Poor management systems, over-exploitation of fisheries, inadequate infrastructure, and poverty are exacerbated by rising temperatures, weather events, sea-level rise, and ocean acidification. Together, these factors are having a detrimental impact on fisheries in these developing nations.⁴⁷ Senegalese fishing communities are increasingly facing livelihood deterioration due to the exacerbation of existing vulnerabilities by climate change. The direct impact on the fishing sector is evident, with approximately 40 percent of the ocean affected by pollution, resulting in a significant decline in

⁴¹ Rezaeedyakenari, Babak, Steven T Landis, and Cameron G Thies. "Food Price Volatilities and Civilian Victimization in Africa." *Conflict Management and Peace Science* 37, no. 2 (2020): 193–214.

<https://doi.org/10.1177/0738894217729527>.

⁴² Field, Christopher B., and Vicente R. Barros, eds. *Climate Change 2014 : Impacts, Adaptation, and Vulnerability : Working Group II Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. New York: Cambridge University Press, 2014. <https://www.ipcc.ch/report/ar5/wg2/>

⁴³ It is crucial to highlight that this study covered all of Africa, and it was included in our research because it encompassed the specific countries under investigation.

⁴⁴ Rezaeedyakenari, Babak, Steven T Landis, and Cameron G Thies. "Food Price Volatilities and Civilian Victimization in Africa." *Conflict Management and Peace Science* 37, no. 2 (2020): 193–214.

<https://doi.org/10.1177/0738894217729527>.

⁴⁵ Pinstруп-Andersen, Per, and Satoru Shimokawa. 2008. "Do Poverty and Poor Health and Nutrition Increase the Risk of Armed Conflict Onset?" *Food Policy* 33 (6): 513–20. <https://doi.org/10.1016/j.foodpol.2008.05.003>.

⁴⁶ Ujunwa, Augustine, Chinwe Okoyezu, and Ebere Ume Kalu. "Armed Conflict and Food Security in West Africa: Socioeconomic Perspective." *International Journal of Social Economics* 46, no. 2 (2019): 182–98.

<https://doi.org/10.1108/IJSE-11-2017-0538>.

⁴⁷ Freduah, George, Pedro Fidelman, and Timothy F Smith. "Adaptive Capacity of Small-scale Coastal Fishers to Climate and Non-climate Stressors in the Western Region of Ghana." *The Geographical Journal* 185, no. 1 (2019): 96–110. <https://doi.org/10.1111/geoj.12282>.

fisheries, coastal homes, and livelihood activities.⁴⁸ These effects are particularly pronounced in West African states like Senegal, which rely heavily on natural resources such as fishing for survival. Aggravating these threats are elite groups and governmental organizations exploiting marine resources, aware of their abundance.

Environmental degradation, leading to livelihood insecurity and employment loss, does not occur in isolation. Economic and social factors compound these vulnerabilities, further driving economic instability. From a postcolonial perspective, Jonsson (2019)⁴⁹ examines the intersection between capitalism and livelihood insecurity in Senegalese fishing communities. He highlights how climate impacts and a neoliberal economy interact, making West Africa increasingly vulnerable. Specifically, he explores the relationship between overfishing, climate impacts, livelihood insecurity, and forced migration and displacement. Jonsson (2019)⁵⁰ argues that climate change and local human impacts cannot be understood separately from capitalism and the neoliberal economy. These factors influence each other, with economic interests negatively affecting vulnerable populations, weak states, and the environment.⁵¹

Another compounding factor is gender inequality. Certain academics argue that climate change is not gender neutral, as women disproportionately suffer due to their roles in patriarchal societies. This is especially evident in West African countries, where women typically lack access to resources such as the economic opportunities that men possess, increasing their reliance on natural resources. In West Africa, women primarily manage agriculture, while men own land. As a result, women are more vulnerable to climate impacts due to their dependence on agriculture, as climate shocks and variability deplete their resources. Men, however, are less affected because their employment is not solely climate dependent.⁵² This situation contributes to women disproportionately suffering from food and livelihood insecurity. When their crops no longer provide sufficient sustenance, women are often responsible for distributing the remaining resources within the household. Consequently, women are more likely to suffer from diseases such as malaria, schistosomiasis, sleeping sickness, and intestinal parasites. Additionally, they are particularly vulnerable to HIV due to their diminished ability to fight infections.⁵³ These factors limit women's capacity to adapt to climate change, as cultural, health, and socioeconomic constraints confine them to their homes, making them bear the brunt of climate change while men have the freedom to mobilize. This is evidence of climate change exacerbating political, economic, and social marginalization of women.

Development policies to mitigate climate change are often based on Western concepts of sustainable development, exacerbating socioeconomic vulnerability, inequality, climate shocks, civil

⁴⁸ United Nations Development Programme. (2018). Goal 14: Life below water. Retrieved from <http://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-14-lifebelow-water.html>

⁴⁹ Jönsson, Jessica H. "Overfishing, Social Problems, and Ecosocial Sustainability in Senegalese Fishing Communities." *Journal of Community Practice* 27, no. 3–4 (2019): 213–30. <https://doi.org/10.1080/10705422.2019.1660290>.

⁵⁰ Ibid.

⁵¹ Parr, Adrian. *The Wrath of Capital: Neoliberalism and Climate Change Politics*. New York: Columbia University Press, 2013.

⁵² Phiri, Austin T, Howele M.A.C Toure, Oliver Kipkogei, Rokiatou Traore, Pamela M.K Afokpe, and Alemayehu Abebe Lamore. "A Review of Gender Inclusivity in Agriculture and Natural Resources Management under the Changing Climate in Sub-Saharan Africa." *Cogent Social Sciences* 8, no. 1 (2022). <https://doi.org/10.1080/23311886.2021.2024674>.

⁵³ Austin, Kelly F, Mark D Noble, and Virginia Kuulei Berndt. "Drying Climates and Gendered Suffering: Links Between Drought, Food Insecurity, and Women's HIV in Less-Developed Countries." *Social Indicators Research* 154, no. 1 (2021): 313–34. <https://doi.org/10.1007/s11205-020-02562-x>.

and communal conflict, forced migration, and local insecurity. Climate goals set by international organizations such as the UN, dominated by the Western powers, have marginalized groups – causing grievances against national governments, international organizations, and elites, as well as amplifying poverty due to employment restrictions tied to climate adaptation goals.⁵⁴ West Africa is already struggling with local violence and ethnic conflicts.⁵⁵ Moreover, corruption at both local and federal levels, evidenced by agreements between African states and the EU, has led to the exploitation of natural resources. These agreements have impacted local fishing communities, driving them out of employment and forcing them to migrate in search of opportunities. European fishing operations in West African waters overpower local Senegalese fishermen, as their vessels can catch two to three times more fish than sustainable catch levels, leading to loss of income and employment for locals and exacerbating overfishing and the depletion of fish stocks. Coupled with the impact of climate change on food security on land, Senegalese communities are experiencing significant livelihood loss.⁵⁶

This has widened the gap of inequality, with the West capitalizing on African resources while local communities are forced from their homes as their livelihoods become untenable. As inequality grows, the region has seen an increase in social discord, armed conflict, poverty, disease, and migration, further weakening the state. With the Senegalese government unable or unwilling to respond to these vulnerabilities, worsening livelihood conditions due to job loss are becoming increasingly severe in the region. Successful fishing trips in local waters have become difficult forcing the community to travel farther afield. Locals state that they “have to work much harder now to get fish, to make a living” (p. 221).⁵⁷ As a result, young people are forced to migrate in search of employment opportunities, whereas previous generations were relatively immobile. Many of these migrants often become illegal in their destination countries, making this adaptation method dangerous. Those who do not or cannot migrate have resorted to alternative means to achieve livelihood stability.⁵⁸

Furthermore, scholars emphasize the significant impact of maladaptation in the region by locals. Freduah et al. (2018)⁵⁹ investigate the adaptive strategies implemented by fishers in Ghana to address the impacts of climate change on small-scale fisheries. They found that various measures aimed at mitigating coastal erosion, declining catches, fuel scarcity and high costs, among others, have led to maladaptation in the region. For instance, some fishers built defensive walls using household refuse to combat coastal erosion. However, waves washed these walls away, scattering the refuse, causing pollution.⁶⁰ To address declining fish stocks, fishers resorted to traveling farther and staying longer at sea or utilizing advanced technologies, but these strategies proved unfeasible

⁵⁴ Sarr, Fatou, and Andrew Stafford. “Changes in Social Policy and the Social Services in Senegal.” In *Globalisation, Global Justice and Social Work*, 1st ed., 54–65. Routledge, 2005. <https://doi.org/10.4324/9780203358238-6>.

⁵⁵ Kamali, Masoud. *War, Violence and Social Justice : Theories for Social Work*. 1st ed. London ; Routledge, 2016. <https://doi.org/10.4324/9781315547671>.

⁵⁶ Jönsson, Jessica H. “Overfishing, Social Problems, and Ecosocial Sustainability in Senegalese Fishing Communities.” *Journal of Community Practice* 27, no. 3–4 (2019): 213–30. <https://doi.org/10.1080/10705422.2019.1660290>.

⁵⁷ Jönsson, Jessica H. “Overfishing, Social Problems, and Ecosocial Sustainability in Senegalese Fishing Communities.” *Journal of Community Practice* 27, no. 3–4 (2019): 213–30. <https://doi.org/10.1080/10705422.2019.1660290>.

⁵⁸ Ibid.

⁵⁹ Freduah, George, Pedro Fidelman, and Timothy F Smith. “Adaptive Capacity of Small-scale Coastal Fishers to Climate and Non-climate Stressors in the Western Region of Ghana.” *The Geographical Journal* 185, no. 1 (2019): 96–110. <https://doi.org/10.1111/geoj.12282>.

⁶⁰ Ibid.

due to the high costs involved. With fuel becoming increasingly scarce and expensive, many fishers turned to smuggling fuel as an adaptation strategy to address livelihood insecurity. Despite confronting the government with their grievances and requesting aid, the government's focus remained on tackling smuggling rather than addressing the root issues faced by the fishers. The authors found that adaptive responses of Ghana's small-scale fisheries are driven by immediate needs rather than strategic planning, and the interdependence of different types of capital (e.g., financial, human, social) can hinder their adaptive capacity, with many of their current strategies resulting in maladaptive outcomes.⁶¹

Rather than implementing coping strategies that are reactive, adaptive strategies need to focus on long-term responses to stressors within fishing communities. This principle of prioritizing sustainable, long-term solutions can be applied to agricultural practices. Similarly, other research finds that to cope with income losses caused by rainfall shocks, farmers often sell their livestock during periods of heavy rain. While this may appear to be an effective adaptation strategy, it does not substantially alter overall income. In times of little rain, livestock sales decrease, effectively balancing out the increased sales during heavy rain, resulting in a net zero effect on sales. For instance, during the 2004 drought in northern Burkina Faso, farmers increased their livestock sales to cope, but the revenue was primarily used for food rather than supplementing their income. This demonstrates that although households increase livestock sales to mitigate the economic impact of droughts, the earnings are insufficient to meet basic needs.⁶² This serves as another example of climate adaptation strategies that fall short in effectively addressing climate change.

Livelihood insecurity, leading to food and water insecurity and loss of employment, is often a driving factor of migration into resource rich areas and those with economic opportunities.⁶³ Migration is recognized as a crucial adaptation strategy for maintaining livelihood security in response to climate change.⁶⁴ Additionally, there is a cyclical relationship where food and water scarcity and job loss drive migration and changes in mobility patterns, which in turn further influence resource insecurity and employment loss. As water and food scarcity are likely to increase in these regions, so too will conflict.⁶⁵ To better understand these related pathways, it is essential to explore the relationship between climate-induced mobility and conflict, along with the various mediating factors that exacerbate this relationship.

Climate Mobility

The remainder of the academic literature extracted focuses on the rising trends in migration and mobility patterns, particularly highlighting shifts in mobility among pastoralists. However, this area of study is still relatively new, and the long-term effects of environmentally induced migration remain

⁶¹ Ibid.

⁶² Lange, Simon, and Malte Reimers. "Livestock as a Buffer Stock in Poorly Integrated Markets." *Economic Development and Cultural Change* 69, no. 2 (2021): 727–64. <https://doi.org/10.1086/703081>.

⁶³ Owusu, Victor, and Edo Andriess. "Local Differentiation and Adaptation to Climate Change In Coastal Ghana." *Geographical Review* 113, no. 3 (2023): 337–58. <https://doi.org/10.1080/00167428.2021.2023530>.

⁶⁴ O'Brien, Geoff, Phill O'Keefe, Hubert Meena, Joanne Rose, and Leanne Wilson. "Climate Adaptation from a Poverty Perspective." *Climate Policy* 8, no. 2 (2008): 194–201. <https://doi.org/10.3763/cpol.2007.0430>.

⁶⁵ Alade, Adebisi David. "Water Resources and Sub-Sahara African Economy: Anthropogenic Climate Change, Wastewater, and Sustainable Development in Nigeria." *Journal of Social Development in Africa* 34, no. 2 (2019): 113–38.

largely unexplored. Initially noted by van Baalen and Mobjork (2018),⁶⁶ another primary mechanism linking climate change to conflict involves migration and evolving mobility patterns, partly driven by growing livelihood insecurity. Migration is often viewed in climate security literature as an adaptive response to livelihood insecurity resulting from climate impacts. As resource scarcity intensifies, communities, especially those heavily reliant on resources like those in North and West Africa, may be drawn to areas with less pronounced resource scarcity. Additionally, the host regions may offer employment opportunities, as job losses caused by climate change occur in their own communities. Changes in mobility patterns significantly contribute to increased conflict vulnerability, particularly when migrants, such as livestock herders, are compelled to alter their movements due to diminishing water and grazing lands.⁶⁷ Climate-induced migration and the resultant shifts in mobility patterns can pave the way for conflicts to emerge.

Previous studies have identified four mechanisms that reinforce the link between migration and conflict. Firstly, competition over resources arises when migrants strain the existing natural resource supply in host regions, leading to conflicts over these dwindling resources. This strain is evident in rural-to-urban migration scenarios, where overcrowding exacerbates resource scarcity. This issue becomes particularly pronounced when migration occurs into less developed or climate-affected regions.⁶⁸ Secondly, encounters between diverse ethnic or social groups due to migration, especially amidst concurrent resource competition from climate change, elevate the likelihood of disputes and social tensions, especially if the host region is grappling with livelihood insecurity.⁶⁹ Similarly, when different social and ethnic groups vie for resources, feelings of distrust may emerge, particularly if there's a perception that migrants are encroaching on employment opportunities, straining infrastructure, depleting resources, and challenging community identity.⁷⁰ Lastly, interactions between diverse communities, such as rural and urban populations or various socioeconomic groups, may breed discrimination, social exclusion, and potential conflict and violence.⁷¹ These four factors, coupled with other conflict vulnerability mediating factors, heighten the risk of conflict.

In the examined literature, discussions on migration and mobility patterns predominantly highlight pastoral mobility as a significant risk factor for conflict. The interaction of pastoralists with diverse groups has led to a notable escalation in conflict and violence within these regions.

Climate Mobility vs. Climate Migration

Research on movement related to environmental factors in Africa largely focuses on mobility rather than migration. Previous migration literature established a migrant vs. non-migrant dichotomy,

⁶⁶ van Baalen, Sebastian, and Malin Mobjörk. "Climate Change and Violent Conflict in East Africa: Integrating Qualitative and Quantitative Research to Probe the Mechanisms." *International Studies Review* 20, no. 4 (2018): 547–75. <https://doi.org/10.1093/isr/vix043>.

⁶⁷ Ibid.

⁶⁸ Reuveny, Rafael. "Climate Change-Induced Migration and Violent Conflict." *Political Geography* 26, no. 6 (2007): 656–73. <https://doi.org/10.1016/j.polgeo.2007.05.001>.

⁶⁹ Tarif, Kheira, Malin Mobjörk, and Florian Krampe. *Pathways of Climate Insecurity: Guidance for Policymakers*, November 2020. https://www.sipri.org/sites/default/files/2020-11/pb_2011_pathways_2.pdf.

⁷⁰ Reuveny, Rafael. "Climate Change-Induced Migration and Violent Conflict." *Political Geography* 26, no. 6 (2007): 656–73. <https://doi.org/10.1016/j.polgeo.2007.05.001>.

⁷¹ Lau, Dora C, and J. Keith Murnighan. "Demographic Diversity and Faultlines: The Compositional Dynamics of Organizational Groups." *The Academy of Management Review* 23, no. 2 (1998): 325–40. <https://doi.org/10.2307/259377>. <https://doi.org/10.2307/259377>; Reuveny, Rafael. "Climate Change-Induced Migration and Violent Conflict." *Political Geography* 26, no. 6 (2007): 656–73. <https://doi.org/10.1016/j.polgeo.2007.05.001>.

overlooking the fact that non-migrants can still be mobile actors. This emerging perspective on migration and mobility moves away from rigid definitions, recognizing that traditionally defined non-migrants are not entirely static, as they may engage in localized or short-term forms of movement. Thus, the distinction becomes less about absolute movement and more about the nature, scale, and intent of mobility or immobility.⁷² Zickgraf (2022)⁷³ highlights this mobility perspective, applying it to Senegalese coastal fishing populations facing increasing livelihood insecurity due to flooding. Northern Senegal is experiencing coastal erosion, sea-level rise, flooding, soil salinization, and storm surges, creating significant challenges for those working in the Senegalese fishing industry.⁷⁴ Given their dependence on artisanal fishing and the amplification of environmental impacts on the ocean and rivers, coupled with population increases, these communities are extremely vulnerable. As a result, the community engages in micro-mobilities, where people are displaced due to flooding or move for economic reasons. These micro-mobilities are characterized by everyday movement as the community adapts to and reacts to environmental changes. This approach focuses on the interplay between movement (mobilities), lack of movement (immobilities), and the factors that anchor people in place (moorings), rather than solely on climate migrations.⁷⁵

After interviewing Guet Ndarians in Senegal, Zickgraf (2022)⁷⁶ found that despite climate impacts that have reduced fish stock and biodiversity and eroded the shoreline, older generations prefer to remain in Guet Ndar. This preference is attributed to strong community, cultural, and land bonds that go back generations. Women are more likely to stay immobile due to their primary duties of motherhood, household responsibilities, and active role in the local fishing markets. Those who become mobile often look to Mauritania, which borders Senegal and has abundant fish. Mauritians often lack the fishing expertise of Guet Ndarians, leading to employment opportunities for Senegalese fishers in their markets. This international labor mobility allows the community to send remittances back home while continuing to fish. Research indicates that these patterns of small-scale mobility are primarily associated with poverty and rapid environmental changes in their home regions.⁷⁷ This mobility also facilitates immobility, allowing members to remain at home and encouraging micro-mobilities, such as traveling just to the border in response to coastal erosion and overpopulation.⁷⁸

While these patterns of mobility reflect a community's adaptation to environmental changes, they also underscore the broader issue of gender inequality in the face of climate change. Women often bear the brunt of climate changes' consequences due to its disproportionate impact on their health and livelihood. Their extensive responsibilities, coupled with societal constraints, leave them particularly vulnerable. In many West African countries, where patriarchal norms dominate, women

⁷² Zickgraf, Caroline. "Relational (Im)Mobilities: A Case Study of Senegalese Coastal Fishing Populations." *Journal of Ethnic and Migration Studies* 48, no. 14 (2022): 3450–67. <https://doi.org/10.1080/1369183X.2022.2066263>.

⁷³ Ibid.

⁷⁴ Salem, M.-C. C. 2013. "L'aménagement Du Littoral: Un Enjeu Crucial Pour Les Pêcheries Artisanales." *Artisans de La Mer: Une Histoire de La Pêche Maritime Sénégalaise*, 136–45.

⁷⁵ Zickgraf, Caroline. "Relational (Im)Mobilities: A Case Study of Senegalese Coastal Fishing Populations." *Journal of Ethnic and Migration Studies* 48, no. 14 (2022): 3450–67. <https://doi.org/10.1080/1369183X.2022.2066263>.

⁷⁶ Ibid.

⁷⁷ Owusu, Victor, and Edo Andriessse. "LOCAL DIFFERENTIATION AND ADAPTATION TO CLIMATE CHANGE IN COASTAL GHANA." *Geographical Review* 113, no. 3 (2023): 337–58. <https://doi.org/10.1080/00167428.2021.2023530>.

⁷⁸ Zickgraf, Caroline. "Relational (Im)Mobilities: A Case Study of Senegalese Coastal Fishing Populations." *Journal of Ethnic and Migration Studies* 48, no. 14 (2022): 3450–67. <https://doi.org/10.1080/1369183X.2022.2066263>.

are primarily tasked with household chores and caring for children, the sick, and the elderly.⁷⁹ During extreme weather events, they are expected to prioritize the well-being of others, limiting their ability to respond effectively to climate impacts.⁸⁰ Moreover, women are disproportionately affected by diseases such as malaria, schistosomiasis, sleeping sickness, and intestinal parasites, and they are particularly vulnerable to HIV due to reduced immunity.⁸¹ These health burdens, combined with cultural and socioeconomic constraints, further restrict their capacity to adapt to climate change. Confined to their homes, women face greater risks while men often have the freedom to mobilize and seek opportunities elsewhere. This dynamic highlights how climate change exacerbates the political, economic, and social marginalization of women, reinforcing existing inequalities.

In addition to the gendered impacts of climate change, there are other complex consequences of climate mobility in the region. For instance, micro-mobilities have sometimes resulted in criminal activity. Although there is an agreement between Mauritania and Senegal to grant 400 licenses to Senegalese artisanal vessels each year, high demand and overcrowding have made these licenses difficult to obtain.⁸² Mauritania has even revoked or failed to renew the agreement.⁸³ Despite the absence of the agreement, Senegalese fishermen still need to be mobile to adapt to livelihood insecurity. As a result, fishermen often cross the Mauritanian border and bring back fish illegally. There have been reports of racism, abuse, and corruption among Mauritanian coast guards, even among legal fishermen. Illegal fishermen have reported beatings, jail time, fines, and confiscation of supplies and materials. This situation is likely to escalate if climate impacts worsen and licenses become more difficult to obtain, especially given the history of conflict between the two regions.⁸⁴

Overall, the mobility perspective breaks down the dichotomy between mobility and migration, offering a more accurate representation of environmental displacement and patterns following climate shocks. Traditionally, academic literature on climate migration has focused on short-term impacts. However, a recent publication by Thiefe et al. (2022)⁸⁵ explores the long-term impacts of climate shocks and precipitation on migratory patterns. The authors introduce the concept of childhood origin margins, arguing that climate conditions during childhood can affect future migration. They find that increased rainfall in early life influences lifetime migration in West Africa, with exposure to hot and wet conditions leading to 10-12 percentage-point increase change in

⁷⁹Phiri, Austin T, Howele M.A.C Toure, Oliver Kipkogei, Rokiadou Traore, Pamela M.K Afokpe, and Alemayehu Abebe Lamore. "A Review of Gender Inclusivity in Agriculture and Natural Resources Management under the Changing Climate in Sub-Saharan Africa." *Cogent Social Sciences* 8, no. 1 (2022). <https://doi.org/10.1080/23311886.2021.2024674>.

⁸⁰ Wong, Sam. "Can Climate Finance Contribute to Gender Equity in Developing Countries?" *Journal of International Development* 28, no. 3 (2016): 428–44. <https://doi.org/10.1002/jid.3212>; Brody, Alyson, Justina Demetriades, Emily Esplen, BRIDGE (Organization), and Great Britain Department for International Development. 2008. *Gender and Climate Change : Mapping the Linkages, a Scoping Study on Knowledge and Gaps*. Brighton, UK: BRIDGE, Institute of Development Studies, University of Sussex. http://www.bridge.ids.ac.uk/reports/Climate_Change_DFID.pdf.

⁸¹ Austin, Kelly F, Mark D Noble, and Virginia Kuulei Berndt. "Drying Climates and Gendered Suffering: Links Between Drought, Food Insecurity, and Women's HIV in Less-Developed Countries." *Social Indicators Research* 154, no. 1 (2021): 313–34. <https://doi.org/10.1007/s11205-020-02562-x>.

⁸² Zickgraf, Caroline. "Relational (Im)Mobilities: A Case Study of Senegalese Coastal Fishing Populations." *Journal of Ethnic and Migration Studies* 48, no. 14 (2022): 3450–67. <https://doi.org/10.1080/1369183X.2022.2066263>.

⁸³ Zickgraf, Caroline. "Keeping People in Place: Political Factors of (Im)Mobility and Climate Change." *Social Sciences (Basel)* 8, no. 8 (2019): 228-. <https://doi.org/10.3390/socsci8080228>.

⁸⁴ Zickgraf, Caroline. "Relational (Im)Mobilities: A Case Study of Senegalese Coastal Fishing Populations." *Journal of Ethnic and Migration Studies* 48, no. 14 (2022): 3450–67. <https://doi.org/10.1080/1369183X.2022.2066263>.

⁸⁵Thiede, Brian C, Heather Randell, and Clark Gray. "The Childhood Origins of Climate-Induced Mobility and Immobility." *Population and Development Review* 48, no. 3 (2022): 767–93. <https://doi.org/10.1111/padr.12482>.

lifetime migration probabilities. In this region, agricultural dependence compounds the connection between early-life impacts and later migration. These findings suggest that climate shocks have long-term and indirect impacts on migration patterns, which may not be immediately detectable but manifest over extended periods.⁸⁶ While Thiefe et al.'s. (2022) paper introduces a novel approach to climate-migration research, most existing literature focuses on short-term changes in mobility patterns, particularly regarding pastoral mobility.

Mobility Patterns and Pastoralist-Farmer Conflicts

Conflict between pastoral and farmer communities is becoming increasingly prevalent in African regions as climate shocks exacerbate livelihood insecurity among agrarian communities. Historically these communities have coexisted, with local leaders mitigating tensions.⁸⁷ However, as climate change affects the availability and productivity of essential resources, tensions between farmers and pastoralists have escalated. Pastoralists have long used mobility as an adaptation strategy to cope with climate conditions; however, climate change has altered their traditional patterns and grazing routes.⁸⁸ These groups now compete more intensely over resources like land and water, which are vital for both farming and grazing. The increased competition for these resources, necessary for their livelihoods, has fueled conflicts. Additionally, identity crises and societal fault lines contribute to the tension.⁸⁹

Resource Competition

The pathway from climate change to conflict is significantly influenced by migration and mobility patterns, primarily due to resource competition. Climate impacts force agrarian communities in North and West Africa to alter their traditional migration routes. Severe droughts and rising temperature degrade land and reduce water availability, pushing pastoralists to migrate in search of resources, which heightens conflict with host communities. Pastoralism and crop agriculture overlap, increasing the risk of conflict arising from competing claims to the same land and resources.⁹⁰ In a paper by Bukari et al. (2020),⁹¹ a herder residing in Gushiegu articulated:

As pastoralists, we tend to be sensitive to changes in the environment because our activities - [and our] livestock - depend on the availability of resources [water and pasture], which are negatively affected by climate change. When these resources are not available, we need to migrate to places where they are available and that tends to put us in competition with farmers and others for resources (p. 15).⁹²

⁸⁶ Ibid.

⁸⁷Ugwueze, Michael I, J. Tochukwu Omenma, and Felicia O Okwueze. "Land-Related Conflicts and the Nature of Government Responses in Africa: The Case of Farmer-Herder Crises in Nigeria." *Society (New Brunswick)* 59, no. 3 (2022): 240–53. <https://doi.org/10.1007/s12115-022-00685-0>.

⁸⁸ Tinsley, Jonathan H.I, and Lovemore C Gwiriri. "Understanding the Representation of Pastoralism in Livestock-Related Climate Adaptation Policies in Ghana and Nigeria: A Review of Key Policy Documents." *Nomadic Peoples* 26, no. 1 (2022): 83–105. <https://doi.org/10.3197/np.2022.260105>.

⁸⁹ Otu, Bernard Okoampah, and Kojo Impraim. "Aberration of Farmer - Pastoralist Conflicts in Ghana." *Peace Review (Palo Alto, Calif.)* 33, no. 3 (2021): 412–19. <https://doi.org/10.1080/10402659.2021.1953813>.

⁹⁰ Brottem, Leif V. "Pastoral Resource Conflict in the Context of Sudano-Sahelian Security Crises: A Critical Review of Research." *African Security* 13, no. 4 (2020): 380–402. <https://doi.org/10.1080/19392206.2020.1871291>.

⁹¹ Bukari, Kaderi Noagah, Shaibu Bukari, Papa Sow, and Jürgen Scheffran. "Diversity and Multiple Drivers of Pastoral Fulani Migration to Ghana." *Nomadic Peoples* 24, no. 1 (2020): 4–31. <https://doi.org/10.3197/np.2020.240102>.

⁹²Ibid.

Additionally, population growth, driven by climate-induced migration, further strains resources, often referred to as environmental scarcity or absolute scarcity. As more pastoralists deplete natural resources, farmers are forced to expand or defend their agricultural land, leading to conflicts. Climate change has affected annual rainfall and increased droughts in the region, therefore depleting water sources and reducing pasture productivity. This scarcity intensifies conflicts over resources,⁹³ as herders must alter their grazing routes in the short term and adjust their adaptation strategies in the long term.⁹⁴ For instance, Ghana and Nigeria have witnessed violent clashes between farmers and pastoralists due to increased competition for land resources.⁹⁵

As natural resources become scarce and herders migrate to wetter areas seeking sustenance for their animals, their livestock often feed on and destroy farmers' crops. In response, farmers retaliate with violence as their livelihoods are threatened. These cycles of revenge are fueled by both human and natural consequences of climate change.⁹⁶ In a study by Yeboah et al. (2023),⁹⁷ which involved semi-structured interviews in Asante Akim North Municipality, Ghana - a region heavily affected by the farmer-herder conflict - a cattle herder reported:

Anytime my cattle are butchered or killed by a farmer, I feel like going crazy. A cow apart from being my investment is like a brother or sister to me. So, when farmers attack them, I get very angry and feel like retaliating. (pg. 190)

This statement followed a cycle of violence, where herdsmen attacked a farmer in retaliation for killing their cattle. After the herdsmen were wounded and some killed, farmers relocated out of fear of further retaliatory attacks.⁹⁸

The primary case study employed to investigate resource competition resulting from migration focuses on the movement of Fulani pastoralists into Ghana. These studies highlight various environmental factors that drive Fulani herders to relocate from their current habitats, including fluctuating rainfall, land degradation, food insecurity, and droughts.⁹⁹ An uptick in migrations to

⁹³ Yeboah, Daniel Kojo Leon Brenya, Christian Pilegaard Hansen, Abdulai Abubakari, and Adzo Dzigbodi Doke. "Manufacturing Scarcity: Understanding the Causes of Conflicts Between Farmers and Herders in Asante Akim North Municipality of Ghana." *African Security* 16, no. 2–3 (2023): 176–98.

<https://doi.org/10.1080/19392206.2023.2251313>.

⁹⁴ Brottem, Leif V. "Pastoral Resource Conflict in the Context of Sudano-Sahelian Security Crises: A Critical Review of Research." *African Security* 13, no. 4 (2020): 380–402. <https://doi.org/10.1080/19392206.2020.1871291>.

⁹⁵ Otu, Bernard Okoampah, and Kojo Impraim. "Aberration of Farmer - Pastoralist Conflicts in Ghana." *Peace Review (Palo Alto, Calif.)* 33, no. 3 (2021): 412–19. <https://doi.org/10.1080/10402659.2021.1953813>; Yeboah, Daniel Kojo Leon Brenya, Christian Pilegaard Hansen, Abdulai Abubakari, and Adzo Dzigbodi Doke. "Manufacturing Scarcity: Understanding the Causes of Conflicts Between Farmers and Herders in Asante Akim North Municipality of Ghana." *African Security* 16, no. 2–3 (2023): 176–98. <https://doi.org/10.1080/19392206.2023.2251313>.

⁹⁶ Ugwueze, Michael I, J. Tochukwu Omenma, and Felicia O Okwueze. "Land-Related Conflicts and the Nature of Government Responses in Africa: The Case of Farmer-Herder Crises in Nigeria." *Society (New Brunswick)* 59, no. 3 (2022): 240–53. <https://doi.org/10.1007/s12115-022-00685-0>.

⁹⁷ Yeboah, Daniel Kojo Leon Brenya, Christian Pilegaard Hansen, Abdulai Abubakari, and Adzo Dzigbodi Doke. "Manufacturing Scarcity: Understanding the Causes of Conflicts Between Farmers and Herders in Asante Akim North Municipality of Ghana." *African Security* 16, no. 2–3 (2023): 176–98. <https://doi.org/10.1080/19392206.2023.2251313>.

⁹⁸ Ibid.

⁹⁹ Bukari, Kaderi Noagah, Shaibu Bukari, Papa Sow, and Jürgen Scheffran. "Diversity and Multiple Drivers of Pastoral Fulani Migration to Ghana." *Nomadic Peoples* 24, no. 1 (2020): 4–31. <https://doi.org/10.3197/np.2020.240102>; Tschakert, Petra. "Views from the Vulnerable: Understanding Climatic and Other Stressors in the Sahel." *Global Environmental Change* 17, no. 3 (2007): 381–96. <https://doi.org/10.1016/j.gloenvcha.2006.11.008>.

Benin, Côte d'Ivoire, Ghana, and Togo during the Sahelian droughts in the 1970s and 1980s illustrates this phenomenon.¹⁰⁰ However, migration literature emphasizes that Fulani herders' movement does not occur in isolation; rather, it is influenced by a mix of push and pull factors.¹⁰¹ Scholars such as Ven der Geest (2009),¹⁰² Castles (2002),¹⁰³ and Scheffran et al. (2014)¹⁰⁴ argue that environmental factors are deeply intertwined with social, political, and economic drivers of migration, particularly in fragile nations characterized by high levels of instability.

Push factors entail conditions in the pastoralists' current habitats that drive them to seek alternative living arrangements, while pull factors comprise conditions or opportunities in the host country that attract migrations. For instance, Bassett and Turner (2007)¹⁰⁵ note that migration among Fulani pastoralists to the south is motivated by push factors like cattle disease, drought, and political instability, as well as pull factors such as social networks, herding contracts, and breeding opportunities. However, the exacerbation of these factors by climate-related conditions has led to heightened conflicts, including violence, between herders and farmers in Ghana. Farmers gravitate toward Agogo, Ghana, due to its abundant resources, including pastures and accessible water sources, which has intensified conflicts with herders.¹⁰⁶ Data indicates that in Agogo these conflicts resulted in more than 60 fatalities between 2000 and 2017.¹⁰⁷ Tensions between the groups have escalated since the 1990s as farmers seek fertile lands and herders acquire more cattle, exacerbating land ownership disputes and availability issues. Moreover, governmental intervention favoring farmers over herders has further inflamed tensions.¹⁰⁸ Scholars emphasize that while environmental drivers play a role, they must be contextualized within the broader nexus of factors influencing pastoralist migration. This approach assists researchers and policymakers in comprehensively

¹⁰⁰ Bukari, Kaderi Noagah, Shaibu Bukari, Papa Sow, and Jürgen Scheffran. "Diversity and Multiple Drivers of Pastoral Fulani Migration to Ghana." *Nomadic Peoples* 24, no. 1 (2020): 4–31. <https://doi.org/10.3197/np.2020.240102>; Tschakert, Petra, Regina Sagoe, Gifty Ofori-Darko, and Samuel Nii Codjoe. "Floods in the Sahel: An Analysis of Anomalies, Memory, and Anticipatory Learning." *Climatic Change* 103, no. 3–4 (2010): 471–502. <https://doi.org/10.1007/s10584-009-9776-y>.

¹⁰¹ Bukari, Kaderi Noagah, Shaibu Bukari, Papa Sow, and Jürgen Scheffran. "Diversity and Multiple Drivers of Pastoral Fulani Migration to Ghana." *Nomadic Peoples* 24, no. 1 (2020): 4–31. <https://doi.org/10.3197/np.2020.240102>

¹⁰² Van der Geest, K. 2009. 'Migration and natural resources scarcity in Ghana', Environmental Change and Forced Migration Scenarios Case Study Report. Bonn: United Nations University.

¹⁰³ Castles, S. 2002. "Environmental change and forced migration: Making sense of the debate" Working Paper No. 70. Geneva: United Nations High Commissioner for Refugees.

¹⁰⁴ Scheffran, Jürgen, Tobias Ide, and Janpeter Schilling. "Violent Climate or Climate of Violence? Concepts and Relations with Focus on Kenya and Sudan." *The International Journal of Human Rights* 18, no. 3 (2014): 369–90. <https://doi.org/10.1080/13642987.2014.914722>.

¹⁰⁵ Bassett, Thomas J, and Matthew D Turner. "Sudden Shift or Migratory Drift? FulBe Herd Movements to the Sudano-Guinean Region of West Africa." *Human Ecology: An Interdisciplinary Journal* 35, no. 1 (2007): 33–49. <https://doi.org/10.1007/s10745-006-9067-4>.

¹⁰⁶ Bukari, Kaderi Noagah, Shaibu Bukari, Papa Sow, and Jürgen Scheffran. "Diversity and Multiple Drivers of Pastoral Fulani Migration to Ghana." *Nomadic Peoples* 24, no. 1 (2020): 4–31. <https://doi.org/10.3197/np.2020.240102>.

¹⁰⁷ Bukari, Kaderi Noagah, Shaibu Bukari, Papa Sow, and Jürgen Scheffran. "Diversity and Multiple Drivers of Pastoral Fulani Migration to Ghana." *Nomadic Peoples* 24, no. 1 (2020): 4–31. <https://doi.org/10.3197/np.2020.240102>; Bukari, Kaderi Noagah. 2022. "Farmer-herder Relations in Ghana: Interplay of Environmental Change, Conflict, Cooperation and Social Networks." <https://doi.org/10.53846/goediss-6461>.

¹⁰⁸ Bukari, Kaderi Noagah, Shaibu Bukari, Papa Sow, and Jürgen Scheffran. "Diversity and Multiple Drivers of Pastoral Fulani Migration to Ghana." *Nomadic Peoples* 24, no. 1 (2020): 4–31. <https://doi.org/10.3197/np.2020.240102>; Ugwueze, Michael I, J. Tochukwu Omenma, and Felicia O Okwueze. "Land-Related Conflicts and the Nature of Government Responses in Africa: The Case of Farmer-Herder Crises in Nigeria." *Society (New Brunswick)* 59, no. 3 (2022): 240–53. <https://doi.org/10.1007/s12115-022-00685-0>

understanding the climate-security nexus, wherein climate change interacts with various security factors.¹⁰⁹

Societal Fault Lines

Another dimension of climate-induced migration leading to conflict involves societal fault lines. Farmer-herder conflicts often stem from xenophobic biases, where the politics of citizenship influences who is considered part of the in-group versus the out-group. Scholars refer to this as the migration-citizenship nexus, which is further complicated by climate change.¹¹⁰ In these studies, the authors point to citizenship as another influencing factor in the pathway from climate to conflict, where migration brings non-citizens, such as pastoralists, into contact with citizens, leading to competition for available resources. This dynamic determines access to land and resources, with autochthony, or the status of being an original inhabitant, often used to exclude migrants.¹¹¹

Studies exploring the migration-citizenship connection, akin to other climate security research, concentrate on conflicts within Ghana. Here, Fulani herders, perceived as outsiders, encounter substantial tensions with local populations.¹¹² While historically, many Fulani pastoralists settled in Northern Nigeria and forged ties within the indigenous community, their limited numbers in Ghana led to their classification as migrants by the local community. Despite this, literature suggests that Fulani herders persist in their efforts to establish a sense of belonging through various means, including language proficiency, land access, education, marriage practices, and livelihood choices, despite being labeled as migrants by citizens. Consequently, their attempts to integrate into Ghanaian society often lead to tensions with native Ghanaian farmers. Even if pastoralists manage to acquire citizenship through these efforts, it does not guarantee them access to resources and land in the region. Farmers with longer histories in the area still regard them as outsiders, perpetuating a cycle of exclusion. This is further compounded by Ghanaian legal definitions of citizenship, which

¹⁰⁹ Bukari, Kaderi Noagah, Shaibu Bukari, Papa Sow, and Jürgen Scheffran. "Diversity and Multiple Drivers of Pastoral Fulani Migration to Ghana." *Nomadic Peoples* 24, no. 1 (2020): 4–31. <https://doi.org/10.3197/np.2020.240102>; Black, Richard, W. Neil Adger, Nigel W Arnell, Stefan Dercon, Andrew Geddes, and David Thomas. "The Effect of Environmental Change on Human Migration." *Global Environmental Change* 21 (2011): S3–11. <https://doi.org/10.1016/j.gloenvcha.2011.10.001>; Hampshire, Kate. "Flexibility in Domestic Organization and Seasonal Migration Among the Fulani of Northern Burkina Faso." *Africa (London. 1928)* 76, no. 3 (2006): 402–26. <https://doi.org/10.3366/afr.2006.0044>; Laczko, Frank, and Christine Aghazarm. 2009. *Migration, Environment and Climate Change: Assessing the Evidence*. <http://ci.nii.ac.jp/ncid/BB02461311>.

¹¹⁰ Setrana, Mary B. "Citizenship, Indigeneity, and the Experiences of 1.5- and Second-Generation Fulani Herders in Ghana." *Afrikaspectrum* 56, no. 1 (2021): 81–99. <https://doi.org/10.1177/00020397211002940>; Chilaka, Francis Chigozie, and S. I Odoh. "Climate Change and Conflict in Nigeria: A Theoretical and Empirical Examination of the Worsening Incidence of Conflict between Fulani Herdsmen and Farmers in Northern Nigeria." *Arabian Journal of Business and Management Review (Oman Chapter)* 2.1 (2012): 110–124. Web; Turner, Matthew D, Augustine A Ayantunde, Kristen P Patterson, and E. Daniel Patterson. "Livelihood Transitions and the Changing Nature of Farmer-Herder Conflict in Sahelian West Africa." *The Journal of Development Studies* 47, no. 2 (2011): 183–206. <https://doi.org/10.1080/00220381003599352>.

¹¹¹ Otu, Bernard Okoampah, and Kojo Impraim. "Aberration of Farmer - Pastoralist Conflicts in Ghana." *Peace Review (Palo Alto, Calif.)* 33, no. 3 (2021): 412–19. <https://doi.org/10.1080/10402659.2021.1953813>.

¹¹² Otu, Bernard Okoampah, and Kojo Impraim. "Aberration of Farmer - Pastoralist Conflicts in Ghana." *Peace Review (Palo Alto, Calif.)* 33, no. 3 (2021): 412–19. <https://doi.org/10.1080/10402659.2021.1953813>; Ugwueze, Michael I, J. Tochukwu Omenma, and Felicia O Okwueze. "Land-Related Conflicts and the Nature of Government Responses in Africa: The Case of Farmer-Herder Crises in Nigeria." *Society (New Brunswick)* 59, no. 3 (2022): 240–53. <https://doi.org/10.1007/s12115-022-00685-0>.

reinforce their status as non-citizens.¹¹³ This labeling disrupts previous coexistence and fuels conflict. Governmental efforts to mitigate the presence and impact of Fulani pastoralists have involved police orders to expel them and seize their cattle.¹¹⁴ However, increased force by state actors has escalated violence, prompting Fulani pastoralists to resist authority and resort to armed defense, exacerbating environmental degradation, destroying crops, and killing cattle in the process.¹¹⁵

The amplification of these tensions by the state is not unique to Ghana but is also evident in other West African countries, including Nigeria and Mali. Like Ghana, these states often favor farmers over herders, creating an imbalanced power dynamic where farmers essentially control land management.¹¹⁶ Aapengnuo (2010)¹¹⁷ describes this as ethnic contestation and power politics, where ethnicity determines power, inflaming tensions due to the lack of fairness and inclusivity in political and social systems. Ugwueze et al. (2022)¹¹⁸ refer to the state's actions, or lack thereof, in the farmer-herder power dynamic as state complicity. This occurs when the state fails to protect and promote the rights of herders due to political interests. Their paper focuses on Nigeria, where there is a pronounced indigene-settler dichotomy. The farming community in this region has high social capital due to neighborhood support and is labeled as "indigenous people," "autochthonous" or "the first-comers," further separating them from pastoralists, who are called "settlers" or "herders." For example, a Nigerian government policy, the Rural Grazing Area in Nigeria (RUGA), aimed to create settlements for nomadic herders with basic necessities and infrastructure. However, this policy faced significant backlash from the public, who believed that the President's identity as a Fulani biased the implementation. Many felt that this policy would exacerbate ethnic tensions by favoring the Fulani community and potentially causing a population boom among the Fulani in the region. They feared that Fulani would take over their land and believed the policy was only possible because

¹¹³ Setrana, Mary B. "Citizenship, Indigeneity, and the Experiences of 1.5- and Second-Generation Fulani Herders in Ghana." *Afrikaspectrum* 56, no. 1 (2021): 81–99. <https://doi.org/10.1177/00020397211002940>; Atuguba, Raymond A, Francis Xavier Dery Tuokuu, and Vitus Gbang. "Statelessness in West Africa: An Assessment of Stateless Populations and Legal, Policy, and Administrative Frameworks in Ghana." *Journal on Migration and Human Security* 8, no. 1 (2020): 14–31. <https://doi.org/10.1177/2331502419900771>.

¹¹⁴ Setrana, Mary B. "Citizenship, Indigeneity, and the Experiences of 1.5- and Second-Generation Fulani Herders in Ghana." *Afrikaspectrum* 56, no. 1 (2021): 81–99. <https://doi.org/10.1177/00020397211002940>

¹¹⁵ Soeters, Sebastiaan, Ruben Weesie, and Annelies Zoomers. "Agricultural Investments and Farmer-Fulani Pastoralist Conflict in West African Drylands: A Northern Ghanaian Case Study." *Sustainability* 9, no. 11 (2017): 2063–.

<https://doi.org/10.3390/su9112063>; Setrana, Mary B. "Citizenship, Indigeneity, and the Experiences of 1.5- and Second-Generation Fulani Herders in Ghana." *Afrikaspectrum* 56, no. 1 (2021): 81–99. <https://doi.org/10.1177/00020397211002940>

¹¹⁶ Ugwueze, Michael I, J. Tochukwu Omenma, and Felicia O Okwueze. "Land-Related Conflicts and the Nature of Government Responses in Africa: The Case of Farmer-Herder Crises in Nigeria." *Society (New Brunswick)* 59, no. 3 (2022): 240–53. <https://doi.org/10.1007/s12115-022-00685-0>.

¹¹⁷ Aapengnuo, Clement Mweyang. *Misinterpreting Ethnic Conflicts in Africa*. Washington, DC: Africa Center for Strategic Studies, 2010.

¹¹⁸ Ugwueze, Michael I, J. Tochukwu Omenma, and Felicia O Okwueze. "Land-Related Conflicts and the Nature of Government Responses in Africa: The Case of Farmer-Herder Crises in Nigeria." *Society (New Brunswick)* 59, no. 3 (2022): 240–53. <https://doi.org/10.1007/s12115-022-00685-0>.

the President was “one of its own” (p. 96).¹¹⁹ The state’s influence in these conflicts leads to significant marginalization, fueling conflict and increasing grievances.¹²⁰

Pastoralist-Farmer Conflict to Large-scale Violence

Literature on farmer-pastoralist conflicts in West Africa highlights the potential for these conflicts to escalate into large-scale violence. Militant groups and political leaders may exploit instability for control and influence and concerns have been raised that pastoral migrants might collaborate with terrorist and extremist organizations for retribution. The Fulani herdsmen in West Africa, identified as a significant security threat, rank as the second most dangerous threat to peace in the region according to the Global Terrorism Index of 2019.¹²¹ Specifically, the farmer-herder conflict has led to a 500 percent increase in deaths between 2015 and 2018 in Nigeria, resulting in six times more fatalities than those caused by Boko Haram.¹²² The escalation in violent conflict, involving criminal activity, militant presence, and terrorism, is partly due to both pastoralist groups and sedentary farmers increasingly using firearms.¹²³

Ajala (2020)¹²⁴ attributes the heightened use of arms in these clashes to changes in cattle ownership dynamics, known as neo-pastoralism. Traditional pastoralism is being replaced by neo-pastoralism, which involves larger herds and a greater reliance on arms. Ajala defines neo-pastoralism as “non-pastoralists, [cattle] kept by salaried herdsmen, often involving the use of sophisticated arms and ammunitions, arising from the need to hide stolen wealth, proceeds of trafficking or income derived from terrorism with the underlying aim of deriving profit for investors” (pg. 2050).¹²⁵ Using Nigeria as a case study, the article identifies several factors influencing the use of arms and the rise of neo-pastoralism, including increased conflict between pastoralists and farmers and a noticeable rise in cattle rustling.¹²⁶ Historically, cattle rustling was local, seasonal, and involved traditional weaponry, resulting in relatively minor conflicts.¹²⁷ However, climate change has significantly contributed to cattle loss through droughts, flooding, diseases, and bushfires, increasing the need for cattle rustling. Economic incentives, such as higher cattle prices and demand, have also contributed. Consequently, neo-pastoralists argue they need to arm themselves to protect their cattle from hired herdsmen and

¹¹⁹ Afolab, Abiodun, Olasupo Thompson, Oluniyi Ademola, Onyekwere Nwaorgu, and Adenike Onifade. “Public Reaction to Federal Government’s Farmer-Herder Conflicts through the Ruga Policy: Can One Continuously Do the Same and Expect Different Result?” *Africa Insight* 49, no. 4 (2020): 88-.

¹²⁰ Ugwueze, Michael I, J. Tochukwu Omenma, and Felicia O Okwueze. “Land-Related Conflicts and the Nature of Government Responses in Africa: The Case of Farmer-Herder Crises in Nigeria.” *Society (New Brunswick)* 59, no. 3 (2022): 240–53. <https://doi.org/10.1007/s12115-022-00685-0>.

¹²¹Otu, Bernard Okoampah, and Kojo Impraim. “Aberration of Farmer - Pastoralist Conflicts in Ghana.” *Peace Review (Palo Alto, Calif.)* 33, no. 3 (2021): 412–19. <https://doi.org/10.1080/10402659.2021.1953813>.

¹²² Global Index (GI). (2019). Report on crop-farmers-herdsmen conflicts in Nigeria, International Crisis Group (ICG). 2019 Annual Report on Conflicts in Sub-Saharan Africa; ICG, (2018). Stopping Nigeria’s spiraling farmer-herder violence. Crisis Group Africa Report N°262, 26 July.

¹²³Ajala, Olayinka. “New Drivers of Conflict in Nigeria: An Analysis of the Clashes between Farmers and Pastoralists.” *Third World Quarterly* 41, no. 12 (2020): 2048–66. <https://doi.org/10.1080/01436597.2020.1811662>; Otu, Bernard Okoampah, and Kojo Impraim. “Aberration of Farmer - Pastoralist Conflicts in Ghana.” *Peace Review (Palo Alto, Calif.)* 33, no. 3 (2021): 412–19. <https://doi.org/10.1080/10402659.2021.1953813>.

¹²⁴Ajala, Olayinka. “New Drivers of Conflict in Nigeria: An Analysis of the Clashes between Farmers and Pastoralists.” *Third World Quarterly* 41, no. 12 (2020): 2048–66. <https://doi.org/10.1080/01436597.2020.1811662>.

¹²⁵ibid.

¹²⁶ibid.

¹²⁷ Olaniyan, Azeez, and Aliyu Yahaya. “Cows, Bandits, and Violent Conflicts: Understanding Cattle Rustling in Northern Nigeria.” *Afrikaspectrum* 51, no. 3 (2016): 93–105. <https://doi.org/10.1177/000203971605100305>.

professional bandits. The use of firearms in the pastoralist-farmer conflict has been rationalized under the guise of self-defense against cattle rustling.¹²⁸ Further, state complicity plays a role in the increase of use of weapons among herders. The implementation of RUGA was seen as a policy that could provoke violence instead of reducing it, as it was feared that the Fulani might use force to take grazing land from indigenous peoples, with perceived immunity. A Yoruba cultural leader expressed concerns that the policy would allow Fulani people to carry weapons without challenge from security forces, due to protection from powerful figures.¹²⁹ The president's Fulani ethnicity has created an environment conducive to grassroots and state-backed political violence.¹³⁰

This new wave of neo-pastoralism is seen as a full-blown militia, with suspicions of collaboration with extremist groups, such as Boko Haram and MUJAO.¹³¹ In Mali, there is evidence that Fulani herdsmen have sought resolution and protection from MUJAO. Grievances over resource access and marginalization, and promise of livelihood security, have driven the Fulani community to turn to this extremist group.¹³² Moreover, historically, pastoralists have paid local authorities, known as zakat, in return for protection, resource access, and conflict mediation. However, there are reports indicating that armed groups have seized control of these zakat payments in Mali, replacing them with "sofal." As a result, pastoralists are now forced to pay these armed groups for protection of their livestock. There are indications that similar occurrences may be taking place in Burkina Faso.¹³³ Ajala (2020) reports that a leader in the pastoralist community boasted about their arsenal, stating "we have over 800 rifles, machine guns; Fulanis now have bombs and military uniforms."¹³⁴ Some believe that these pastoralists are hired, as farmers note the presence of unfamiliar, heavily armed individuals rather than traditional pastoralists. The Nigerian military has referred to them as "sponsored,"¹³⁵ and police in Kano state claim that arrested individuals are from Senegal, Mali, and Chad, not Nigeria.¹³⁶ This complicated local conflict management as the parties involved no longer share a common understanding. Neo-pastoralist strategies have also influenced traditional pastoralists, who have begun arming themselves. There have been reports of reprisal attacks from farming communities, leading to an arms race between the groups.¹³⁷

¹²⁸ Ajala, Olayinka. "New Drivers of Conflict in Nigeria: An Analysis of the Clashes between Farmers and Pastoralists." *Third World Quarterly* 41, no. 12 (2020): 2048–66. <https://doi.org/10.1080/01436597.2020.1811662>.

¹²⁹ Afolab, Abiodun, Olasupo Thompson, Oluniyi Ademola, Onyekwere Nwaorgu, and Adenike Onifade. "Public Reaction to Federal Government's Farmer-Herder Conflicts through the Ruga Policy: Can One Continuously Do the Same and Expect Different Result?" *Africa Insight* 49, no. 4 (2020): 88–.

¹³⁰ Brottem, Leif V. "Pastoral Resource Conflict in the Context of Sudano-Sahelian Security Crises: A Critical Review of Research." *African Security* 13, no. 4 (2020): 380–402. <https://doi.org/10.1080/19392206.2020.1871291>.

¹³¹ McGregor, A., 2014; Brottem, Leif V. "Pastoral Resource Conflict in the Context of Sudano-Sahelian Security Crises: A Critical Review of Research." *African Security* 13, no. 4 (2020): 380–402. <https://doi.org/10.1080/19392206.2020.1871291>.

¹³² Brottem, Leif V. "Pastoral Resource Conflict in the Context of Sudano-Sahelian Security Crises: A Critical Review of Research." *African Security* 13, no. 4 (2020): 380–402. <https://doi.org/10.1080/19392206.2020.1871291>.

¹³³ Ibid.

¹³⁴ Salkida, Ahmad. 2018. "Exclusive on Fulani Herdsmen: 'WE HAVE MACHINE GUNS, BOMBS AND MILITARY UNIFORMS,' JAURO BUBA." *Salkida.Com* (blog). July 9, 2018. <https://salkida.com/exclusive-on-fulani-herdsmen-we-have-machine-guns-bombs-and-military-uniforms-ready-for-war-jauro-buba/>.

¹³⁵ Olusola, Fabiyi, Aluko Olaleye, and Charles John. 2018. "Benue: Killer Herdsmen Are Sponsored, Says Military." *Punch Newspapers*, April 27, 2018. <https://punchng.com/benue-killer-herdsmen-are-sponsored-says-military/>.

¹³⁶ Channels TV, "Big Story: Focus on Cattle Rustling in Nigeria Part 1."

¹³⁷ Ajala, Olayinka. "New Drivers of Conflict in Nigeria: An Analysis of the Clashes between Farmers and Pastoralists." *Third World Quarterly* 41, no. 12 (2020): 2048–66. <https://doi.org/10.1080/01436597.2020.1811662>.

However, some scholars argue that framing this conflict as herdsman militancy unfairly places the blame on the herders, since they can also be victims of violence or militancy.¹³⁸ Instead, they prefer the term “eco-violence” to describe the complex nature of the conflict without politicizing it. Specifically, “eco-violence” refers to conflicts arising from resource competition within or between social groups or state actors, often leading to violence and environmental destruction. These conflicts are compounded by the state's inability to confront grievances, including challenges in resource distribution, institutional shortcomings, and environmental and social injustices. Supporters of this conceptualization argue that it more accurately captures social, environmental, and political discrimination while remaining neutral.¹³⁹ Similarly, in studies examining Mali’s challenges with large-scale land acquisitions and climate vulnerabilities, researchers criticize the “climate security” narrative. They caution that this framework may oversimplify complex issues and sideline local perspectives by framing conflict and migration solely as consequences of climate change. Instead, they advocate for “agrarian climate justice” as a more inclusive and sustainable approach that empowers marginalized communities. Overall, there is a growing scholarly trend to analyze land politics within the context of climate mobility, emphasizing the need to consider power dynamics through a climate security lens.¹⁴⁰

Ultimately, scholars supporting this perspective argue that while environmental factors do contribute to increased demand and competition for land, the true issue lies in the politically constructed scarcity created by those in power. Thus, the root cause of conflict is not inherently the environmentally induced resource scarcity but rather the artificial scarcity orchestrated and facilitated by authorities.¹⁴¹ This manipulation and exploitation have sparked conflicts between farmers and herders as they both vie for the limited available land.

Climate Maladaptation

Beyond the herder-pastoralist conflict, North and West Africa face several persistent climate security challenges that exacerbate regional instability and drive migration. A noteworthy theme in climate literature, highlighted in Bruning’s (2021)¹⁴² paper, is maladaptation, which has become more prominent as climate policies have been increasingly implemented. Maladaptation refers to actions or policies intended to address climate change impacts that inadvertently increase vulnerability or exacerbate existing problems, rather than reducing them. In the context of climate security, maladaptation occurs when climate policies are not adaptive, context-specific, or inclusive, leading to increased vulnerability and exacerbating existing problems. This creates a cyclical pattern where

¹³⁸ Benjaminsen, Tor A, and Boubacar Ba. “Fulani-Dogon Killings in Mali: Farmer-Herder Conflicts as Insurgency and Counterinsurgency.” *African Security* 14, no. 1 (2021): 4–26. <https://doi.org/10.1080/19392206.2021.1925035>.

¹³⁹ Olumba, Ezenwa E, Bernard U Nwosu, Francis N Okpaleke, and Rowland Chukwuma Okoli. “Conceptualising Eco-Violence: Moving beyond the Multiple Labelling of Water and Agricultural Resource Conflicts in the Sahel.” *Third World Quarterly* 43, no. 9 (2022): 2075–90. <https://doi.org/10.1080/01436597.2022.2083601>.

¹⁴⁰ Calmon, Daniela, Chantal Jacovetti, and Massa Koné. “Agrarian Climate Justice as a Progressive Alternative to Climate Security: Mali at the Intersection of Natural Resource Conflicts.” *Third World Quarterly* 42, no. 12 (2021): 2785–2803. <https://doi.org/10.1080/01436597.2021.1965870>.

¹⁴¹ Yeboah, Daniel Kojo Leon Brenya, Christian Pilegaard Hansen, Abdulai Abubakari, and Adzo Dzigbodi Doke. “Manufacturing Scarcity: Understanding the Causes of Conflicts Between Farmers and Herders in Asante Akim North Municipality of Ghana.” *African Security* 16, no. 2–3 (2023): 176–98. <https://doi.org/10.1080/19392206.2023.2251313>.

¹⁴² Brüning, Loïc, and Catriona Dutreuilh. “Consequences of Migration on Strategies of Adaptation to Coastal Erosion in Senegal: A Typology.” *Population (English Ed.: 2002)* 76, no. 3 (2021): 487–509.

climate consequences necessitate climate policies and strategies, which, in turn, generate more climate consequences, leading to livelihood insecurity and migration as an adaptation strategy.¹⁴³

According to Bruning (2021),¹⁴⁴ maladaptation has significantly impacted Senegal, particularly along the Senegal River. Due to changes in rainfall patterns caused by climate change, the Senegal River has experienced extensive flooding, prompting initiatives to manage water levels. Authorities built a drainage canal, la Breche, to redirect waters into the Atlantic Ocean. However, this canal expanded southward from its initial four-meter width to 5,200 meters wide in 2015, causing severe coastal erosion in Gandiol, a village in Senegal. This erosion affected livelihoods dependent on gardening, fishing, livestock, tourism, and salt production. The breach disrupted fish breeding and mixed fresh and saltwater, diminishing fish stocks. Coastal flooding also increased soil salinity, significantly reducing the viability of fruits and vegetables. Moreover, groundwater salinity rose, decreasing freshwater availability and livestock numbers.

As inhabitants' livelihoods became increasingly unsustainable due to these maladaptation efforts, residents turned to migration as an adaptation strategy. These consequences have also altered mobility patterns, with males predominantly migrating from rural regions to urban areas like Dakar and Touba in search of employment, often sending remittances back to their families. In Gandiol, local inhabitants claim that the departure of migrants has lessened the stress on resources, infrastructure, and employment, while also challenging traditional gender roles, as women take on jobs historically held by men.¹⁴⁵ While this paper discusses the impacts within the regions migrants leave, it fails to investigate the effects on the urban areas hosting these migrants. Based on climate mobility literature, we can assume that this cyclical relationship may create social and economic pressures within host cities, potentially contributing to resource scarcity and infrastructure challenges.

As climate change escalates, maladaptation becomes increasingly evident. Notably, renewable energy initiatives often necessitate extensive land use, displacing populations and triggering forced migration while altering traditional livelihoods. This phenomenon is illustrated by Morocco's shift towards solar power plants, spearheaded by their government. This large-scale energy project in Morocco has aimed to meet the growing electricity demands but has often led to unintended consequences. This project has sparked conflicts among governments, local communities, and ecosystems, disrupting traditional ways of life and degrading environmental quality. Communities have faced displacement and repercussions for resisting these changes, while the extensive land and water requirements of renewable energy initiatives have strained resources and exacerbated existing environmental challenges. Moreover, labor practices associated with these projects have faced criticism, drawing comparisons to colonial exploitation.¹⁴⁶ This example highlights maladaptation driven by an overriding focus on economic development at the expense of considering and mitigating the social and environmental impacts of such ventures.

One of the most consequential climate-induced conflicts in the North and West Africa region is the pastoral conflict. Studies analyzing various policies find that they are often unclear and improperly

¹⁴³ Ibid.

¹⁴⁴ Ibid.

¹⁴⁵ Ibid.

¹⁴⁶ Schapper, Andrea, Clemens Hoffmann, and Phyllis Lee. "Procedural Rights for Nature - a Pathway to Sustainable Decarbonisation?" *Third World Quarterly* 43, no. 5 (2022): 1197–1216. <https://doi.org/10.1080/01436597.2022.2057293>.

implemented, if at all. Sometimes policies aimed at abating this issue fail because they are rejected by the people or law enforcement.¹⁴⁷ Additionally, Tinsley and Gwiriri (2022),¹⁴⁸ in their investigation of Nigerian and Ghanaian pastoral livestock policies, found that these policies fail to provide specific guidance on proper implementation. For example, goals such as the demarcation of cattle corridors are set, but the methods to achieve them are not clearly outlined. The authors stated that policies in Ghana and Nigeria were implemented incorrectly and lacked mechanisms for monitoring and evaluation.¹⁴⁹ They are ambiguous, blending multiple objectives without clear direction, which, according to Kugbega and Anoagye (2021)¹⁵⁰ and Bello and Abdullahi (2021),¹⁵¹ opens the door to corruption in Nigeria.

Likewise, the lack of clarity in these policies has led to the misrepresentation of the pastoralist community, promoting policies that favor sedentary systems for herders. Sedentarism, which involves transitioning from a mobile stationary lifestyle, has been introduced as a solution to the pastoralist-farmer conflict. Tinsley and Gwiriri (2022) noted that sedentarisation was mentioned in every Ghanaian and Nigerian policy they analyzed. This approach risks making a historically mobile community immobile, preventing them from adapting to climate consequences, which is crucial for maintaining food diversity and biodiversity. Additionally, the policies do not offer specific or effective strategies to manage the increased strain on rangelands where pastoralists will be settled. These semi-arid and arid ecosystems, already under pressure from smallholder farmers' livestock production, will face further strain due to the settlement of pastoralists.¹⁵² The use of sedentarism in Nigerian and Ghanaian policy to mitigate conflict between pastoralists and farmers is another example of maladaptation, where the strategy will negatively impact the pastoralist community, exposing them to more severe climate impacts that their traditional mobility patterns would have mitigated.

Ultimately, policies should target the root causes of climate-security challenges, focusing on solutions that consider community needs and the complexities of identity and conflict, rather than merely implementing adaptation and mitigation measures in isolation. In examining existing efforts, it is crucial to evaluate how current policies in North and West Africa, as well as those from the international community, have addressed - or failed to address - these interconnected issues.

¹⁴⁷ Afolab, Abiodun, Olasupo Thompson, Oluniyi Ademola, Onyekwere Nwaorgu, and Adenike Onifade. "Public Reaction to Federal Government's Farmer-Herder Conflicts through the Ruga Policy: Can One Continuously Do the Same and Expect Different Result?" *Africa Insight* 49, no. 4 (2020): 88-.

¹⁴⁸ Tinsley, Jonathan H.I, and Lovemore C Gwiriri. "Understanding the Representation of Pastoralism in Livestock-Related Climate Adaptation Policies in Ghana and Nigeria: A Review of Key Policy Documents." *Nomadic Peoples* 26, no. 1 (2022): 83–105. <https://doi.org/10.3197/np.2022.260105>.

¹⁴⁹ Ibid.

¹⁵⁰ Kugbega, Selorm Kobla, and Prince Young Aboagye. "Farmer-Herder Conflicts, Tenure Insecurity and Farmer's Investment Decisions in Agogo, Ghana." *Agricultural and Food Economics* 9, no. 1 (2021): 1–38. <https://doi.org/10.1186/s40100-021-00186-4>.

¹⁵¹ Bello, Bashir, and Mustapaha Muhammad Abdullahi. "Farmers–Herdsman Conflict, Cattle Rustling, and Banditry: The Dialectics of Insecurity in Anka and Maradun Local Government Area of Zamfara State, Nigeria." *SAGE Open* 11, no. 4 (2021): 215824402110401-. <https://doi.org/10.1177/21582440211040117>.

¹⁵² Tinsley, Jonathan H.I, and Lovemore C Gwiriri. "Understanding the Representation of Pastoralism in Livestock-Related Climate Adaptation Policies in Ghana and Nigeria: A Review of Key Policy Documents." *Nomadic Peoples* 26, no. 1 (2022): 83–105. <https://doi.org/10.3197/np.2022.260105>.

Policy Findings

International organizations have been pivotal in shaping the global understanding of climate change and in setting the goals necessary for its mitigation and adaptation. Their influence has made climate policy, action, and funding inherently collaborative. Given that the global discourse on climate change is framed through an international perspective, understanding the climate action priorities of individual states requires recognizing the significant impact of these organizations. This policy review aims to provide context to climate security in North and West Africa by examining how states in these regions are integrating climate security into their climate-related actions and ambitions. The review process involves identifying the climate action priorities set by intergovernmental organizations, comparing these with established climate security priorities in North and West Africa, and assessing policy actions and outcomes in relation to the climate security literature.

The specifics of the methodological approach adopted for the policy extraction are detailed in 2.2.2 Policy Landscape Scan and Literature Extraction, above.

Climate Action Priorities

Intergovernmental Organizations¹⁵³

Climate change has been on the international community's radar for quite some time, formally starting in 1988 with the establishment of the Intergovernmental Panel on Climate Change (IPCC). The focus of the IPCC has been scientific in nature, having been established by the World Meteorological Organization and UN Environment Programme, and has worked to highlight trends in GHG emissions and their atmospheric concentration. Early climate conventions and treaties used the science on GHGs to frame their approach to international climate change mitigation. Historically, international climate conventions and treaties have been widely accepted and adopted, such as the United Nations Framework Convention on Climate Change (UNFCCC) with 154 signatories in 1992 and the ratification of the Kyoto Protocol by 152 parties by 2005 when it entered into force. Today, each of these have the support of 198 and 192 parties, respectively, and there have since been more international agreements and initiatives established to address climate change.

United Nations

One of the most pivotal developments in climate change action was the Paris Agreement in 2015 that initiated collaborative international action where states agreed to acknowledge the importance of recognizing and working to mitigate climate change. Article 2 of the Paris Agreement outlines its overall goals as such:

“This Agreement ... aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

- (a) Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-

¹⁵³ The UN, EU, and AU were selected as the most relevant IGOs to discuss based on their influence in the establishment of climate change efforts in North and West Africa. Principal documents and efforts were selected based on their relevance and connection to the regional scope of this study and are meant to assist in presenting a general trend rather than a comprehensive overview of all climate efforts being made by these intergovernmental organizations. This is also noted as a limitation for this section.

- industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
- (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and
 - (c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.”¹⁵⁴

While the international conversation on climate action remains focused on emphasizing the reduction of GHG emissions, what sets this agreement apart from previous ones is its focus on establishing greater resilience against the effects of climate change by prioritizing efforts for adaptation and resiliency in all areas of climate impact. Priorities outlined in the initial agreement include specific considerations to food security; transition of the workforce; obligations to human rights pertaining to health, equality, and equity; conservation of sinks and reservoirs of specified GHGs; the integrity of all ecosystems and climate justice; public education, training, awareness, participation, access to information and cooperation; engagement of all levels of government and various actors; and sustainable patterns of consumption and production. The Paris Agreement also places importance on the establishment of stable climate-resilient development in lesser developed countries (LDCs), where these goals require a lot more effort and resources for change. This recognition results in the encouragement of collaboration with and support from more developed countries (MDCs) in establishing climate resilience in LDCs.

Additionally, the UN urges states to increase their efforts toward achieving the UN Sustainable Development Goals (SDGs), which present the international community with 17 major goals to increase sustainable development.¹⁵⁵ These SDGs are important in understanding climate priorities at the national and international levels because they provide additional constraints on what actions states may take to address climate change and who they choose to collaborate with. Goal 13, *Climate Action*, turns its focus to the implementation of the Paris Agreement and the prioritization of GHG emissions, and expresses that its implementation is necessary in achieving the SDGs. When taking the SDGs into account along with the Paris Agreement goals, it can be understood that international climate efforts at the level of the UN incorporate objectives meant to address resilience and adaptation against the effects of climate change and throughout development.

European Union

The EU has established ambitious climate action as one of its main institutional platforms. This has involved the creation and implementation of climate friendly action in its member states and worldwide through extensive outreach and funding. The EU also continues to take on a leading role in climate action advocacy at an international level. At the 28th United Nations Climate Change Conference (COP28) in November and December of 2023, the Council of the European Union provided conclusions for its negotiations that focused heavily on international efforts to address climate change.¹⁵⁶ The EU has actively highlighted and addressed disparities in capacity and

¹⁵⁴ [Paris Agreement English \(unfccc.int\)](https://unfccc.int/)

¹⁵⁵ “THE 17 GOALS | Sustainable Development.” United Nations Department of Economic and Social Affairs. Accessed August 29, 2024. <https://sdgs.un.org/goals>.

¹⁵⁶ “Preparations for the 28th Conference of the Parties (COP28) of the United Nations Framework Convention on Climate Change (UNFCCC).” 2023. 14285/23. Brussels: THE COUNCIL OF THE EUROPEAN UNION. [pdf \(europa.eu\)](https://europa.eu)

vulnerability between nations, emphasizing the critical roles of adaptation, resilience, and mitigation. This commitment was reinforced at COP28, where the EU underscored climate change as a top priority, as evidenced in the following statement:

“EXPRESSES WITH DEEP CONCERN that the observed impacts of climate change, from drought to floods, wildfires and heatwaves, among others, continue increasing all around the world with record breaking extremes affecting communities on every continent in the context of record levels of greenhouse gas (GHG) emissions. Furthermore, RECOGNISES with concern the increasing impacts in highly vulnerable areas such as, among others, coastal and mountain areas and polar regions. In this light, STRESSES the extremely urgent need to strengthen the global response to address the climate emergency with a significant acceleration of global GHG emission reductions by all countries and adaptation action and sustainable development as the only way to tackle climate change and ensure better standards of living and prosperity for the people around the world while also protecting nature and ecosystems.”

While the EU continues to frame the importance of climate action in terms of meeting goals to reduce GHG emissions to maintain (rather than increase) the projected 1.5°C increase in average temperature, statements made by the EU here incorporate much more language than the Paris Agreement on resilience and adaptation. It advocates for international cooperation and funding to strengthen climate resilience in vulnerable countries. Additionally, the EU promotes global collaboration and more holistic approaches to climate action as it emphasizes its focus on addressing the “triple planetary crisis,” climate change, biodiversity loss, and pollution in recent policy documents on green diplomacy,¹⁵⁷ the COP28, and the climate and security nexus.¹⁵⁸

The Council of the EU is very prolific in their production and delivery of inclusive climate-related conclusions beyond those related to the Paris Agreement. In December 2023, the Joint Communication to the European Parliament and the Council on “A new outlook on the climate and security nexus - Addressing the impact of climate change and environmental degradation on peace, security and defence” was published, identifying the climate and security nexus as “the impacts of both climate change and environmental degradation, including biodiversity loss and pollution, on peace, security and defence.”¹⁵⁹ Accepting this nexus understanding has enabled the EU to continue actively incorporating efforts into their climate action outreach agenda to address climate security, as it is defined in this paper. The EU has been working to make these connections for quite some time, with one example being the Water-Energy-Food-Ecosystems (WEFE) Nexus approach, originally promoted by the EU, that advocates for holistic thinking and coordinated strategies in the management of natural resources to prevent competition for scarce resources.¹⁶⁰ Also, the Council Conclusions on Green Diplomacy, approved in March of 2024, reiterates their commitment to extensively supporting and funding efforts toward sustainable green transitions globally, which are

¹⁵⁷ “Council Conclusions on EU Green Diplomacy EU Diplomacy Promoting the Just and Inclusive Green Transition and Supporting the Implementation of Global Commitments.” 2024. 7865/24. Brussels: Council of the European Union. [pdf \(europa.eu\)](https://europa.eu)

¹⁵⁸ “A New Outlook on the Climate and Security Nexus: Addressing the Impact of Climate Change and Environmental Degradation on Peace, Security and Defence.” 2022. 19. Brussels: European Commission. eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023JC0019

¹⁵⁹ Ibid.

¹⁶⁰ Abadi, Almotaz. 2022. “UFM WATER POLICY FRAMEWORK FOR ACTIONS 2030.” Union for the Mediterranean. [PolicyF-2023-EN-Web-2.pdf \(ufmsecretariat.org\)](https://ufmsecretariat.org/PolicyF-2023-EN-Web-2.pdf)

shifts from non-sustainable/climate friendly development/livelihood standards to systems that enable sustainability and climate resilience across all levels of a state.

African Union

The African Union (AU) has worked to establish its own climate priorities and agreements based on both international and local goals. One of the most recent and major documents outlining their goals and efforts is the African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032)¹⁶¹ that leans heavily on its intentions to adhere to the goals of Agenda 2063,¹⁶² an AU agenda that outlines the plan for Africa’s development into a stable and flourishing continent. Agenda 2063 does address the importance of climate-resilient development for other goals to be met due to Africa’s high vulnerability to the impacts of climate change. While there is mention of low emissions in the action plan objectives, it is limited to establishing forms of development that do not increase GHG emissions, rather than focusing on broad goals to decrease emissions. This is due to the recognition that Africa is not responsible for high levels of GHG emissions. This climate action plan is guided by key objectives aimed at addressing the pressing challenges of climate change. Strengthening the adaptive capacity of communities to manage climate-related risks is a foundational priority, ensuring resilience against its impacts. Advancing equitable and transformative pathways for low-emission, climate-resilient development is essential to achieving sustainable progress. Enhancing Africa’s ability to mobilize resources and access cutting-edge technology is critical to supporting ambitious climate initiatives. Finally, promoting inclusive and collaborative approaches to climate strategies—engaging all levels of government and diverse stakeholders—ensures alignment and ownership, fostering comprehensive and effective responses to the climate crisis.¹⁶³

Overall, this action plan outlines the top priorities for climate action in Africa that are based on adaptation and resilience, rather than mitigation. However, it is clearly stated that the AU remains interested in the promotion of mitigation efforts wherever necessary, as well as where they can be applied during the process of development in the name of GHG emissions prevention. The AU Climate Action Plan outlines specific measures to advance its objectives of prioritizing adaptation and resilience while incorporating capacity-building efforts. Strengthening policy and governance frameworks is fundamental to creating robust systems capable of addressing climate challenges. Adopting transformative pathways toward climate-resilient development ensures that progress is sustainable and inclusive. Enhancing the means of implementation, particularly through climate finance, supports the transition to climate-resilient, low-emission development models. Additionally, leveraging regional flagship initiatives plays a crucial role in driving coordinated and impactful action across the continent.¹⁶⁴

North and West African States

African states are considered extremely vulnerable to the effects of climate change due to their physical geography and institutional instability. As African states continue to face increasing

¹⁶¹ “African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032) | African Union.” 2022. Addis Ababa, Ethiopia: African Union. [41959-doc-CC Strategy and Action Plan 2022-2032 08 02 23 Single Print Ready.pdf \(au.int\)](https://au.int/sites/default/files/2022-08/41959-doc-CC_Strategy_and_Action_Plan_2022-2032_08_02_23_Single_Print_Ready.pdf)

¹⁶² “Agenda 2063: The Africa We Want.” n.d. African Union. Accessed August 29, 2024. <https://au.int/agenda2063/overview>.

¹⁶³ Ibid.

¹⁶⁴ Ibid.

populations and urbanization, they must focus heavily on the stability of their development processes to improve the livelihoods of their citizenry. Along with a focus on their general development, is an acknowledgement that climate change greatly impacts their ability to establish stability effectively. Regardless of their lack of GHG emissions, African states do express their interest in assisting in international efforts to mitigate climate change and increase their resilience and development in climate friendly ways.

Outlining climate priorities by state, for the purpose of this research, involved reading through the Nationally Determined Contributions (NDC)/Intended Nationally Determined Contributions (INDC) documents that each submitted as part of their participation in the Paris Agreements. A breakdown of the NDC/INDC documents provides information regarding the framing of individual state priorities when it comes to establishing climate change mitigation and adaptation efforts, and context to the influence of international priorities.

The NDC/INDC documents are not all formatted the same, nor do they all cover the same material, so information was grouped together based on major sections and themes.¹⁶⁵ Climate and climate-related concerns were extracted from introductory sections that outline national circumstances. Mentioned climate-related concerns largely pertained to changing weather patterns (increased/decreased rainfall, severe weather, drought, etc.), water security, agricultural security, food security, natural resource security, marine productivity, and health. The approaches outlined in the documents to address these issues are often separated into mitigation, adaptation, and capacity building goals.

Mitigation goals are often categorized into subgroups, the most common being energy, waste, forestry/land use, and agriculture, where very specific and concrete goals are listed, such as expected percentages for GHG emission reduction and levels within a given timeframe, decreasing landfill waste through different specified methods, and climate friendly and resilient agricultural techniques and methods, to name a few. Listed adaptation goals often include language that indicates proposed efforts for increasing long term resiliency against the impacts of climate change. Capacity building goals focus on long term efforts to increase research, institutional capabilities, citizen engagement, and establish management systems, education programs, awareness campaigns, among others

¹⁶⁵ See Table 2 for a more detailed breakdown of NDC/INDC document contents

Table 2: breakdown of NDC/INDC Priorities

NDC/INDC Priorities ¹⁶⁶		
Region	North Africa	West Africa
Concerns	Drought, flooding, strong winds, heat waves, wildfires, water security, food security, agricultural security, natural resource security, marine productivity, health, sea level rise, coastal erosion, desertification, land degradation, rainfall decline, rural to urban migration, landslides, snowstorms	Drought, flooding, strong winds, heat waves, wildfires, water security, food security, agricultural security, natural resource security, marine productivity, health, sea level rise, coastal erosion, salinization of fresh water, energy security, transportation, deforestation, waste management, oceanic forcing, dust winds, oceanic acidification, low literacy, poverty, biodiversity, ecosystems, tourism, economy, communal conflicts, death, livestock, severe weather
Mitigation	Increase electricity produced from renewable sources, reduce GHG emissions, reforestation, improve waste management practices, reduce gas flaring, thermal insulation of buildings, increase liquified petroleum and natural gas in fuel consumption, composting organic and green waste, methane recycling from landfill and wastewater treatment sites	Increase electricity produced from renewable sources, reforestation, reduce GHG emissions, improve waste management practices, improve agricultural methods, increase household access to non-fuel-wood energy sources, development of rail systems, improve early warning and disaster risk management, increase social inclusion, develop smart and safe communities, avoid unnecessary deaths, create jobs, promotion of eco-tourism, reduction in energy grid loss, increase energy efficient infrastructure, increase access to improved stoves, increase landfill recycling and composting, increase management of protected land areas, decrease deforestation, strengthen forestry capacity, improve dairy productivity, improve rice-cultivation, reduce field burning, increase legume fodder, increase use of digesters, increase urban green space, net-zero deforestation mining policy, protect mangrove ecosystems, restore coastal wetlands, increase marine/coastal protections, increase electric vehicle use, increase use of natural gas for public transportation, increase use of diesel particulate filters, improve road infrastructure, reduction in individual use generators, increase access to electricity, enhance industrial energy efficiency, replace diesel with biodiesel, diversify agricultural production, increase use of organic manure, dune restoration, improve efforts to transform garbage into usable materials, update industrial environment and energy procedures, increase breeding efficiency, collection and conservation of rainwater

¹⁶⁶ These are compiled and summarized, non-exhaustive lists of the climate concerns, mitigation goals, adaptation goals, and capacity building goals found in the NDC and/or INDC documents of each country in North and West Africa.

<p>Adaptation</p>	<p>Incorporate climate change impacts into agriculture, water management, public health, transportation, political, and national security strategies. Agriculture: climate resilient crops; Resources: management and protection of resources (water, wood, fishing), dam building, desalination, aquaculture; Ecosystems: restoration & management of ecosystems (Incorporate climate change impacts into agriculture, water management, public health, transportation, political, and national security strategies. Agriculture: climate resilient crops; Resources: management and protection of resources (water, wood, fishing), dam building, desalination, aquaculture; Ecosystems: restoration & management of ecosystems (wetlands, soil, marine, coast, forest), habitat planning, biodiversity conservation, urban planning, flood resilience, drought resilience, prevent erosion, artificial reefs, watershed development; Human security: prevention & monitoring of climate related disease, promote resilient economy, protect key infrastructure, protect population, prevention of extreme weather, improve health infrastructure.), habitat planning, biodiversity conservation, urban planning, flood resilience, drought resilience, prevent erosion, artificial reefs, watershed development; Human security: prevention & monitoring of climate related disease, promote resilient economy, protect key infrastructure, protect population, prevention of extreme weather, improve health infrastructure.</p>	<p>Agriculture: climate resilient crops, sustainability, self-sufficiency, develop sustainable rural livelihoods, climate insurance for small farmers, improve irrigation systems, improve breeding systems, construct hydro-agricultural dams, agro-forestry initiatives, development of intelligent agropastoral and fishing systems, hydroculture, establish transhumance axis, plant fruit trees; Resources: management and protection of resources (water, forest, fish, energy), decrease impact of tourism on resources, use local material for construction; Ecosystems: restoration & management of ecosystems (lagoons, marine spaces, soil, coast, mangroves), increase technology in coastal management, reforestation, dune restoration, ecosystem observation & data collection networks; Health: prevention & monitoring of climate related disease, improve sanitation network, improve technology in health, protect public health; Economy: job creation, mobilize financial resources, reduce vulnerability to water fluctuation, reduce human vulnerability on the coast; Energy: renewable energy development, decrease the use of wood, energy efficient housing</p>
<p>Capacity Building</p>	<p>Revise regulatory/legal/legislative frameworks; technology transfer to support mitigation and/or adaptation; bolster monitoring capacity of climate-related policies, training for relevant stakeholders, strengthening institutions, financing for climate-related services and products, and technical assistance in specific sectors; improve early warning capacity; education and awareness efforts; research regarding both adaption and mitigation</p>	<p>Revise regulatory/legal/legislative frameworks; technology transfer to support mitigation and/or adaptation; bolster monitoring capacity of climate-related policies; increasing capacity to utilize carbon market mechanisms; improve early warning capacity; education and awareness efforts; research regarding both adaptation and mitigation</p>

Climate Action Themes in North and West Africa

An additional method to identify North and West African state climate priorities has been the analysis and synthesis of documents published in North and West Africa pertaining to climate action and the research team's established definition of climate security. The following syntheses of the extracted documents provides an overview of specific projects, steps, and actions being taken in these states that fall within certain categories under the umbrella of climate security. The main concerns and priorities were identified as water security, food security, and energy security.

Water Security

In the materials from the policy extraction, water scarcity and water security are consistently mentioned among the most significant issues facing North and West African states. Water scarcity severely impacts economic growth, food security, and geopolitical stability in these regions. However, water security policy priorities vary from country to country, influenced by the severity of climatic shocks, availability of natural resources, and geographic and geopolitical positions.

The Maghreb region, synonymous here with the North African states being focused on, is significantly impacted by climate change, resulting in severe water shortages. The region's dry climate is becoming increasingly arid due to rising temperatures, declining annual precipitation, and frequent droughts. Its expansive deserts further exacerbate vulnerability to water scarcity and desertification. The heavy reliance on agriculture in North African countries underscores the seriousness of water insecurity, as it poses a destabilizing threat. Coastal regions are also at risk from saltwater intrusion, which can damage coastal infrastructure, and the warming Mediterranean Sea can lead to extreme weather events, such as Storm Daniel, which struck Libya in 2023.¹⁶⁷

To combat water insecurity, numerous policies have been implemented to mitigate its effects, promote more efficient water use, and explore sustainable alternatives. Morocco, Algeria, Tunisia, and (to a lesser extent) Libya, have all adopted seawater desalination as a key strategy to address water scarcity and ensure stable drinking water supplies.¹⁶⁸ For instance, Morocco has committed to sourcing 50 percent of its drinking water from desalination.¹⁶⁹ Additionally, wastewater reuse is being increasingly adopted to counter water scarcity, although its potential remains largely untapped

¹⁶⁷ Altaeb, Malak. 2024. "Ecological Security Threats in North Africa for 2040: Water Scarcity and Desertification." The Council on Strategic Risks. July 18, 2024. <https://councilonstrategicrisks.org/2024/07/18/ecological-security-threats-in-north-africa-for-2040-water-scarcity-and-desertification/>.

¹⁶⁸ Mustalampi, Unna. 2024. "Water Sector Opportunities in Morocco." Team Finland. December 1.

<https://www.marketopportunities.fi/home/2024/water-sector-opportunities-in-morocco>;

"Stratégie Du Ministère [Strategies of the Ministry]." n.d. Moroccan Ministry of Equipment and Water. Accessed September 5, 2024. <https://www.equipement.gov.ma/Gouvernance/Strategie/Pages/Strategie-du-Ministre.aspx>

; Irving, Jayden. 2023. "Water Crisis Forces Tunisia to Boost Sea and Wastewater Purification." November 30.

<https://newseu.cgtn.com/news/2023-11-30/Water-crisis-forces-Tunisia-to-boost-sea-and-wastewater-purification-1p8xkCjGbeg/index.html>; Talbi, Djamila, and Aya Alani. 2022. "The 5th BUI Doctoral Research Conference 2020.";

Altaeb, Malak. 2021. "Desalination in Libya: Challenges and Opportunities." Middle East Institute..

<https://www.mei.edu/publications/desalination-libya-challenges-and-opportunities>; "المياه الصالحة للشرب [Drinking Water]." Ministry alRay [Ministry of Irrigation]. Accessed July 29, 2024. https://www.mh.gov.dz/?page_id=7392

¹⁶⁹ "Morocco Accelerates Its Water Transformation: Innovative Strategies to Confront Drought." 2024. Text. Smart Water Magazine. Smart Water Magazine. January 11, 2024. <https://smartwatermagazine.com/news/smart-water-magazine/morocco-accelerates-its-water-transformation-innovative-strategies>

due to societal reservations. These countries are also enhancing their water storage infrastructure, including dams and reservoirs, to manage precipitation variability and increase adaptability.¹⁷⁰ Reservoirs have traditionally been used in many arid rural areas. In Libya, households in desert towns use small-scale water conservation systems, such as sinking wells and basins, to collect and store rainwater.¹⁷¹ Water rationing has also been considered as a potential management strategy, though its implementation has been limited due to public opposition.¹⁷²

The absence of transboundary rivers and lakes in the North African countries under consideration has helped avoid potential conflicts over shared water resources between neighboring states. However, the extensive aquifers that cross national borders present a risk of new disputes. The North-Western Sahara Aquifer System (NWSAS) Project, under the United Nations Environment Programme, has fostered cooperation between Algeria, Tunisia, and Libya, resulting in the establishment of a "Consultation Mechanism" for the NWSAS.¹⁷³ In contrast, the Bounaim-Tafna basin, which both Algeria and Morocco have been recklessly overexploiting, lacks such collaborative measures for its management.¹⁷⁴ Interestingly, for North African states, some collaborative efforts focused on water security are situated in a pan-Mediterranean context. Morocco hosted the 1st Water-Energy-Food-Ecosystems (WEFE) Nexus Roundtable in the Mediterranean on "Promoting Innovation, Investments and Upscaling of Solutions" in June 2023, with over 160 participants from 15 countries, including some of the North African states focused on here.

In contrast to North Africa, transboundary water resources are much more prevalent in West Africa, where 28 transboundary basins and rivers exist, including major ones like the Senegal River, Niger River, Lake Chad, Volta River, and Gambia River basins. These vital water resources are essential for the region's socioeconomic development, food, and energy security. West African nations have been managing these resources collaboratively since the 1960s through agreements like the UN water-

¹⁷⁰ "Morocco-Country Commercial Guide." 2022. International Trade Administration. November 29, 2022. <https://www.trade.gov/country-commercial-guides/morocco-water>; Chaibi, Thameur. 2020. "Water Infrastructure in Tunisia." Fanack. <https://water.fanack.com/tunisia/water-infrastructure-tunisia/>; "RAPPORT NATIONAL DU SECTEUR DE L'EAU Année 2021 [National Report on the water Sector for 2021]." 2021. Ministry of Agriculture, Hydrophilic resources, and fishing. Accessed September 5, 2024. <http://www.onagri.tn/search-results?q=rapport>; "المياه الصالحة للشرب [Drinking Water]." Ministry alRay [Ministry of Irrigation]. Accessed July 29, 2024. https://www.mh.gov.dz/?page_id=7392

¹⁷¹ Chibani, Achref. 2022. "From the River to the Sea: Water Management in Libya." *The Tahrir Institute for Middle East Policy* - (blog). July 14, 2022. <https://timep.org/2022/07/14/from-the-river-to-the-sea-water-management-in-libya/>

¹⁷² Metz, Sam. 2024. "To Save Water, Drought-Hit Morocco Is Closing Its Famous Public Baths Three Days a Week." AP News. March 7, 2024. <https://apnews.com/article/morocco-baths-hammam-climate-water-drought-ce9daf66af854f93bd1123b98018c7f4>; Cordall, Simon Speakman. 2023. "Water Ban in Drought-Stricken Tunisia Adds to Growing Crisis." *The Guardian*, April 5. Global development. <https://www.theguardian.com/global-development/2023/apr/05/water-ban-in-drought-stricken-tunisia-adds-to-growing-crisis>; Egbejule, Eromo. 2024. "'Whack-a-Mole Situation': Algerian Officials Wrestle with Water Shortage Anger." *The Guardian*, June 27, 2024, sec. World news. <https://www.theguardian.com/world/article/2024/jun/27/algerian-officials-wrestle-water-shortage-anger>.

¹⁷³ "Policy Brief: Improving Sustainable Development in the North Western Sahara Aquifer System through a Transboundary Nexus Approach." 2020. UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE. <https://unece.org/environment-policy/publications/policy-brief-improving-sustainable-development-north-western-sahara>.

¹⁷⁴ Al-Ghwell, Hafed. 2023. "Water Security & The Maghreb." *The SAIS Review of International Affairs*. October 18, 2023. <https://saisreview.sais.jhu.edu/water-security-the-maghreb/>.

sharing agreement and with support from regional and international partners.¹⁷⁵ However, declining water quality and availability, coupled with worsening security conditions and shifting regional priorities, have strained these collaborative efforts.

For instance, the Lake Chad Basin, which spans Cameroon, Chad, Niger, and Nigeria and supports over 30 million people, has become a significant point of contention. The basin's degradation due to climate change has been linked to severe economic deprivation, conflicts, crime, and migration.¹⁷⁶ Efforts by the Lake Chad Basin Commission (LCBC) and international partners to stabilize affected communities by recovering lands, implementing resilient water management systems, and addressing climate change effects have largely been ineffective due to institutional inefficiencies, lack of political will, and the threat of violent extremist groups.¹⁷⁷ Similarly, the Volta River, which flows through Ghana, Burkina Faso, and Ivory Coast, has seen prolonged disputes over the Nounbiel multipurpose dam project. Intended to provide hydropower, support agriculture, and build climate resilience, the project was suspended for over a decade due to disagreements between Burkina Faso and Ghana over its primary use.¹⁷⁸ However, with the increasing frequency and severity of extreme climatic events, such as persistent droughts and frequent floods, there is a rising opportunity and effort to strengthen transboundary cooperation, particularly in water management and climate resilience.¹⁷⁹

Many people in West Africa still rely heavily on surface water for drinking and cleaning, but these sources are unreliable and easily contaminated. Therefore, several West African governments have listed water sanitation and access to clean drinking water as a water security and public health priority.¹⁸⁰ For instance, in 2019 Nigerian Ministry of Water Resources launched a program called

¹⁷⁵“World Bank Engagement in Transboundary Waters in West Africa.” 2021. Washington, DC: The Cooperation in International Waters in Africa (CIWA); “AIP Support to PIDA-PAP 2 Approved Transboundary and Hydropower Water Projects | Policy Commons.” n.d. Pretoria, South Africa: AIP Report. Accessed September 5, 2024. <https://policycommons.net/artifacts/2139836/aip-support-to-pida-pap-2-approved-transboundary-and-hydropower-water-projects/2895143/>.

; “About the Water Convention.” 2023. UNECE Sustainable Development Goals. September 21, 2023. <https://unece.org/environment-policy/water/about-the-convention/introduction>.

¹⁷⁶ Frimpong, Osei Baffour. 2020. “Climate Change and Violent Extremism in the Lake Chad Basin: Key Issues and Way Forward |.” Washington, DC: Wilson Center- Africa Program. <https://www.wilsoncenter.org/publication/climate-change-and-violent-extremism-lake-chad-basin-key-issues-and-way-forward>.

¹⁷⁷Ibid.

¹⁷⁸ Magoum, Inès. 2021. “BURKINA FASO/GHANA: AfDB to Provide €4.5 Million for Nounbiel Dam.” *Afrik 21*, September 20, 2021. <https://www.afrik21.africa/en/burkina-faso-ghana-afdb-to-provide-e4-5-million-for-nounbiel-dam/>; Weber-Fahr, Monika, and Alex Simalabwi. 2019. “Climate Week: 10 Stories of Water, 10 Stories of Impact.” Stockholm, SWEDEN: The Global Water Partnership (GWP). <https://www.gwp.org/en/About/more/news/2019/climate-week-10-stories-of-water-10-stories-of-impact/>.

¹⁷⁹ Weber-Fahr, Monika, and Alex Simalabwi. 2019. “Climate Week: 10 Stories of Water, 10 Stories of Impact.” Stockholm, SWEDEN: The Global Water Partnership (GWP). <https://www.gwp.org/en/About/more/news/2019/climate-week-10-stories-of-water-10-stories-of-impact/>

¹⁸⁰ “Bénin | Sanitation and Water for All (SWA).” 2020. Sanitation and Water for All. January 30. <https://www.sanitationandwaterforall.org/partners/countries-map/benin>; “Niger State Urban Policy Projects Boost Clean Water and Healthcare Access for 50,000 Households.” 2023. Urban Policy Platform. December 13, 2023. <https://urbanpolicyplatform.org/niger-state-urban-policy-projects-boost-clean-water-and-healthcare-access-for-50000-households/>.

; “National Climate Change Policy for Nigeria: 2021-2030.” 2021. LEX-FAOC209876. FAOLEX Database. <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC209876/>.

“Clean Nigeria: Use the Toilet” that aims to achieve an open defecation-free Nigeria by 2025.¹⁸¹ Other programs funded by international and regional organizations and supported by local government, private sector and civil society actors are being implemented across the region to advance Water, Sanitation and Hygiene Activity (WASH) service delivery. Ensuring sustainable and safe WASH is reportedly critical to building people’s resilience to climate change threats especially given how the increasing frequency of flooding results in the spread of vector-borne diseases such as diarrhea, cholera, bacillary dysentery, dengue, malaria, and acute respiratory infection.¹⁸²

Food Security

In 2023, nearly 43 million people in West Africa faced food shortages—a figure four times higher than the average over the past decade. In Mali alone, over 15 percent of the population was estimated to be either experiencing severe food insecurity or at risk of doing so in early 2023, with projections suggesting this could reach almost 25 percent within six months.¹⁸³ This food and nutrition crisis is driven by a combination of factors, including consecutive climate shocks, rising food prices, underlying structural vulnerabilities, a deteriorating regional and global security context, and the lingering effects of the COVID-19 pandemic. Growing food insecurity across the region is increasingly recognized as the foremost challenge, prompting the implementation of strategies aimed at developing the current food systems to sustainably address this crisis.

After the 2007-2008 global food crisis, grain reserves have received considerable attention as a critical strategy to counter food scarcity and famine.¹⁸⁴ Grain storage plays an increasingly important role in promoting sustainable and resilient food systems, strengthening the region’s food sovereignty and its capacity to feed its growing population.¹⁸⁵ To assist those facing food insecurity, the Economic Community of West African States (ECOWAS) established a Regional Food Security Reserve and encouraged its member states to develop national and local food storage strategies.¹⁸⁶ Following ECOWAS's advice, Nigeria developed its first maize pyramid in Katsina, symbolizing the country’s commitment to becoming a self-sufficient maize producer by 2022. Nigeria has also imposed more stringent laws prohibiting the export of maize.¹⁸⁷ The North African countries being studied have recognized the importance of preserving grains to ensure food security in response to rising grain

¹⁸¹ “Water, Sanitation and Hygiene National Outcome Routine Mapping Report 2021.” 2022. Abuja. Nigeria: Federal Ministry of Water Resources, National Bureau of Statistics, World Bank and UNICEF.

<https://www.unicef.org/nigeria/reports/water-sanitation-and-hygiene-national-outcome-routine-mapping-report-2021>

¹⁸² “Cyclones and More Frequent Storms Threaten Africa.” 2022. Infographic. Washington, DC: Africa Center for Strategic Studies. <https://africacenter.org/spotlight/cyclones-more-frequent-storms-threaten-africa/>.

¹⁸³ Tucker, Luc. 2023. “Climate Vulnerabilities and Food Insecurity in Mali.” 23/210. International Monetary Fund. <https://www.imf.org/en/Publications/selected-issues-papers/issues/2023/07/19/Climate-Vulnerabilities-and-Food-Insecurity-in-Mali-536695>.

¹⁸⁴ “Grain Storage and Global Food Security.” 2021. Research paper 7. Agricultural Market Information System. <https://www.amis-outlook.org/mobile/resources/detail/en/c/1154853/>.

¹⁸⁵ Ibid.

¹⁸⁶ “ECOWAP Web Based Monitoring and Evaluation System.” n.d. ECOWAS COMMISSION. Accessed September 5, 2024. <https://ecowap.ecowas.int/ecowap-sector/5>; “Des réserves alimentaires pour faire face à l’urgence [Food reserves to tackle emergency].” Accra, Ghana: Development Agency of France. Accessed September 5, 2024. <https://www.afd.fr/fr/carte-des-projets/des-reserves-alimentaires-pour-faire-face-lurgence>.

¹⁸⁷ CBN, 2021. *Emeele Unveils First Maize Pyramid in Nigeria*, CBN: Central Bank of Nigeria. Nigeria. Retrieved from <https://coilink.org/20.500.12592/pk0p3n3>.

prices and declining domestic production. For example, Tunisia received a loan from the European Investment Bank to modernize its grain silos.¹⁸⁸

Food security is also a question of access. Persistent volatile security conditions due to violent non-state actor presence in the tri-border area of the Central Sahel, the Lake Chad Basin, and the northwestern and southwestern regions of Cameroon and northwestern Nigeria particularly affects livelihoods and food access, threatening to disrupt food security for the millions that are teetering on the edge of famine.¹⁸⁹ The ECOWAS Agriculture Trade Program (EAT) aims to enhance regional integration and facilitate trade.¹⁹⁰ However, the success of the EAT remains limited, and food and water shortages can act as threat multipliers, further exacerbating the situation.

Agriculture

When addressing the region's food scarcity issues, it is crucial to consider the close connection between water security and food security. The two issues cannot be disentangled, given that agriculture is a water-intensive activity and is highly vulnerable to changes in rainfall. In Morocco, for instance, the agricultural sector accounts for 85 percent of the country's water consumption.¹⁹¹ Consequently, efficient water management for farming has been a focal point of many policies, especially in the Maghreb.¹⁹² Morocco, for example, implemented the Resilient and Sustainable Water in Agriculture (RESWAG) project, which aims to modernize irrigation and drainage, support water governance, and provide agricultural advice to farmers facing hotter and drier conditions that further stress already limited water resources.¹⁹³ Meanwhile, Nigerian researchers, in collaboration with foreign partners, have developed technology that allows farmers to remotely control irrigation systems using real-time meteorological and hydrological data.¹⁹⁴

¹⁸⁸ Senusi, Ibrahim. 2023. "Libyan Grain Bureau Recommends Preserving Strategic Reserves of Grains." *Libya Herald*, July 26, 2023, sec. Business. <https://libyaherald.com/2023/07/libyan-grain-bureau-recommends-preserving-strategic-reserves-of-grain>

¹⁸⁹ "Millions of Nigerians Go Hungry as Floods Compound Hardship | Reuters." n.d. Accessed December 23, 2024. https://www.reuters.com/world/africa/millions-nigerians-go-hungry-floods-compound-hardship-2024-11-13/?utm_source=chatgpt.com; "UN Food Agency Says 40 Million People Are Struggling to Feed Themselves in West and Central Africa | AP News." n.d. Accessed December 23, 2024. <https://apnews.com/article/africa-food-insecurity-hunger-304b66ef7b9b56262fe1114a4b28c7e6>.

¹⁹⁰ "ECOWAS: Strengthening Agri-Food Trade in the Region through Institutional Coordination and Business Support." 2024. International Trade Center. 2024. <https://www.intracen.org/our-work/projects/ecowas-strengthening-agri-food-trade-in-the-region-through-institutional>.

¹⁹¹ Chibani, Achref. 2022. "Confronting Water Scarcity in North Africa." Washington, DC: Arab Center. <https://arabcenterdc.org/resource/confronting-water-scarcity-in-north-africa/>; Tsakok, Isabelle. 2023. "Short of Water and Under Increasing Pressure to Deliver Food Security: Key Policy Considerations - The Case of the Kingdom of Morocco." Rabat, Morocco: Policy Center For the New South. <https://www.policycenter.ma/publications/short-water-and-under-increasing-pressure-deliver-food-security-key-policy-0>.

¹⁹² Tanchum, Michaël. 2021. "The Fragile State of Food Security in the Maghreb: Implication of the 2021 Cereal Grains Crisis in Tunisia, Algeria, and Morocco." Washington D.C: Middle East Institute. <https://www.mei.edu/publications/fragile-state-food-security-maghreb-implication-2021-cereal-grains-crisis-tunisia>.

¹⁹³ "A Pan-African Campaign for Healthy Diets and Resilient Food Systems." 2023. Alliance for Food Sovereignty in Africa. June 22. <https://afsafrica.org/my-food-is-african-campaign/>; "Food System Resilience in the Middle East and North Africa." The World Bank. Accessed September 5, 2024. <https://www.worldbank.org/en/news/immersive-story/2023/09/18/food-system-resilience-in-the-middle-east-and-north-africa>.

¹⁹⁴ Maru J., Eshetu S., Bheenick K., Munoko K., and Abugri B. (2020). Transforming Africa's Agriculture through Enhancing Commercialization of Aquaculture Research Products: The case of Orange-Fleshed Sweet Potato (OFSP) Technology. FARA Dissemination Notes FDN 53. Pp 1-8. https://library.faraafrica.org/2021/03/12/fdn-53_2021-the-case-of-orange-fleshed-sweet-potato-ofsp-technology-fara-taat/

Agriculture is the backbone of Africa’s economy and a powerful instrument for poverty reduction, warranting particular emphasis in policy and strategy design. To increase farmers’ resilience to climate-related risks and strengthen food-production systems to meet domestic demand, North and West African countries are focusing on incorporating research, innovations, and new technologies into the agriculture sector.¹⁹⁵ For instance, the Gambia National Agricultural Investment Plan - Food and Nutrition Security (GNAIP-FS, 2017–2026) emphasizes digital innovation in agriculture.¹⁹⁶ In Senegal, agricultural research entities have launched several initiatives utilizing digital technology to increase productivity and information sharing.¹⁹⁷ One such project involved collaboration between Senegalese scientists, 105 rural radio stations, and national meteorological agencies to facilitate local information exchange and seasonal forecasting. These climate information services benefited fishermen, pastoralists, and crop producers in managing farm-related and other livelihood activities.¹⁹⁸ In an effort to increase the country’s preparedness to food insecurity, the World Bank’s Food Systems Resilience Program, helped establish digital advisory services and strengthened agricultural research systems.¹⁹⁹

Recognizing the importance of enhancing African governments’ capacity to design and implement strategies for emerging agricultural and food system challenges, several regional and international organizations have been providing training, technical, and financial support. For example, the Alliance for a Green Revolution in Africa (AGRA) has been instrumental in developing African scientists and research institutions, including the training of over 500 breeders, bolstering local genetic development capacity.²⁰⁰

The Forum for Agricultural Research in Africa (FARA) provides another prominent example of this sort of agricultural capacity building, involving collaboration between intergovernmental organizations, national governments, and agricultural researchers. “The Forum for Agricultural Research in Africa (FARA) is the apex continental organization responsible for coordinating and advocating for agricultural research for development (AR4D). FARA serves as the technical arm of the Africa[n] Union Commission on matters concerning agriculture science, technology and

¹⁹⁵ Ajayi, Tunde, Wole Fatunbi, Aggrey Agumya, and Yemi Akinbamiyo. 2022. “Strategies for Continuous Development of Climate-Smart Agriculture Technologies in Africa.” Accra, Ghana: Forum for Agricultural Research in Africa (FARA). <https://library.faraafrica.org/2022/09/17/strategies-for-continuous-development-of-climate-smart-agriculture-technologies-in-africa/>.

¹⁹⁶ “Status of Digital Agriculture in 47 Sub-Saharan African Countries.” 2021. Policy Support and Governance. Rome, Italy: Food and Agriculture Organization of the United Nations and the International Telecommunication Union. <https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1476537/>.

¹⁹⁷ Maru J, Eshetu S, Bheenuk K, Munoko K, and Abugri B. 2020. “FDN 53_2021 - The Case of Orange-Fleshed Sweet Potato (OFSP) Technology.” Accra, Ghana: Forum for Agricultural Research in Africa (FARA). https://library.faraafrica.org/2021/03/12/fdn-53_2021-the-case-of-orange-fleshed-sweet-potato-ofsp-technology-fara-taat/; Ajayi, Tunde, Wole Fatunbi, Aggrey Agumya, and Yemi Akinbamiyo. 2022. “Strategies for Continuous Development of Climate-Smart Agriculture Technologies in Africa.” Accra, Ghana: Forum for Agricultural Research in Africa (FARA). <https://library.faraafrica.org/2022/09/17/strategies-for-continuous-development-of-climate-smart-agriculture-technologies-in-africa/>.

¹⁹⁸ Ajayi, Tunde, Wole Fatunbi, Aggrey Agumya, and Yemi Akinbamiyo. 2022. “Strategies for Continuous Development of Climate-Smart Agriculture Technologies in Africa.” Accra, Ghana: Forum for Agricultural Research in Africa (FARA). <https://library.faraafrica.org/2022/09/17/strategies-for-continuous-development-of-climate-smart-agriculture-technologies-in-africa/>.

¹⁹⁹ “Enhancing Food Security in West Africa.” 2024. Text/HTML. World Bank Group. <https://www.worldbank.org/en/news/press-release/2024/01/22/enhancing-food-security-in-west-africa>.

²⁰⁰ “Food Security: Strengthening Africa’s Food Systems.” 2023. Brookings. Accessed September 9, 2024. <https://www.brookings.edu/articles/food-security-strengthening-africas-food-systems/>.

innovation.”²⁰¹ As explained on the FARA website, the organization was created in a 1997 vote in a plenary session of the Special Programme for African Agricultural Research, within the World Bank. Among the extracted policy materials were research papers exploring different aspects of climate-smart agriculture and associated policies, included by FARA in regularly published research reports.

African countries have also utilized science and technology to develop the seed sector, a vital component of sustainable and resilient crop production.²⁰² AfricaSeeds, a public online knowledge platform dedicated to the African seed sector, was developed to facilitate access to information, catalyze collaboration, and allow farmers to check seed quality.²⁰³ Additional policies and legal frameworks have been put in place to better regulate the seed sector. In most Sub-Saharan and West African countries, existing seed systems are primarily managed by farmers, but authorities often fail to acknowledge their role or regulate the market.²⁰⁴ Various governments have supplied resistant or biofortified seeds to farmers to increase productivity levels. In Liberia, for example, as part of the “Sustainable Cocoa Sector in Liberia” initiative, the Ministry of Agriculture (MoA) distributed improved cocoa seedlings to about 5,299 smallholder cocoa farmers.²⁰⁵ However, while these efforts have aimed to boost agricultural productivity, they have also inadvertently sidelined traditional farming practices.

The focus on the development and integration of new technologies in food production and farming has unfortunately led to the marginalization of traditional farming methods. This was the case for the World Bank-funded programs and projects in Mali, where cotton-based systems and rice irrigation techniques were improved, while “traditional” production systems were disregarded.²⁰⁶ To address this, a coalition of regional research organizations, including FARA and the Association of Agricultural Research Institutions in the Near East & North Africa (AARINENA), has collaborated with local and international partners to promote traditional food systems through the cultivation of forgotten foods.²⁰⁷ The Alliance for Food Sovereignty in Africa (AFSA) launched the “My Food is

²⁰¹ “About FARA.” n.d. FARA Africa. Accessed August 12, 2024. <https://faraafrica.org/about-fara/>.

²⁰² “An Online Platform on the African Seed Sector: AfricaSeeds Takes the Lead.” n.d. AfricaSeeds. Accessed September 10, 2024. <https://www.africa-seeds.org/en/knowledge/seed-knowledge-gateway/>.

²⁰³ Ibid.

²⁰⁴ Ronnie, Vernoooy, Adokorach, J, Kimani, D, Marwa, A, Mayoyo, A, and Nyadanu, D. 2023. “On the Margins: A Review of Policies and Laws in Support of Farmer-Managed Seed Systems in Africa.” Rome, Italy, Bioversity International: ISSD Africa. <https://alliancebioversityciat.org/publications-data/margins-review-policies-and-laws-support-farmer-managed-seed-systems-africa>.

²⁰⁵ “Regional Collaboration on Overcoming Binding Constraints on the Growth of Liberia’s Cocoa Value Chain | Policy Commons.” 2023. Accra, Ghana: The African Center for Economic Transformation (ACET). <https://policycommons.net/artifacts/3818157/regional-collaboration-on-overcoming-binding-constraints-on-the-growth-of-liberias-cocoa-value-chain/4624073/>.

²⁰⁶ Kergna, Alpha Oumar, and Daouda Dembele. n.d. “Status of Agricultural Innovations, Innovation Platforms, and Innovations Investment.” 2015 PARI Project Country Report: Republic of Mali. Accra Ghana: Forum for Agricultural Research in Africa (FARA). Accessed July 7, 2024. <https://policycommons.net/artifacts/2390922/status-of-agricultural-innovations-innovation-platforms-and-innovations-investment-in/3412351/>.

²⁰⁷ The Global Forum for Agricultural Research and Innovation (GFAR). 2021. “The Global Manifesto on Forgotten Foods.” The Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA); The Asia-Pacific Association of Agricultural Research Institutions (APAARI); Crops For the Future (CFF); The Forum for Agricultural Research in Africa (FARA); The Global Forum for Agricultural Research and Innovation (GFAR); and The Alliance of Bioversity International and CIAT. <https://www.gfair.network/documents/global-manifesto-forgotten-foods>; Geib, Claudia, and Elodie Toto. 2024. “In Sub-Saharan Africa, ‘Forgotten’ Foods Could Boost Climate Resilience, Nutrition.” Mongabay Environmental News. July 26, 2024. <https://news.mongabay.com/2024/07/in-sub-saharan-africa-forgotten-foods-could-boost-climate-resilience-nutrition/>.

African” campaign, which advocates for more localized food policy and promotes the cultivation of native foods.²⁰⁸ Traditional crop varieties, which can thrive in challenging ecological and climatic conditions, are essential for creating a more diversified and sustainable agri-food system.²⁰⁹ In particular, the cultivation of forgotten foods can support smallholder farming communities, women, and marginalized groups, who are critical to household food security and rural development but are also more vulnerable to climate change due to their limited ability to invest in adaptive institutions and technologies.²¹⁰

Soil Degradation and Desertification

The rising frequency and severity of droughts and ensuing land degradation have had severe impacts on the region’s soil fertility and overall natural resource conservation. Half of Sub-Saharan Africa’s population lives in drylands that are particularly susceptible to land degradation and desertification. While actions to address land degradation have been taken, the threat persists.

The Rio Conventions on biodiversity, climate change, and desertification serve as a baseline for addressing these interdependent issues. Given the transnational nature of the threat posed by soil degradation and desertification, many instruments and frameworks have been established at the regional level. The African Ministerial Conference on Environment (AMCEN) and the Malabo Declaration have been instituted by regional economic communities to address climate change and land degradation.²¹¹ In September 2020, the African Union Commission (AUC) issued a call for the creation of a Soil Initiative for Africa (SIA). This ambitious endeavor aims to improve the condition of the continent’s soils to boost farmers’ productivity and help sequester greenhouse gas.²¹² Additionally, every year, the African Union holds the Africa Fertilizer and Soil Health Summit, which aims to engage all relevant stakeholders in conversations about the crucial role of fertilizer and soil health in stimulating sustainable, pro-poor productivity growth in African agriculture.²¹³ The United

²⁰⁸ “A Pan-African Campaign for Healthy Diets and Resilient Food Systems.” 2023. Alliance for Food Sovereignty in Africa. June 22, 2023. <https://afsafrika.org/my-food-is-african-campaign/>.

²⁰⁹ The Global Forum for Agricultural Research and Innovation (GFAR). 2021. “The Global Manifesto on Forgotten Foods.” The Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA) <https://www.gfair.network/documents/global-manifesto-forgotten-foods>; Geib, Claudia, and Elodie Toto. 2024. “In Sub-Saharan Africa, ‘Forgotten’ Foods Could Boost Climate Resilience, Nutrition.” Mongabay Environmental News. July 26, 2024. <https://news.mongabay.com/2024/07/in-sub-saharan-africa-forgotten-foods-could-boost-climate-resilience-nutrition/>; “Forgotten Foods.” n.d. Foodie SmartAfriHub. Accessed September 10, 2024. <http://localhost/research/forgotten-foods/>.

²¹⁰ Asimeng, Emmanuel Theodore, Pter Asare-Nuamah, David Anaafo, and Tina Beuchelt. 2024. “Fostering Gender-Responsive Innovation Adoption Among Smallholder Farmers in Africa.” 1. SLM Briefing Series. Interface. <https://policycommons.net/artifacts/11754735/fostering-gender-responsive-innovation-adoption-among-smallholder-farmers-in-africa-slm/12645962/>; Geib, Claudia, and Elodie Toto. 2024. “In Sub-Saharan Africa, ‘Forgotten’ Foods Could Boost Climate Resilience, Nutrition.” Mongabay Environmental News. July 26, 2024. <https://news.mongabay.com/2024/07/in-sub-saharan-africa-forgotten-foods-could-boost-climate-resilience-nutrition/>

²¹¹ Ajayi, Tunde, Wole Fatunbi, Aggrey Agumya, and Yemi Akinbamijo. 2022. “Strategies for Continuous Development of Climate-Smart Agriculture Technologies in Africa.” Accra, Ghana: Forum for Agricultural Research in Africa (FARA). <https://library.farafrica.org/2022/09/17/strategies-for-continuous-development-of-climate-smart-agriculture-technologies-in-africa/>

²¹² “A Soil Initiative for Africa: Vision, Plan and Processes.” 2022. Accra, Ghana: Forum for Agricultural Research in Africa (FARA). <https://policycommons.net/artifacts/2458788/a-soil-initiative-for-africa/3480585/>.

²¹³ Bahigwa, Godfrey. 2023. “US-Africa Engagement to Strengthen Food Security: An African (Union) Perspective.” 13. Washington, DC: Wilson Center; Africa Center.

Nations Convention is also engaged in Combat Desertification through the Great Green Wall (GGW) initiative. This effort aims to restore 100 million hectares of degraded land in Africa by 2030, along an 8,000-kilometer strip south of the Sahara from Senegal to Djibouti.²¹⁴

Livestock

Livestock is a key economic sector in West Africa, providing meat, milk, and other products for both food consumption and commerce. It generates a significant portion of rural household incomes and plays multiple roles within pastoral and mixed crop systems. However, climate shocks have a profound and far-reaching impact on the livestock sector. To address these challenges, several projects and strategies have been implemented to enhance the sector's resilience to climate shocks. Most of these strategies focus on improving the quality and sustainability of feed. For instance, to improve fodder diversity and availability, countries like Senegal, Burkina Faso, Tunisia, and Mauritania have introduced indigenous drought-resistant crops such as cactus, Angola peas, and cowpeas.²¹⁵ Additionally, the International Livestock Research Institute launched a Forage Genetic Resources Unit in Nigeria to address issues like insufficient and unpredictable animal feed supplies, which are exacerbated by climate change.²¹⁶

Moreover, several North and West African countries have prioritized grazing land rehabilitation and the improvement of herd genetics.²¹⁷ Enhancing livestock genetics not only increases their resilience to climate change and rising temperatures, but also boosts productivity and disease resistance.²¹⁸

https://www.scribd.com/embeds/632776618/content?start_page=1&view_mode=scroll&access_key=key-8PrRELCFUcN1NF4S6o9u.

²¹⁴ "The Great Green Wall: Restoring Land in Africa." 2023. Agence Française de Développement (French Agency for Development). February 9, 2023. <https://www.afd.fr/en/actualites/great-green-wall-restoring-land-africa>

²¹⁵ These are national efforts supported by organizations such as Brooke West Africa and the International Center for Agricultural Research in the Dry Areas (ICARDA). <https://projects.livestockdata.org/livestock-climate-resilience/#6> ; <https://projects.livestockdata.org/livestock-climate-resilience/#16>;"Cactus Pear for Better Nutrition and Income."

ICARDA. Accessed September 10, 2024. <https://www.icarda.org/research/innovations/cactus-pear-better-nutrition-and-income>; ""Mauritania's National Adaptation Programme of Action to Climate Change (NAPA)" 2004. Ministry of Rural Development and Environment. <https://unfccc.int/resource/docs/napa/mau01e.pdf>

²¹⁶ Onifade, Folusho Omotayo. 2024. "ILRI Lbadan Forage Genetic Resources Unit Launches to Revolutionize Livestock Feed Production in Nigeria." International Livestock Research Institute. July 11, 2024.

<https://www.ilri.org/index.php/news/ilri-lbadan-forage-genetic-resources-unit-launches-revolutionize-livestock-feed-production>

²¹⁷"Nigeria: National Climate Change Policy 2021-2030." 2021. Federal Ministry of Environment Department of Climate Change. <https://www.preventionweb.net/publication/nigeria-national-climate-change-policy-2021-2030>

; "Ghana National Climate Change Policy." 2013. FAOLEX. <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC169292/>.

; Abiy, Rahel, and Madison Spinelli. 2024. "Supporting Sustainable Livestock Value Chains to Restore Large Rangelands." International Livestock Research Institute. June 27, 2024. <https://www.ilri.org/news/supporting-sustainable-livestock-value-chains-restore-large-rangelands>.

; Snaibi, W., Mezrhab, A. (2021). Livestock Breeders' Adaptation to Climate Variability and Change in Morocco's Arid Rangelands. In: Oguge, N., Ayal, D., Adeleke, L., da Silva, I. (eds) African Handbook of Climate Change Adaptation. Springer, Cham. https://doi.org/10.1007/978-3-030-45106-6_18

²¹⁸Tadelle, Dessie. 2022. "Tropical Poultry Genetics Solutions (TPGS)." International Livestock Research Institute. August 22, 2022. <https://www.ilri.org/research/projects/tpgs>.

; Collin, Anne, Vincent Coustham, Jacob Kokou Tona, Sophie Tesseraud, Sandrine Mignon-Grasteau, Bertrand Méda, Anaïs Vitorino Carvalho, et al. 2024. "Face Au Changement Climatique, Quelles Stratégies d'atténuation et d'adaptation Pour Les Productions Avicoles ? (Faced with Climate Change, What Mitigation and Adaptation Strategies

For example, N'Dama cattle are resistant to trypanosomiasis, which can enhance the resilience of smallholder livestock owners. Unfortunately, poorly planned and executed crossbreeding programs have led to genetic erosion, threatening the existence of more resilient breeds.²¹⁹

Livestock plays a crucial role in the economic and social life of Africa, particularly for smallholder farming and women.²²⁰ In much of Africa, livestock is one of the few assets that rural women can own. In fact, an estimated two-thirds of poor livestock keepers are women.²²¹ Despite their pivotal role, the region's norms, traditions, and gender roles often constrain women's mobility, access to financial resources, and information and extension services.²²² Some programs, such as PREVENT, which provides day-old chicks to mid-size hatcheries across Africa, aim to support women farmers, recognizing their key role in preventing poverty and food insecurity.²²³ Despite these efforts, the measures taken to build a more resilient livestock sector remain inadequate. Additionally, donor interventions have predominantly focused on mitigation due to concerns about livestock's contribution to greenhouse gas emissions, sidelining efforts to foster adaptation—a bias that jeopardizes the future of the livestock sector in the region.²²⁴

Cross-border transhumance livestock production is a significant aspect of the livestock sector in Africa and has been practiced for centuries. However, climate shocks, particularly drought and subsequent water scarcity, have forced farmers and pastoralists to compete for scant resources, leading to conflict.²²⁵ Historically, agricultural and transhumant pastoral groups coexisted, but with insufficient biomass on grazing lands, many livestock owners have been compelled to move onto farmland before the harvest.²²⁶ In countries like Ghana, Nigeria, Mali, and Burkina Faso, these tensions have exacerbated already volatile security conditions as well as ethnic and religious tensions. Inadequate and ambiguous government responses have further fueled divisions and

for Poultry Production?)." *INRAE Productions Animales* 37 (1): 8069. <https://doi.org/10.20870/productions-animales.2024.37.1.8069>.

;Ekine-Dzivenu, Chinyere C., Raphael A. Mrode, Gebregziabher Gebreyohanes, Selam Meseret, Julie M. K. Ojango, Ally Okeyo Mwai, D. M. Komwihangilo, and Eliamoni T. Lyatuu. 2024. "Using Genomic Technology to Inform Dairy Seedstock Import Choices for Smallholder Dairy Systems in Low- and Middle-Income Countries." CGIAR.

<https://hdl.handle.net/10568/144147>; Mrode., Raphael A. 2015. "Africa Asia Dairy Genetic Gains (AADGG)." International Livestock Research Institute. December 7, 2015. <https://www.ilri.org/research/projects/aadgg>

²¹⁹ "State and Trends in Adaptation Report 2022- Livestock." 2022. Rotterdam and Abidjan: Global Center on Adaptation. https://gca.org/wp-content/uploads/2023/01/GCA_State-and-Trends-in-Adaptation-2022_Livestock.pdf

²²⁰ Ibid.

²²¹ Adeola, O., Evans, O., Ngare, I. (2024). Climate Change and Gender Gaps in Africa's Agricultural Sector. In: Gender Equality, Climate Action, and Technological Innovation for Sustainable Development in Africa. Sustainable Development Goals Series. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-40124-4_4

²²² Puskur, R., Lecoutere, E. 2022. Identifying climate–agriculture–gender inequality hotspots can help target investments and make women drivers of climate resilience. CGIAR GENDER Platform Evidence Explainer. Nairobi, Kenya: CGIAR GENDER Platform. <https://hdl.handle.net/10568/120017>

²²³ Galvmed team. 2023. "Celebrating 2 Years of Achievements with PREVENT." GALVmed (blog). April 20, 2023. <https://www.galvmed.org/celebrating-2-years-of-achievements-with-prevent/>.

²²⁴ "State and Trends in Adaptation Report 2022- Livestock." 2022. Rotterdam and Abidjan: Global Center on Adaptation. https://gca.org/wp-content/uploads/2023/01/GCA_State-and-Trends-in-Adaptation-2022_Livestock.pdf

²²⁵ Alade, Adebisi David. 2019. "Water Resources and Sub-Saharan African Economy: Anthropogenic Climate Change, Wastewater, and Sustainable Development in Nigeria." *Journal of Social Development in Africa* 34 (2): 113–38.

²²⁶ Nunn, Nathan, and Eoin McGuirk. 2021. "How Climate Shocks Trigger Inter-Group Conflicts: Evidence from Africa's Transhumant Pastoralists." *VoxDev*, April 30, 2021. <https://voxdev.org/topic/energy-environment/how-climate-shocks-trigger-inter-group-conflicts-evidence-africas>.

violence.²²⁷ In Nigeria, for instance, the government intervened through military action and implemented various policies, the most controversial being the Rural Grazing Area (RUGA) initiative, which was perceived as discriminatory and favoring farmers' interests.²²⁸

To prevent similar outcomes, several North and West African nations have promoted policies and programs that foster unity among rural communities and tribes, recognize the rights of herders, and broker accords to restore and regulate cross-border herder mobility.²²⁹ International and regional organizations have also intervened to address the herder-farmer conflict. For example, the World Bank funded the Regional Sahel Pastoralism Support Project (PRAPS) aims to protect pastoral systems by providing financial and technical resources to improve animal health and feeding management, diversify pastoral families' income sources, and manage conflicts by facilitating dialogue between herders and farmers.²³⁰ ECOWAS, on the other hand, has developed several protocols and regulations to support livestock breeding and facilitate the free movement of livestock across member states, including the 2003 Regulations on Transhumance between ECOWAS Member States, the ECOWAS Strategic Plan for the Development and Transformation of the Livestock Sector, and the 2005 ECOWAS Agricultural Policy (ECOWAP).²³¹ More recently, ECOWAS, in collaboration with the United Nations Office for West Africa and the Sahel (UNOWAS), has been involved in discussions with partners across West Africa and the Sahel to develop a handbook of good practices for resolving this issue. However, the herder-farmer conflict continues to escalate. The transborder nature of the conflict necessitates cross-border cooperation and a unified response, but a lack of political will and commitment continues to undermine regional institutions' efforts to end the conflict.²³²

Fisheries

Much of coastal Africa is already feeling the impact of climate change, with significant challenges on the horizon. Ocean acidification and rising temperatures are shrinking marine ecosystems, leading to reduced fish stocks. Fish production in Coastal West Africa is expected to decline by 30 percent by 2050.²³³ Inland, the drying up of lakes has resulted in the loss of fisheries. These changes are

²²⁷ Tinsley, Jonathan H. I., and Lovemore C. Gwiriri. 2022. "Understanding the Representation of Pastoralism in Livestock-Related Climate Adaptation Policies in Ghana and Nigeria: A Review of Key Policy Documents." *Nomadic Peoples* 26 (1): 83–105. <https://doi.org/10.3197/np.2022.260105>.

²²⁸ Afolab, Abiodun, Olasupo Thompson, Oluniyi Ademola, Onyekwere Nwaorgu, and Adenike Onifade. 2020. "Public Reaction to Federal Government's Farmer-Herder Conflicts through the Ruga Policy: Can One Continuously Do the Same and Expect Different Result?" *Africa Insight* 49 (4): 88–103.

²²⁹ "Global Land Outlook Thematic Report on Rangelands and Pastoralism." 2024. Bonn, Germany: United Nations Convention to Combat Desertification. <https://www.unccd.int/resources/global-land-outlook/glo-rangelands-report>; "Sécuriser Plus Les Parcours (Make Pasture Routes More Secure)." n.d. Land Portal. Accessed September 10, 2024. <https://landportal.org/fr/debates/2018/s%C3%A9curiser-plus-les-parcours>

²³⁰ "Where Climate Change Is Reality: Supporting Africa's Sahel Pastoralists to Secure a Resilient Future." 2020. World Bank. September 21. <https://www.worldbank.org/en/news/immersive-story/2020/09/21/where-climate-change-is-reality-supporting-africas-sahel-pastoralists-secure-a-resilient-future>.

²³¹ Nwangwu, Chikodiri & Enyazu, Chukwuemeka. (2019). *Nomadic Pastoralism and Human Security: Towards a Collective Action against Herders-Farmers Crisis in Nigeria*.

²³² Ibid.

²³³ De Fontaubert, Charlotte, Olga Stradysheva, David Kaczan, Gunilla Greig, and Prince Berengere. n.d. "From Africa to Asia, Supporting Fisheries to Address Climate Change Impacts." *World Bank Blogs* (blog). Accessed December 23, 2024. <https://blogs.worldbank.org/en/climatechange/africa-asia-supporting-fisheries-address-climate-change-impacts>

projected to have serious consequences for both fishing fleets and the communities that rely on them.²³⁴

The fisheries sector in most West African countries is dominated by foreign industrial fishing fleets, with the majority of their catches destined for the international market.²³⁵ Over the past decade, China has expanded its presence in West Africa by deploying large fishing vessels, establishing fishing enterprises, and strengthening partnerships in the region as it lacks financial, technical, operational, and institutional capacity to manage their fisheries.²³⁶ Meanwhile, local small-scale fishing communities have been heavily impacted by declining fish stocks.²³⁷ Artisanal fishers find themselves trapped in a vicious cycle of increasing fishing effort and cost, with continually diminishing yields.²³⁸ Local coastal dwellers have adopted various strategies to counter the effect of climate change, but with limited success. In Senegal, fishermen have begun targeting new species, while in Ghana, they have reduced the frequency of fishing days and embarked on longer and more dangerous trips to cut costs and boost productivity. Nature-based solutions, such as mangrove reforestation, have been promoted to enhance coastal flood resilience.²³⁹ However, these measures have proven to be unsustainable.²⁴⁰

The lack of appropriate trade policies, weak enforcement capabilities, poor fisheries governance, and the declaration of Exclusive Economic Zones by many African countries have jeopardized the fishing

²³⁴ Committee, European Economic and Social. 2023. "Opinion of the European Economic and Social Committee on 'Water Politics – Between Desertification and Securitization – Time for a Blue Diplomacy' (Own-Initiative Opinion)," December. <https://policycommons.net/artifacts/11199282/opinion-of-the-european-economic-and-social-committee-on-water-politics/12079365/>; Zougmore, Robert, Samuel Partey, Mathieu Ouédraogo, Bamidele Omitoyin, Timothy Thomas, Augustine Ayantunde, Polly Ericksen, Mohammed Said, and Abdulai Jalloh. 2016. "Toward Climate-Smart Agriculture in West Africa: A Review of Climate Change Impacts, Adaptation Strategies and Policy Developments for the Livestock, Fishery and Crop Production Sectors." *Agriculture & Food Security* 5 (1): 26. <https://doi.org/10.1186/s40066-016-0075-3>.

²³⁵ "Impacts of Climate Change on Fisheries and Aquaculture: Synthesis of Current Knowledge, Adaptation and Mitigation Options." 2018. *FAO Fisheries and Aquaculture Technical Paper*, no. 627. <https://www.fao.org/fi/static-media/MeetingDocuments/CECAF/CECAF-SSC8/Inf.5e.pdf>

²³⁶ Dana Williams Dana Williams

²³⁷ Jönsson, Jessica H. 2019. "Overfishing, Social Problems, and Ecosocial Sustainability in Senegalese Fishing Communities." *Journal of Community Practice* 27 (3/4): 213–30. <https://doi.org/10.1080/10705422.2019.1660290>; <https://www.fao.org/fi/static-media/MeetingDocuments/CECAF/CECAF-SSC8/Inf.5e.pdf>

²³⁸ "Impacts of Climate Change on Fisheries and Aquaculture: Synthesis of Current Knowledge, Adaptation and Mitigation Options." 2018. *FAO Fisheries and Aquaculture Technical Paper*, no. 627. <https://www.fao.org/fi/static-media/MeetingDocuments/CECAF/CECAF-SSC8/Inf.5e.pdf>

²³⁹ Ogunnaiké, Maria Gbemisola, and Olumide David Onafeso. n.d. "Mangrove Forest Restoration Nature-Based Solution to Climate Change: An Agro- Ecological Contribution to Climate Sensitive Agriculture in Coastal Communities" 7.; "Policy Brief: Ghanaian Artisanal Fisheries: Adapting to Climate Change." n.d. One Ocean Hub. Accessed December 23, 2024. <https://oneoceanhub.org/publications/policy-brief-ghanaian-artisanal-fisheries-adapting-to-climate-change/>.

²⁴⁰ Freduah, George, Pedro Fidelman, and Timothy F. Smith. 2019. "Adaptive Capacity of Small-scale Coastal Fishers to Climate and Non-climate Stressors in the Western Region of Ghana." *Geographical Journal* 185 (1): 96–110. <https://doi.org/10.1111/geoj.12282>. Additionally, climate change, which caused an increase in extreme weather incidents, has rendered small scale fishing dangerous; see

"The Number of Deaths of African Artisanal Fishers Is Devastatingly High, Says New Research." 2022. Coalition for Fair Fisheries Arrangements. November 23, 2022. <https://www.cffacape.org/news-blog/the-number-of-deaths-of-african-artisanal-fishers-is-devastatingly-high-says-new-research>.

sector in North and West Africa.²⁴¹ Therefore, many countries have devised better management strategies for coastal marine resources. In Morocco, Senegal, Mauritania, and Guinea, strategies such as licensing, coastal zonation, and implementing quota systems have allowed for better control of overfishing activities. In fact, Morocco and Mauritania applied an adaptive fisheries management approach for several fisheries in Morocco and Mauritania including individual transferable quota (ITQ) systems. In contrast, Senegal, Cabo Verde, and Sierra Leone have established localized territorial use rights for fisheries (TURFs). Many countries have also created marine protected areas to safeguard specific species.²⁴² Furthermore, several African states have revised their legal frameworks and regulations to include provisions on fisheries conservation, sustainable management, and combating fishing crimes.²⁴³

Meanwhile, agreements have been brokered between neighboring countries to enhance cooperation in marine fisheries, such as between Côte d'Ivoire and Senegal.²⁴⁴ At the regional level, ECOWAS has been heavily involved in promoting fishing safety and security. The ECOWAS Integrated Maritime Strategy (EIMS) aims to improve maritime security and safety in the Gulf of Guinea through a combined approach encompassing legal, technical, and operational activities in the region.²⁴⁵

The fishing sector plays a significant social and nutritional role in Africa. It contributes to food and nutrition security, with fish being a staple food in many North and West African countries.²⁴⁶ The proportion of dietary protein derived from fish varies across the region, with Sierra Leone at the highest with 60 percent, followed by Ghana and Senegal at around 47 percent.²⁴⁷ The region is already experiencing food shortages, which are expected to place further pressure on the fishing sector. As a result, North and West African countries are exploring the potential of fish farming. However, challenges such as limited access to quality fish seed, low skills among fish breeders in best management practices (BMPs), and a lack of knowledge on fish health management in hatcheries have hindered progress in this area.²⁴⁸ Programs like “Technologies for African Agricultural Transformation (TAAT)” project funded by the African Development Bank (AfDB) can help build

²⁴¹ “Impacts of Climate Change on Fisheries and Aquaculture: Synthesis of Current Knowledge, Adaptation and Mitigation Options.” 2018. *FAO Fisheries and Aquaculture Technical Paper*, no. 627.

<https://www.fao.org/fi/static-media/MeetingDocuments/CECAF/CECAF-SSC8/Inf.5e.pdf>

²⁴² Geall, Sam, Carolyn Gruber, Regina Lam, Lily Schlieman, Lauren Shea, U. Rashid Sumaila, Sally Yozell, publisher Henry L. Stimson Center, and publisher Henry L. Stimson Center. 2023. *Charting a Blue Future for Cooperation between West Africa and China on Sustainable Fisheries*. Washington, DC: Stimson Center.

²⁴³ Ibid

²⁴⁴ “Agreement between the Government of the Ivory Coast and the Government of Senegal in the Field of Marine Fisheries. | FAOLEX.” n.d. FAOLEX Database. Accessed December 23, 2024.

<https://www.fao.org/faolex/results/details/en/c/LEX-FAOC024534/>.

²⁴⁵ UNIT, RAO SUPPORT. 2020. “Support to West Africa Integrated Maritime Strategy),(SWAIMS).” ECWS Partners Platform. April 26, 2020. <https://www.raosupportcellecowas.com/post/support-to-west-africa-integrated-maritime-security-swaims-actions>.

²⁴⁶ “Impacts of Climate Change on Fisheries and Aquaculture: Synthesis of Current Knowledge, Adaptation and Mitigation Options.” 2018. *FAO Fisheries and Aquaculture Technical Paper*, no. 627.

<https://www.fao.org/fi/static-media/MeetingDocuments/CECAF/CECAF-SSC8/Inf.5e.pdf>

²⁴⁷ Ibid

²⁴⁸ “June 2021 - Modular Outreach Materials for Capacity Development Initiatives in TAAT Compacts.” 2021, June. <https://policycommons.net/artifacts/2389860/june-2021/3411076/>.

capacity in this field.²⁴⁹ Additionally, projects like those proposed by USAID promote innovative integration of aquaculture and agriculture.²⁵⁰ Countries in the region are also investing in canned and frozen fish products, as well as fishmeal production, to reduce waste. Many countries, including Mauritania, Gambia, Senegal, and Morocco, host several foreign-owned fishmeal factories.²⁵¹ Though, the processing of fish, such as freezing, canning, drying, and packaging, is energy-intensive, relying on electricity and other energy sources to maintain operations.

Energy Security

The sustainable development and economic growth of countries depend on fulfilling the energy needs of their populations.²⁵² Access to energy has been linked to economic growth and has shown positive effects on education and health.²⁵³ In recent years, shifts in energy production and consumption have significantly impacted both economic and environmental sustainability.

Fossil fuels remain the primary energy source in North and West Africa. However, oil prices have been volatile due to ongoing geopolitical uncertainties and rising demand.²⁵⁴ As a result, many countries in these regions have been transitioning to green energy. While progress has been made, it has been uneven across different countries and regions.²⁵⁵ In fact, the EU's policy toward North African countries has focused on economic development for stabilization, alongside security, migration, and mobility, while prioritizing sustainable development and climate action in Sub-Saharan Africa.²⁵⁶

In North Africa, Morocco and Tunisia have positioned themselves as global leaders in the clean energy sector, particularly in wind and solar power, with the goal of reducing their reliance on fossil fuels. The Noor Ouarzazate Concentrated Solar Complex in Morocco and the Tunur Solar Project in Tunisia are prime examples of the progress these two countries have made in advancing clean

²⁴⁹ "June 2021 - Modular Outreach Materials for Capacity Development Initiatives in TAAT Compacts." 2021, June. <https://policycommons.net/artifacts/2389860/june-2021/3411076/>; <https://www.seafoodsource.com/news/supply-trade/usd-36-million-aquaculture-project-in-benin-seeks-to-spur-seafood-output-and-fishery-sustainability>; Ujah, Oliver. n.d. "EXPANDING FISH AND AGRICULTURAL PRODUCTION IN WEST AFRICA." ENVIRONMENTAL SAFEGUARDING SPOTLIGHT. USAID.

https://www.usaid.gov/sites/default/files/2022-05/USAID_Spotlight_SkyFox.pdf

²⁵⁰ Ujah, Oliver. n.d. "EXPANDING FISH AND AGRICULTURAL PRODUCTION IN WEST AFRICA." ENVIRONMENTAL SAFEGUARDING SPOTLIGHT. USAID.

https://www.usaid.gov/sites/default/files/2022-05/USAID_Spotlight_SkyFox.pdf

²⁵¹ Geall, Sam, Carolyn Gruber, Regina Lam, Lily Schlieman, Lauren Shea, U. Rashid Sumaila, Sally Yozell, publisher Henry L. Stimson Center, and publisher Henry L. Stimson Center. 2023. *Charting a Blue Future for Cooperation between West Africa and China on Sustainable Fisheries*. Washington, DC: Stimson Center.

²⁵² Berahab, Rim. 2019. "Thinking Outside the Grid: The Role of Decentralized Power Systems in Electrifying Sub Saharan Africa." Policy Center. November 15, 2019. <https://www.policycenter.ma/publications/thinking-outside-grid-role-decentralized-power-systems-electrifying-sub-saharan-africa>.

²⁵³ Ibid

²⁵⁴ "Policy Brief - Beyond the Energy Crossroads: Deciphering Key Trends and Charting the Path in 2024." n.d. Accessed July 8, 2024. <https://policycommons.net/artifacts/11327672/policy-brief-beyond-the-energy-crossroads/12216479/>.

²⁵⁵ Berahab, Rim. 2019. "Thinking Outside the Grid: The Role of Decentralized Power Systems in Electrifying Sub Saharan Africa." Policy Center. November 15, 2019. <https://www.policycenter.ma/publications/thinking-outside-grid-role-decentralized-power-systems-electrifying-sub-saharan-africa>.

²⁵⁶ Directorate-General for Internal Policies of the Union (European Parliament), Eduardo Sánchez Jacob, Timo Gerres, and Rafael Cossent. 2023. *Developing Countries' Energy Needs and Priorities under a Sustainable Development Perspective: The Specific Case of Africa and Green Hydrogen*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2861/473676>.

energy.²⁵⁷ However, their green energy policies have also sparked controversy. The expanding renewable energy sector demands significant amounts of water for operation and maintenance, further straining an already scarce resource.²⁵⁸ Additionally, local citizens are concerned that these green projects are primarily export-focused and may not adequately serve domestic needs.²⁵⁹ These concerns are particularly relevant in the context of energy bridge projects like ELMED, linking Tunisia and Italy, and Xlinks, connecting Morocco and the United Kingdom.²⁶⁰ Transitioning to green energy in North and West Africa is a complex endeavor, heavily influenced by each country's political and economic priorities.²⁶¹ Investing in green energy remains expensive, with uncertain returns. Moreover, access to necessary technologies is often fragile, regulatory frameworks surrounding the sector are lacking, and there is a shortage of information and skills required for infrastructure development and maintenance.

West Africa is rich in diverse natural energy resources for electricity generation, making energy policy a key pillar of regional integration.²⁶² The ECOWAS Energy Programme has developed a coherent and comprehensive energy strategy to enhance energy access, promote renewable energy, develop electrical infrastructure, and create an environment conducive to attracting investments in the region.²⁶³ Within ECOWAS, the Renewable Energy and Energy Efficiency ECREEE serves as a specialized agency with a public mandate to promote regional renewable energy (RE) and energy efficiency (EE) markets. The agency aims to improve access to modern energy services, mitigate the risks of energy insecurity and climate change through RE and EE, and facilitate the growth of the green energy market.²⁶⁴ Despite ECOWAS's efforts, progress has been limited. Only Sierra Leone has enacted an Energy Efficiency Law (the Energy Efficiency and Conservation Act), while Ghana, Senegal, Cape Verde, and Nigeria have only minor legal provisions related to renewable energy and energy efficiency.²⁶⁵ In addition to ECOWAS, the EU has also contributed to the development of the region's energy sector by investing in solar and hydropower projects.²⁶⁶

²⁵⁷ Cherif, Moez. 2023. "Disclosable Version of the ISR - Morocco: Noor Solar Power Project - P131256 - Sequence No : 15 (English)," January. <https://policycommons.net/artifacts/3373880/disclosable-version-of-the-isr-morocco/4172662/>.

²⁵⁸ Desmidt, Sophie. 2021. "Climate Change and Security in North Africa." European Centre for Development Policy Management. <https://doi.org/10.55317/CASC008>.

²⁵⁹ Desmidt, Sophie. 2021. "Climate Change and Security in North Africa." European Centre for Development Policy Management. <https://doi.org/10.55317/CASC008>.

²⁶⁰ HANEN KESKES. 2023. *Energy Transition in the Middle East and North Africa: The Road to COP28*. Natural Resource Governance Institute.

²⁶¹ "Policy Brief - Beyond the Energy Crossroads: Deciphering Key Trends and Charting the Path in 2024." n.d. Accessed July 8, 2024. <https://policycommons.net/artifacts/11327672/policy-brief-beyond-the-energy-crossroads/12216479/>.

²⁶² Major natural energy resources for electricity generation present in west africa include vast oil and gas reserves (Côte d'Ivoire, Ghana and Nigeria); hydro resources (Ghana, Guinea, Niger, Nigeria, Mali and Niger); coal reserves (Nigeria) and uranium (Niger). Sewornoo, Peter Joy. n.d. "© 2019, United Nations | Policy Commons." Accessed July 6, 2024. <https://policycommons.net/artifacts/1604555/c-2019-united-nations/2294324/>.

²⁶³ Berahab, Rim. 2019. "Thinking Outside the Grid: The Role of Decentralized Power Systems in Electrifying Sub Saharan Africa." Policy Center. November 15, 2019. <https://www.policycenter.ma/publications/thinking-outside-grid-role-decentralized-power-systems-electrifying-sub-saharan-africa>.

²⁶⁴ Ibid

²⁶⁵ Ibid

²⁶⁶ Directorate-General for Internal Policies of the Union (European Parliament), Eduardo Sánchez Jacob, Timo Gerres, and Rafael Cossent. 2023. *Developing Countries' Energy Needs and Priorities under a Sustainable Development Perspective: The Specific Case of Africa and Green Hydrogen*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2861/473676>.

While some progress is being made to enhance energy security in Africa, access to clean energy remains a significant challenge, particularly in rural areas. The clean cooking sector, despite its substantial social and environmental impact, is especially overlooked.²⁶⁷ Niger, Gambia, Mali, Sierra Leone, and Liberia are among the countries with the lowest access to clean cooking solutions globally.²⁶⁸ This issue receives minimal attention in political and media discourse and is often absent from political agendas.²⁶⁹ Furthermore, foreign funding allocated to clean cooking is typically marginal—only two percent of the EU’s global energy sector resources were devoted to this issue.²⁷⁰ One proposed strategy to reduce reliance on biomass for cooking and heating and to promote resilience against climate change effects is the use of mini-grid power systems in low-density and low-demand regions.²⁷¹ In Nigeria, to address energy access deficits, the African Development Bank and the Nigerian government launched a \$200 million National Electrification Project (NEP) to encourage private sector investments in mini-grid and off-grid solutions.²⁷²

In all, energy initiatives in North and West Africa are vital for driving economic development, improving energy security, mitigating climate change, and contributing to social stability in a rapidly changing region. In a region where climate change is increasingly recognized as a climate-security threat, energy initiatives play a role in addressing the climate-security nexus.

Discussion on Climate Priorities

As we consider the various levels at which climate action related to North and West Africa is being implemented, we can see overall priorities and goals branching out and becoming more specific. At the international level, which we can think of as the UN and the EU in this context, climate priorities take on a very broad scope by incorporating the science of climate change to promote urgent collective action at the global level to curtail GHG emissions and mitigate climate change. Moving to a regional level (AU), climate action priorities – while still being mindful and supportive of global mitigation efforts – shift away from prioritizing mitigation to primarily addressing adaptation and resilience. At the state level in these regions, many national governments are pursuing adaptation strategies on various fronts as they cope with the negative impacts of climate change on food, water, and energy security. Connections are being made at all levels (international, regional, state) to the vast influence of climate change on socio-economic, -political, and -cultural spaces beyond the physical environment. Acknowledging this, actors at all levels also continue to promote collaboration

²⁶⁷ Ibid

²⁶⁸ Ibid

²⁶⁹ Directorate-General for Internal Policies of the Union (European Parliament), Eduardo Sánchez Jacob, Timo Gerres, and Rafael Cossent. 2023. *Developing Countries’ Energy Needs and Priorities under a Sustainable Development Perspective: The Specific Case of Africa and Green Hydrogen*. Publications Office of the European Union. <https://data.europa.eu/doi/10.2861/473676>.

²⁷⁰ Ibid

²⁷¹ Berahab, Rim. 2019. “Thinking Outside the Grid: The Role of Decentralized Power Systems in Electrifying Sub Saharan Africa.” Policy Center. November 15, 2019. <https://www.policycenter.ma/publications/thinking-outside-grid-role-decentralized-power-systems-electrifying-sub-saharan-africa>.

²⁷² Berahab, Rim. 2019. “Thinking Outside the Grid: The Role of Decentralized Power Systems in Electrifying Sub Saharan Africa.” Policy Center. November 15, 2019. <https://www.policycenter.ma/publications/thinking-outside-grid-role-decentralized-power-systems-electrifying-sub-saharan-africa>.

to address mitigation, adaptation, and resilience as they pertain to climate change, which can create a complex space to navigate as different stakeholders approach climate action from different perspectives and with differing end goals.

Keeping in mind limitations of this policy analysis due to the nature of the extraction method, there are nevertheless important themes that have been identified in the comparison of documents that outline climate priorities and those that reference specific action steps. These include present differences between the prioritization and operationalization of mitigation versus adaptation and resilience efforts, the influence of climate change as a global issue, and differing levels of application regarding a climate-security nexus approach.

Major themes that came from the policy extraction were water security, food security (land degradation, soil, agriculture), and energy security, compared to the main themes found in the NDC/INDC document mitigation sections: energy, waste, forestry/land use, and agriculture. Although water security and food security are often mentioned as a climate concern for states in their NDC/INDC documents, they are not heavily referenced (if at all) in the mitigation sections, instead being in the adaptation sections of these documents. This is primarily due to the NDCs' focus on mitigation related to GHG emissions – an objective that is not primarily pursued through water and/or food security related efforts. That said, climate-related agricultural policies are being applied in North and West African states in pursuit of food security. While the focus of such efforts is on adaptation and resilience in the interest of promoting food security, these efforts often do adopt sustainable measures in line with broader mitigation goals, even if mitigation is not the top priority.

Energy is a major focus that is outlined in both the NDC/INDC mitigation priorities and documents from the policy extraction. Many states provided specific goals to reduce GHG emissions by cutting production employing non-renewable sources while simultaneously increasing renewable energy infrastructure – all with an eye towards mitigation of climate change.

As found in the extracted documents, it is difficult to approach the development of large-scale sustainable energy infrastructure in Africa due to political and economic concerns, and general issues regarding capacity and capability. There are many collaborative efforts being made to assist countries in North and West Africa to incorporate renewable energy infrastructure, as well as tackle mitigation efforts through other means. An interesting point to be made within the topic of energy is that many countries listed goals to reduce the use of household stoves that require high emitting fuel sources, such as fuel wood. However, this has been identified as a mitigation strategy that is being overlooked and remains widely unfunded. This presents an example of a specific mitigation priority from states that is not being addressed within a sector (energy) that is highly collaborative and heavily focused on by international and regional organizations.

The international community is providing valuable assistance to North and West African states to support climate adaptation while also working to promote climate change mitigation. Due to the different actors and objectives involved, it is difficult to specify any one concrete set of climate policy priorities across the different levels of climate action related to North and West African states. Fruitful collaboration is happening at various levels, reflecting the variegated objectives and perspectives of the different stakeholders, with different emphases on mitigation versus adaptation, resilience, and sustainable development. From mitigation efforts involving the UN to regional bodies supporting adaptive measures regarding transboundary water resources, North and West African states are advancing climate policies that address local impacts, as well as mitigation objectives.

Much of this collaboration is valuable, and increasingly attuned to the specific needs of North and West African countries as low-GHG emitters severely impacted by climate change.

Academic Literature vs. Policy Findings: What is the gap?

This study aims to identify gaps and similarities between academic literature and policy priorities and discussions. The academic literature has brought attention to emerging issues, critical vulnerabilities, and innovative solutions that are not yet fully reflected in current policies. By comparing the extracted literature with existing policies, the research team identified areas where policies fall short or are insufficient in addressing key aspects of climate security. Conversely, the comparison also revealed instances where policy priorities align with what the academic literature identifies as crucial for building resilience. Ultimately, recognizing these gaps helps refine and strengthen policies to better meet the needs of the populations and regions in North and West Africa.

Policy Implementation Failures

Academic literature suggests that North and West African nations are prone to implementation of climate policies that lead to maladaptation, continuing to pose significant challenges in these regions. The literature emphasizes discrepancies between the intended outcomes of these policies and their actual results, indicating that the policies are failing to achieve their goals and causing them harm instead. Maladaptation, frequently highlighted in academic research, exacerbates existing vulnerabilities, and creates new challenges. This typically occurs when climate policies are implemented without considering local contexts, social dynamics, and the needs of vulnerable communities. Consequently, North and West Africa face inadequate policies that increase resource conflicts, social tensions, economic disparities, and heightened vulnerability to climate impacts. These issues undermine the effectiveness of adaptation efforts and contribute to regional instability.

One salient example of maladaptation in climate policies in North and West Africa is the large-scale irrigation project carried out by the Senegalese government along the Senegal River, as argued by Brüning (2021).²⁷³ As part of this project, a drainage canal on the Langue de Barbarie peninsula, which separates the Senegal River from the Atlantic Ocean, has altered the natural flooding regime – disrupting traditional farming and fishing practices.

This project, intended to address coastal erosion and salinization, has had devastating impacts on the community and environment by decimating fish breeding grounds, reducing fish stocks, endangering fishers, and contaminating water points and pastureland. These effects have harmed local livelihoods and reduced community resilience, leading residents to consider migration as an adaptation strategy, potentially causing security issues in other regions.²⁷⁴ This sort of incongruity between intended benefits and actual outcomes exemplifies maladaptation.

Like large irrigation projects, North and West Africa have developed several significant energy projects to address the region’s growing energy needs and harness its renewable energy potential. However, these projects have often led to the displacement of local communities, further environmental degradation, resource depletion, and increased regional conflict. As noted in Schaper

²⁷³ Brüning, Loïc, and Catriona Dutreuilh. 2021. “Consequences of Migration on Strategies of Adaptation to Coastal Erosion in Senegal: A Typology.” *Population (English Ed. : 2002)* 76 (3): 487–509.

²⁷⁴ Ibid.

et al., (2022), with Morocco's solar power plants, the plan clearly lacked knowledge of the local environment and community's needs. Morocco's solar energy initiatives, aiming to generate solar power, requires vast amounts of land and water. This strained water resources, affecting pastoralists and farmers and exacerbating drought conditions through water shortages and cuts.²⁷⁵ Additionally, disputes over labor practices associated with the projects were criticized as reminiscent of colonial practices.²⁷⁶ This is a critical example of the government's intention to reduce vulnerability to climate change but instead lead to increased vulnerability, adverse environmental and social impacts, and under-mine sustainability.

The climate mobility literature underscores the marginalization or misrepresentation of pastoralists in current climate policies in Ghana and Nigeria, exacerbating tensions between farmers and pastoralists under the influence of climate impacts. Despite policymakers' efforts to address these issues through various policies, many strategies have either led to maladaptation or lack clear implementation guidelines. Tinsley and Gwiriri (2022)²⁷⁷ highlighted that Nigeria's National Livestock Transformation Plan (NLTP) is the most focused on addressing pastoralism, emphasizing conflict resolution, and analyzing factors contributing to these conflicts: social, political, economic, environmental, and security issues. However, other policies in both countries either do not explicitly address pastoralism or climate adaptation or mention related topics without clear implementation measures.²⁷⁸

Ineffective governance, misconceptions about pastoralists, lack of expertise, and budget constraints have hindered the NLTP's implementation, as evidenced by the delay in establishing the planned ranches since the strategy was outlined in 2021. Although policies like the National Agricultural Resilience Framework (NARF) and the NLTP mention demarcating grazing corridors, specific plans for implementation are lacking. The National Social Development Fund (NSDF) and the Ghana Local Government Decentralization Program (GLDPS) policies in Ghana outline demarcation of grazing routes as part of broader green infrastructure but predominantly focus on sedentarization of pastoralists despite their traditional nomadic lifestyles, with no current evidence of these plans being enacted. In Ghana, livestock policies suffer from ineffective implementation due to weak governance and inadequate monitoring and evaluation mechanisms, compounded by insufficient funding for livestock management, limiting their effectiveness in addressing pastoralist issues. Respondents in studies suggest that the political sensitivity of the conflict has led to policies with ambiguous language, contributing to public resistance and hindering progress. This is evident in the backlash against initiatives like the 2015 Grazing Bill and the RUGA settlements project, both withdrawn due to public opposition, underscoring societal barriers that impede meaningful policy development and implementation in these regions.²⁷⁹

Other research similarly demonstrates that governmental policies aimed at mitigating farmer-herder conflicts, such as Operation Cat Race, Whirl Stroke, Land Grazing Act of 1964, the Land Use Act, the

²⁷⁵ Schapper, A., Hoffmann, C., & Lee, P. (2022). Procedural rights for nature – a pathway to sustainable decarbonisation? *Third World Quarterly*, 43(5), 1197–1216. <https://doi.org/10.1080/01436597.2022.2057293>

²⁷⁶ Rignall, K. E. 2016. "Solar Power, State Power, and the Politics of Energy Transition in pre-Saharan Morocco." *Environment and Planning A: Economy and Space* 48 (3): 540–557. doi:10.1177/0308518X15619176.

²⁷⁷ Tinsley, Jonathan H.I, and Lovemore C Gwiriri. 2022. "Understanding the Representation of Pastoralism in Livestock-Related Climate Adaptation Policies in Ghana and Nigeria: A Review of Key Policy Documents." *Nomadic Peoples* 26 (1): 83–105. <https://doi.org/10.3197/np.2022.260105>.

²⁷⁸ Ibid.

²⁷⁹ Ibid.

National Agricultural Policy of 1988, the National Grazing Route, and Reserve Commission Bill of 2011 in Nigeria, have not achieved their intended outcomes. This failure is often attributed to incomplete implementation or resistance from the public. While Tinsley and Gwiriri (2022) briefly mention public opposition, Afolabi et al. (2020)²⁸⁰ extensively address this issue, aiming to guide policymakers in developing inclusive policies that consider the intricate dynamics between farmers and herders - an aspect overlooked by initiatives like RUGA. The RUGA initiative sought to create designated settlements for herders and their cattle to curb violent clashes over land and resources. However, the authors highlight the backlash RUGA received, with respondents reporting concerns that it would incite ethnic and regional tensions, lead to land seizures, and create governance inequalities. Many ethnic groups viewed RUGA as an attempt to seize ancestral lands for the benefit of Fulani herdsmen, potentially leading to ethnic clashes. Concerns were also raised about losing control over lands as the Fulani herdsmen increased in numbers and settled permanently. Critics argued that the policy favored herdsmen and failed to address the root causes of conflicts, such as land tenure issues, climate change, and resource scarcity. There were fears that the policy would embolden the Fulani, leading to increased aggression and power imbalances. Additionally, the perceived government bias – with herders not prosecuted for actions like property destruction, bearing arms, and violence – contributed to the rejection of RUGA. The authors suggest that the policy's failure was due to the Nigerian federal government's hasty implementation without consulting stakeholders. They recommend that future policies should be inclusive, promote the rule of law, involve national dialogue with stakeholders, and strengthen state institutions.²⁸¹

A main finding from this literature review is that policy mis-implementation and maladaptation reveal a disconnect between policy makers, local governments, and the needs of local communities and environments. Despite the goal of those in decision making positions to mitigate and adapt to climate change, climate policies can increase vulnerability and lead to maladaptive outcomes. This highlights the need for policymakers to engage local communities in planning and implementing adaptation strategies, ensuring that measures are appropriate for local context and have the community support. Additionally, policies across different sectors and levels of government must be coherent and mutually reinforcing to avoid conflicts that can lead to maladaptation. After implementing policies, mechanisms should be established to monitor and evaluate adaptation outcomes, allowing for early identification and correction of maladaptation. Ultimately, preventing climate maladaptation in North and West Africa requires a comprehensive approach, including careful planning, inclusive policy-making, and sustainable development practices.

Greenhouse Gas Emission Reduction

A significant gap exists between policy documents and academic literature on climate policies. Policy documents emphasize reducing greenhouse gas emissions, a focus largely absent in academic discussions. This gap may be due to the influence of Western concepts of sustainable development on climate policies, which African states often adopt. Scholars argue that for North and West Africa, the focus should be on other developmental and adaptation goals specific to the region rather than on greenhouse gas mitigation. Nevertheless, African states often adhere to Western priorities (at least rhetorically) because of the substantial influence of Western institutions, such as the United

²⁸⁰ Afolabi, Abiodun, Olasupo Thompson, Oluniyi Ademola, Onyekwere Nwaorgu, and Adenike Onifade. 2020. "Public Reaction to Federal Government's Farmer-Herder Conflicts through the Ruga Policy: Can One Continuously Do the Same and Expect Different Result?" *Africa Insight* 49 (4): 88–103.

²⁸¹ Ibid.

Nations and the European Union, their impact on international environmental agreements and protocols like the Paris Agreement, the capitalist framework of the international economy and embedded institutions like the World Bank, and the realities of climate change within Western regions.

Despite North and West African states implementing policies to reduce greenhouse gas emission, climate scholars do not view emissions from these regions as a pressing concern. This is likely because poor countries contribute little to the global accumulation of greenhouse gasses. Sub-Saharan Africa, which includes West Africa, has limited access to modern energy services. For instance, if 250 million homes in this region received electricity entirely from coal, it would only account for 0.25 percent of global emissions.²⁸² Overall, African nations emit the least carbon dioxide,²⁸³ with Africa as a whole contributing only 2-3 percent of the world's carbon dioxide emissions.²⁸⁴ Furthermore, wealthier countries like the UK and US have access to cheap natural gas, which is not available to many poorer countries. They also import embedded carbon, which is not reflected in their national emissions counts. While clean energy is increasingly feasible and necessary, the complete elimination of fossil fuels will be costly. Financial support from developed nations plays a critical role in addressing global climate challenges, as many developing countries lack the necessary resources to implement large-scale renewable energy projects and reduction strategies independently. Given the disparity in financial capacity and historical contributions to emissions, equitable financial assistance can help ensure that all nations are equipped to transition to sustainable energy systems effectively. At COP15 in 2009, there was a promise to provide \$100 billion in annual climate support to developing nations by 2020, but these funds have yet to fully materialize.²⁸⁵ This lack of resources can hinder effective adaptation efforts, leading to either inadequate adaptation or maladaptation.

Another potential reason for why climate scholars' priorities are not aligned with established policy goals is the presence of more immediate and primary concerns in certain regions. African nations, particularly in West Africa, are among the most vulnerable to climate change and face challenges such as providing basic services, addressing conflict and social issues, developing infrastructure, and managing public health crises, like AIDS.²⁸⁶ Climate change is expected to significantly impact the region, posing systemic risks to the economy, infrastructure, food and water security, public health, agriculture, and livelihoods. These threats could negatively impact developmental gains and exacerbate poverty.²⁸⁷ Developing countries often need to prioritize economic development and poverty reduction, which typically involve industrialization, increased energy consumption, and infrastructure development - activities that can lead to higher greenhouse gas emissions. In contrast, developed nations, which already enjoy higher standards of living, can focus on higher-order issues

²⁸² Tongia, Rahul. n.d. "It Is Unfair to Push Poor Countries to Reach Zero Carbon Emissions Too Early." *Brookings*. Accessed December 23, 2024. <https://www.brookings.edu/articles/it-is-unfair-to-push-poor-countries-to-reach-zero-carbon-emissions-too-early/>.

²⁸³ Muggah, Robert. 2021. "In West Africa, Climate Change Equals Conflict." *Foreign Policy*, February 18, 2021. <https://foreignpolicy.com/2021/02/18/west-africa-sahel-climate-change-global-warming-conflict-food-agriculture-fish-livestock/>.

²⁸⁴ https://unfccc.int/files/press/backgrounders/application/pdf/factsheet_africa.pdf

²⁸⁵ <https://www.brookings.edu/articles/it-is-unfair-to-push-poor-countries-to-reach-zero-carbon-emissions-too-early/>

²⁸⁶ https://unfccc.int/files/press/backgrounders/application/pdf/factsheet_africa.pdf

²⁸⁷ <https://www.afdb.org/en/cop25/climate-change-africa>

like greenhouse gas emission reduction. For African nations, food and water insecurity are among the most pressing issues.

The region relies heavily on agriculture for survival, yet rainfall variability is ruining crop production, and coastal fisheries are being decimated by flooding and erosion. Additionally, conflict and social unrest are escalating as climate shocks drive migration and resource competition, particularly among farmers and herders and along the Mauritanian coast.²⁸⁸ These issues, coupled with weak governance, make greenhouse gas emission mitigation efforts less of a priority for fragile nations. Meanwhile, developed nations can afford to prioritize long-term sustainable development goals because they do not face the same immediate risks as North and West Africa.

Less-developed countries have committed to international agreements such as the Paris Agreement, agreeing to ambitious targets, despite projections that adapting to climate change in Africa could cost up to \$50 billion annually by 2050. They do so because at least partially due to reliance on more-developed countries for financial, technical, and capacity-building assistance.²⁸⁹ There is an inherent inequality in the costs of climate change, with developing nations bearing the brunt of its impacts despite contributing less to its causes.²⁹⁰ As a result, African nations' policies, to the extent they prioritize greenhouse gas emission reduction, often reflect concerns that are more pressing in developed countries than in their own contexts, echoing Jonssons' (2019) post-colonial perspective.²⁹¹ This discrepancy contributes to a gap between what scholars publish and what policymakers implement.

Green Jobs

There is substantial literature documenting employment loss in North and West Africa due to climate change. This issue is particularly pronounced in this region because many communities rely on agriculture and fishing for employment, both of which are increasingly affected by climate change. Prolonged droughts, desertification, rising sea temperatures, and erosion have reduced crop yields, water availability, grazing lands, and fishing catches. These impacts have led to loss of income and employment, resulting in livelihood insecurity. While academic literature highlights employment loss as a significant issue, recommendations often focus on promoting resilience rather than directly strengthening the economy. Suggested adaptive measures include enhancing adaptive capacity through various forms of capital (cultural, political, social, human, and natural)²⁹² or social work.²⁹³ While these strategies help mitigate vulnerability, they do not necessarily foster economic development and job creation.

²⁸⁸ Ibid.

²⁸⁹ Bank, African Development. 2019. "Climate Change in Africa." Text. African Development Bank Group. African Development Bank Group. November 28, 2019. <https://www.afdb.org/en/cop25/climate-change-africa>.

²⁹⁰ Al-Zu'bi, Maha, Sintayehu W Dejene, Jean Hounkpè, Olga Laiza Kupika, Shuaib Lwasa, Mary Mbenge, Caroline Mwongera, Nadia S Ouedraogo, and N' Datchoh Evelyne Touré. 2022. "African Perspectives on Climate Change Research." *Nature Climate Change* 12 (12): 1078–84. <https://doi.org/10.1038/s41558-022-01519-x>.

²⁹¹ Jönsson, J. H. (2019). Overfishing, social problems, and ecosocial sustainability in Senegalese fishing communities. *Journal of Community Practice*, 27(3–4), 213–230. <https://doi.org/10.1080/10705422.2019.1660290>

²⁹² Freduah, George, Pedro Fidelman, and Timothy F Smith. 2019. "Adaptive Capacity of Small-scale Coastal Fishers to Climate and Non-climate Stressors in the Western Region of Ghana." *The Geographical Journal* 185 (1): 96–110. <https://doi.org/10.1111/geoj.12282>.

²⁹³ Jönsson, Jessica H. 2019. "Overfishing, Social Problems, and Ecosocial Sustainability in Senegalese Fishing Communities." *Journal of Community Practice* 27 (3–4): 213–30. <https://doi.org/10.1080/10705422.2019.1660290>.

Policies do address these factors, but their implementation is often unclear. Research suggests that green jobs as an adaptation strategy in Africa will be beneficial to economic prosperity and climate adaptation.²⁹⁴ Although policies and institutions recognize the link between climate change and Employment and advocate for green jobs - positions that contribute to preserving or restoring the environment,²⁹⁵ as an adaptation strategy, the creation and documentation of these jobs remain limited.

It is widely believed that transitioning to a green economy and expanding green jobs in North and West Africa can be successful, provided that effective policies are both developed and implemented. Green jobs, such as those in eco-tourism, climate-smart agriculture, agroforestry, green building, and regenerative farming, promote environmental sustainability while creating economic opportunities. These roles not only support new economic activities but also attract investments and generate additional employment. For this transition to be effective, policies must be well-organized, consistent, and focus on the major risks faced by workers, businesses, and sectors most impacted by climate change. Additionally, policies should adopt a developmental approach that is resilient to climate impacts and environmentally sustainable. They must also be equitable and inclusive, addressing the needs and perspectives of all community groups.²⁹⁶ Most importantly, these policies need to be implemented effectively. A significant issue with the promotion of green jobs by African states is that while these measures are often written into policy, there is frequently a lack of follow-through. Measures must be in place to ensure that African countries are not only committing to green jobs on paper but also taking concrete steps to make these commitments a reality.

It is crucial to understand that green jobs, as a strategy for adapting to climate change, offer distinct advantages over traditional aid and may provide more long-term benefits. Unlike aid, which addresses immediate needs, green jobs foster sustainable economic growth by creating new, local employment opportunities that can endure despite climate shocks. As climate change threatens livelihoods and reduces job opportunities, green jobs offer a stable source of income that extends beyond the temporary relief provided by aid. Green jobs also contribute to social stability by reducing poverty, thereby improving living standards and decreasing the risk of conflict. Additionally, they promote environmental sustainability by supporting practices that protect and restore natural resources. While aid can be beneficial in the short term, green jobs represent a long-term investment in development. They support the growth of a green economy and address the root causes of instability and vulnerability caused by climate change. Focusing on green jobs enables African states to achieve sustainable development that tackles economic, social, and environmental challenges simultaneously, offering a more comprehensive and enduring solution.²⁹⁷ Therefore, policies that focus solely on providing aid to African states do not adequately address the issue of employment loss and are insufficient for mitigating livelihood insecurity in the region. Despite their potential, the effective implementation of green jobs and the transition to a green economy often remains unclear in policy and practice.

²⁹⁴ FSD Africa & Shortlist. (2024). *Forecasting Green Jobs in Africa*.

²⁹⁵ <https://www.ilo.org/resource/article/what-green-job#:~:text=Green%20jobs%20are%20decent%20jobs,energy%20and%20raw%20materials%20efficiency>

²⁹⁶ "State and Trends in Adaptation Report 2021 - Global Center on Adaptation." n.d. Global Center on Adaptation. Accessed December 23, 2024. <https://gca.org/reports/sta21/>.

²⁹⁷ Ibid.

Conclusion

The research paper aims to analyze both academic and policy approaches to climate security in North and West Africa. To do so, the research team addressed the following questions:

1. How are issues of climate security in these regions approached in both academic scholarship and relevant policy materials? Are there differences between these approaches?
2. What theoretical explanations in academic literature elucidate the link between climate change and conflict? What mediating factors are identified and recognized?
3. How do academics propose necessary mitigation measures? Are these suggestions implemented by policymakers, or do they diverge?
4. What are the climate security priorities established by the states in North and West Africa, and how do these priorities accord with or diverge from the priorities of Western states regarding climate security in these regions?
5. How do the climate-related priorities set by international organizations influence the strategies and actions of state and local actors? In what ways do these priorities align or diverge?

As detailed in Section 3.1, the recent academic literature on climate security in North and West Africa largely focuses on links between climate change and conflict. This body of scholarship on pathways between climate change and conflict can be broadly divided into two categories: 1) scholarship focused on connections between climate change-related livelihood insecurity and conflict and 2) literature exploring connections between climate-related mobility and conflict. The extracted academic scholarship also emphasizes the significance of maladaptation regarding states' efforts to mitigate and/or adapt to climate change.

The academic literature on climate security emphasizes the importance of inclusive policy development and stakeholder engagement for dealing with the impacts of climate change. This perspective holds that it is beneficial to include local communities in this process to ensure that all viewpoints and needs within the impacted areas are represented. This can be achieved through participatory approaches involving dialogue and consultation with national and local actors, and community members who are directly affected by climate change and related policies.

Community-based adaptation can be particularly effective, as it leverages local knowledge and expertise regarding the land, agriculture, and ethnic relations. Integrating local and traditional knowledge into climate policies ensures they are culturally appropriate and effective, preventing the implementation of misguided policies like RUGA. National government support is essential for the success of these policies, including providing funding for local initiatives, resources, and capacity building to strengthen local authorities and institutions' ability to manage and adapt climate policies. By implementing these strategies, policymakers can ensure that national climate policies are more reflective of and responsive to the specific conditions and needs of different regions within a country.

Indeed, the need to address the negative impacts of climate change in North and West Africa is quite clear. These regions face immediate and tangible impacts such as water and food insecurity due to diminishing water sources and agricultural resources. Policies should prioritize adaptive agricultural

practices and improving water availability. Additionally, as climate change exacerbates existing tensions and conflicts, policies must address the root causes of these conflicts, including ethnic divisions and equitable resource distribution. Current conflict mediation policies are insufficient in tackling these fundamental issues.

Efforts to address the impacts of climate change have begun taking on increasing importance in the policy space – although the situation is complicated by the different policy priorities and emphases at the national, regional, and international levels, particularly given the collaborative nature of climate policy at the global level. Much of international climate change policy discussion has historically been focused on reducing greenhouse gas emissions, thus mitigating climate change – an issue that is not prominent in the recent academic literature on climate security in North and West Africa. Indeed, given that North and West Africa contribute minimally to global emissions, efforts to reduce emissions in these regions are unlikely to significantly impact global climate change, while stringent emissions reduction targets in North and West Africa could hinder economic growth, poverty reduction, infrastructure development, and energy access, which are vital for regional development. By focusing on immediate needs such as resource management, conflict mitigation, and economic development, North and West Africa can better address the critical challenges posed by climate change.

These imperatives are reflected in the changing international landscape regarding climate policy.

While mitigation of GHG emissions remains central to international climate policy discussions, there has been an increasing emphasis on adaptation to climate change in various sectors, as well as sustainable development alongside mitigation efforts. The 2015 Paris Agreement represented a change in the international conversation regarding climate change by incorporating the topics of adaptation and resilience, as well as prioritizing engagement at all levels of government and with different stakeholders in advancing climate-related actions – in line with the academic perspective that climate policies be developed through inclusive discussions and stakeholder engagement. Accompanied by the UN Sustainable Development Goals, the international climate policy regime has increasingly emphasized resilience and adaptation against the effects of climate change and throughout development – not just on mitigation of climate change, itself, through reduction of GHG emissions.

Except for Libya, all countries in North and West Africa are signatories to the Paris Agreement, dictating aspects of their national climate policies. As part of this process, these states have prioritized reducing GHG emissions, with some specifying concrete mitigation goals regarding cutting emission levels. (As explored in Section 3.2.1, regional states have outlined their climate mitigation and adaptation goals to varying extents in the NDC/INDC documents submitted as part of the Paris Agreement process.) Alongside these mitigation goals and measures, however, many North and West African states have also been prioritizing adaptive measures to deal with climate related impacts, particularly regarding food, water, and energy security. Importantly, this is in line with the African Union's top climate policy priorities, which emphasize adaptation and resilience.

This variegated climate policy landscape has resulted in a patchwork of mitigating and adaptive policies in the countries of interest. While some projects aimed at addressing components of climate security, broadly conceived, have resulted in maladaptive outcomes, cooperation between national governments, regional organizations, and international actors is ongoing across a host of climate-related issue areas, as demonstrated in Section 3.2.2. From collaboration on protecting

transboundary water resources to efforts to build capacity in climate-smart agriculture, states in North and West Africa are pursuing adaptive strategies, with efforts often embedded within transnational cooperative frameworks and/or accompanied by international financial or capacity building assistance through organizations such as the World Bank and the Global Water Partnership. The US, European Union, and other states and intergovernmental organizations are often involved in such adaptive efforts on a project-by-project basis, reflecting increasing emphasis on sustainable development and adapting to climate change in regions including North and West Africa, rather than the historically predominant focus on mitigation through GHG emissions cuts.

Steps to build adaptive capacity in North and West African states are crucial to fostering resilience to climate change in these particularly vulnerable regions. When policies fail to reflect the critical needs of these states, communities bear the consequences, including maladaptation. The ongoing evolution in the policy landscape for climate-related action in North and West Africa – advancing resilience and adaptation, while also pursuing mitigation – is a more promising path forward than one focused solely on mitigating global climate change through reduction of GHG emissions in these regions. And, fortunately, developments on the ground make it clear that despite missteps and maladaptive outcomes, this is a strategy that is increasingly being executed by regional states.



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