Climate-related Security Risks in the Sahel[1]

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Abstract:

The Sahel region faces unprecedented climate-related security risks that amplify existing vulnerabilities and create conditions exploited by non-state armed groups (NSAGs). This paper examines the complex relationship between climate change and the rise of NSAGs, particularly Boko Haram, in the Lake Chad Basin. Through a comprehensive review of contemporary literature, case studies, and recent data analysis, the study demonstrates how environmental degradation, resource scarcity, and displacement contribute to farmer-herder conflicts and create recruitment opportunities for extremist groups. While climate change is rarely the primary cause of conflict, it functions as a threat multiplier that exacerbates poverty, marginalization, and competition over dwindling natural resources. The research reveals how groups like Boko Haram capitalize on climate-induced vulnerabilities to expand their territorial control and recruitment base, thereby undermining regional stability. The paper concludes with policy recommendations for addressing climate security challenges through integrated approaches that combine environmental adaptation with peacebuilding initiatives.

Keywords:
Climate Security; Boko Haram; Non-State Armed Groups; Sahel; Farmer-Herder Conflicts; Lake Chad Basin.

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1. Introduction

The Sahel region represents one of the world's most climate-vulnerable areas, where environmental degradation intersects with complex security challenges to create unprecedented risks for regional stability. Extended in ten countries, among which, Burkina Faso, Cameroon, Chad, Gambia, Guinea, Mali, Mauritania, Niger, Nigeria, and Senegal, the Sahel is characterized by semi-arid conditions that make it particularly susceptible to climate change impacts (UNHCR, 2021). This region experiences significant population mobility, socio-economic fluctuations, political instability, and evolving security dynamics, all of which are increasingly influenced by environmental factors.

The concept of climate security has gained momentum in academic and policy circles as evidence grows regarding the interconnections between environmental change and conflict dynamics. The UN Department of Political and Peacebuilding Affairs (DPPA) provides a comprehensive definition of climate security as "preventing and resolving violent conflicts caused by global warming by improving the management of transhumance corridors, resolving land ownership issues, reducing competition over access to natural resources and extractive industries and fostering agreements over climate adaptation strategies as well as local level resilience and livelihoods" (UN DPPA, 2019, p. 15). This definition encompasses multiple dimensions of climate-security interactions, highlighting the need for multifaceted approaches to address these challenges.

The relationship between climate change and conflict is neither direct nor deterministic. Rather, climate change operates as a threat multiplier that amplifies existing grievances, vulnerabilities, and social tensions (Mach et al., 2019; Goodman, 2024). In the Sahel context, environmental stressors interact with pre-existing factors such as poverty, weak governance, ethnic tensions, and resource competition to create conditions that non-state armed groups can exploit for recruitment and territorial expansion.

1.1 Terminology and conceptual framework

Understanding the climate-security nexus in the Sahel requires an understanding of key concepts. Climate change refers to long-term shifts in global or regional climate patterns, primarily attributed to human activities since the mid-20th century (IPCC, 2021). In the Sahel context, climate change manifests through increased temperatures, altered precipitation patterns, and intensified extreme weather events.

Semi-arid climates are characterized by limited rainfall, high evaporation rates, and degraded soils with low organic carbon content and poor structure (Lal, 2004). These conditions make the region particularly vulnerable to desertification and land degradation.

Transhumance represents a traditional mobile livestock farming method based on regular, seasonal movements following predictable patterns and established routes

(Higazi & Abubakar, 2018). Pastoralism encompasses a broader mode of subsistence involving domestic animal husbandry in grassland environments using household and herd mobility strategies (Galaty, 2015). Nomadism constitutes a specific form of pastoralism where herders travel continuously with their animals throughout the year in search of water and pasture (Blench, 2001).

1.2 Literature review and research gaps

While extensive literature exists on climate change impacts in the Sahel and separate bodies of work address security challenges in the region, research specifically examining the climate-NSAGs nexus remains limited. Notable contributions include Onuoha's (2009) analysis of environmental degradation and conflict in the Lake Chad Basin, Buhaug's (2015) work on climate-conflict linkages in Africa, and more recent studies by Ide et al. (2021) on environmental peacebuilding in the Sahel. However, comprehensive analyses of how climate change specifically facilitates NSAG operations and recruitment remain scarce.

This research gap is particularly significant given the prominence of groups like Boko Haram in climate-vulnerable areas. Recent studies by Okafor and Piesse (2017) and Ide et al. (2016) have begun to address this gap, but more systematic analysis is needed to understand the mechanisms through which climate stress enables extremist group expansion.

1.3 Research question and methodology

This study addresses the following research question: Under the climate security framework, what are the specific links between climate change and the rise and expansion of non-state armed groups in the Sahel, with particular focus on the Lake Chad Basin?

The methodology employs a qualitative desk review approach, synthesizing existing literature, peer-reviewed research, case studies, and contemporary data from international organizations and research institutions. The analysis draws on recent reports from UN agencies, regional organizations, think tanks, and academic sources published between 2018- 2024 to ensure currency and relevance.

2. Climate change and environmental degradation in the Sahel

2.1 Regional climate characteristics and projections

The Sahel region, defined here according to the United Nations Integrated Strategy for the Sahel (UNISS) framework, encompasses a transitional zone between the Sahara Desert and tropical forests, roughly spanning 10° to 20°N latitude. This semi-arid region has experienced significant climatic variations over recent decades, with profound implications for human security and livelihoods.

Current climate projections indicate severe challenges ahead. According to the UNHCR

Climate Risk Profile for the Sahel (2021), temperatures are projected to rise between 2.0°C and 4.3°C by 2080 compared to pre-industrial levels. Precipitation trends remain uncertain but suggest an overall increase in annual rainfall of up to 16mm by 2080, though this masks significant seasonal and spatial variations. Critically, both dry and wet periods are expected to become more extreme, increasing the unpredictability of weather patterns essential for agricultural planning.

Sea level rise poses additional threats to coastal Sahelian communities, with projections

indicating potential saline intrusion into coastal waterways and groundwater reservoirs. The population share affected by at least one heatwave per year is projected to rise dramatically from 4.3% in 2000 to 19.9% in 2080, with an estimated 59 additional very hot days per year anticipated over this period (UNHCR, 2021).

2.2 Agricultural vulnerability and food security

Agriculture forms the backbone of Sahelian economies, making climate vulnerability particularly acute. In Mali, agriculture and livestock production contribute approximately 40% of GDP, while in Nigeria, agriculture employs over 70% of the rural population (World Bank, 2023). However, crop yields for staple grains, including maize, millet, and sorghum, are projected to decline significantly due to temperature increases and changing precipitation patterns.

Current soil quality data from the UN Biodiversity Lab (2023) reveal critical deficiencies in soil organic carbon (SOC) across the region, indicating severely degraded agricultural

capacity. Per capita water availability is declining, driven both by climate change and rapid population growth, with projections suggesting a 40% reduction by 2080 in several Sahelian countries (UNHCR, 2021).

Food insecurity affects an estimated 40% of the Sahel's population, with this figure rising to over 60% in conflict-affected areas (WFP, 2023). This widespread food insecurity creates conditions of desperation that extremist groups exploit for recruitment and territorial control.

3. Climate-driven conflicts: The farmer-herder dynamic

3.1 Traditional coexistence and contemporary tensions

Historically, farmer and herder communities in the Sahel maintained symbiotic relationships based on complementary resource use and seasonal movement patterns. Pastoralists provided livestock products and fertilizer to farming communities while accessing crop residues and water sources. However, this traditional coexistence has deteriorated significantly due to environmental pressures and population growth.

Resource scarcity, desertification, and irregular rainfall patterns have forced herders to deviate from traditional migratory routes, bringing them into increased contact and competition with sedentary farming communities. Climate-induced displacement has

intensified as herders seek viable pastures and water sources, often leading them into territories claimed by farming communities.

3.2 Escalation and militarization

The scope and intensity of farmer-herder conflicts have escalated dramatically. According to the African Union Peace and Security Commissioner (2018), conflicts between pastoralists and farmers across Africa claim more lives than terrorism. In Nigeria alone, over 10,000 people died in farmer-herder conflicts between 2009-2019, with approximately 4,000 casualties occurring in the final two years of this period (Foreign Affairs, 2019).

These conflicts have become increasingly militarized, with both communities acquiring small arms for protection. The proliferation of weapons has transformed localized disputes into prolonged violent confrontations. The March 2018 attack in Ogossagou, Central Mali, exemplifies this escalation, where over 160 people were killed, 70 injured, and hundreds displaced in what the UN Office on Genocide Prevention characterized as ethnically targeted violence driven by the "growing ethnicization of the conflict in central Mali" (UN News, 2019, p. 2).

3.3 Climate change as a conflict amplifier

UN Security Council Resolution 2349 (2017) represents a watershed moment in recognizing climate change as a contributing factor to instability in the Lake Chad region. The resolution explicitly acknowledges that climate change contributes to insecurity through environmental degradation, leading to water scarcity, drought, desertification, land degradation, and food insecurity.

The resolution's significance extends beyond symbolic recognition, as it provides the legal and political framework for addressing climate-security linkages in international peace and security responses. This represents the first explicit acknowledgment by the UN Security Council of climate change as a factor in regional conflict dynamics.

4. Non-state armed groups (NSAGs) and climate vulnerability: The Boko Haram case study

4.1 Regional context and NSAG landscape

The Sahel hosts numerous extremist organizations that exploit climate vulnerabilities. Key groups include Jama'at Nusrat ul-Islam wa al-Muslimin (JNIM), formed in 2017 through the merger of several terrorist organizations, including Ansar Dine and Katibat Macina; the Islamic State in the Greater Sahara (ISGS); and various Boko Haram factions operating primarily in the Lake Chad Basin (Institute for Security Studies, 2025).

For this analysis, we focus on Boko Haram's operations around Lake Chad, where climate impacts are most pronounced and the group's exploitation of environmental vulnerabilities is most evident. Boko Haram, officially known as Jama'atu Ahlis Sunna

Lidda'awati wal-Jihad, has adapted its strategies to capitalize on climate-induced displacement and resource competition.

4.2 Lake Chad environmental crisis

Lake Chad has experienced dramatic shrinkage, losing approximately 90% of its surface area since the 1960s due to climate change, overuse, and altered precipitation patterns (UNEP, 2004). This environmental catastrophe has devastated traditional livelihoods, including fishing, farming, and livestock rearing, affecting approximately 40 million people across four countries.

Recent climate data for Nigeria (1901-2020) shows temperature increases of 1.3°C while annual rainfall decreased by 95mm (Nigerian Meteorological Agency, 2021). In Chad,

summer precipitation has declined by 15% over the past two decades while temperatures increased by 1.2°C since 1975, amplifying drought effects and reducing crop yields (Funk et al., 2012).

4.3 Boko Haram's exploitation of climate vulnerabilities

Boko Haram has systematically exploited climate-induced vulnerabilities through several mechanisms. The group has established control over remaining water sources and fertile lands, imposing taxes on communities seeking access. This strategy leverages resource scarcity to generate revenue and establish territorial authority (International Crisis Group, 2020).

High unemployment rates, particularly among youth, create recruitment opportunities. In northeastern Nigeria, 76% of the population lives in poverty, while youth unemployment reaches 65% in rural areas (National Bureau of Statistics Nigeria, 2022). Chad shows similar patterns with youth unemployment at 22% and rising (World Bank, 2023).

Boko Haram systematically raids pastoralist communities for cattle and farming communities for grain, exploiting food insecurity to weaken community resilience. The group has poisoned water sources to force population displacement and eliminate competition for scarce resources (UNOWAS, 2018).

Some pastoralist communities have entered into protection agreements with Boko Haram, paying livestock in exchange for unhindered access to grazing areas and protection from other armed groups. This creates an economy where climate stress drives communities to support extremist groups for survival (Tony Blair Institute, 2024).

4.4 Displacement and recruitment dynamics

Climate-driven displacement has created massive population movements that Boko Haram exploits for recruitment. Since 2015, over 71,000 people have fled Nigeria and northern Cameroon to Lake Chad shores, while an additional 2.9 million people remain internally displaced across the region (UNHCR, 2023).

Displacement camps and settlements around Lake Chad have become recruitment grounds where Boko Haram offers economic opportunities to displaced youth with limited alternatives. The group's recruitment strategy emphasizes religious identity and economic necessity, appealing to Muslim youth marginalized in predominantly Christian areas.

5. International responses: Climate security in Peace Operations

5.1 The climate security mechanism

The UN Climate Security Mechanism, established in 2018, coordinates international responses to climate-security challenges. This mechanism supports peace operations in integrating climate considerations into conflict analysis and mission planning (UN Staff College, 2021).

The August 2021 Sixth Assessment Report of the Intergovernmental Panel on Climate Change provided additional impetus for climate security responses, with the UN Secretary- General acknowledging unprecedented climate risks. Subsequently, the Security Council approved climate-related mandates for 11 regional and country-specific missions.

5.2 Regional Missions and Climate Mandates

Special Political Missions with climate-related mandates include:

- UN Office for West Africa and the Sahel (UNOWAS): Focuses on preventive diplomacy and conflict prevention across the Sahel, with specific attention to transhumance-related conflicts and resource competition (UNOWAS, 2023).
- UN Regional Office for Central Africa (UNOCA): Addresses climate-security linkages in Central Africa, including Lake Chad Basin challenges affecting multiple countries.

Peacekeeping Operations have increasingly incorporated climate considerations:

- United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA): Prior to its termination in December 2023, MINUSMA addressed farmer-herder conflicts and resource competition as key stability challenges (UN Peacekeeping, 2023).
- United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic (MINUSCA): Addresses climate-induced displacement and resource conflicts affecting regional stability.

5.3 Resolution 2349 and legal framework

UN Security Council Resolution 2349 (2017) established the legal precedent for addressing climate-security linkages in the Lake Chad Basin. The resolution specifically recognizes climate change as contributing to instability through environmental degradation, water scarcity, drought, desertification, land degradation, and food insecurity.

The resolution mandates enhanced coordination between regional and international actors, improved early warning systems, and integrated approaches addressing both security and environmental challenges. It represents the most comprehensive international legal framework for climate security responses in the Sahel.

6. Analysis and policy implications

6.1 Climate change as a threat multiplier

The evidence demonstrates that climate change works as a threat multiplier in the Sahel, amplifying existing vulnerabilities rather than directly causing conflict. Environmental degradation reduces agricultural productivity, increases resource competition, and forces population displacement, creating conditions that NSAGs exploit for recruitment and territorial expansion.

The Lake Chad case illustrates how environmental crisis enables extremist group operations through multiple pathways: resource control provides revenue and territorial authority; displacement creates recruitment opportunities; economic desperation drives communities to seek NSAG protection; and social disruption weakens traditional governance structures.

6.2 NSAG adaptation strategies

Boko Haram and similar groups have demonstrated a sophisticated understanding of climate vulnerabilities, adapting their operational strategies accordingly. These adaptations include geographic targeting, economic integration, recruitment messaging, and resource warfare.

These groups focus their operations on climate-stressed areas where state presence is weak, and populations are vulnerable. They establish protection economies that exploit resource scarcity. Through their outreach, they emphasize economic opportunity and religious identity in recruitment appeals to displaced and marginalized populations. Ultimately, they weaponize scarce resources through control, taxation, and destruction.

6.3 Policy recommendations

Addressing climate-security challenges in the Sahel requires integrated approaches combining immediate security responses with long-term adaptation strategies.

Short-term measures can include:

a) Enhanced early warning systems linking climate data with conflict risk assessment.

b) Rapid response mechanisms for climate-induced displacement.

c) Improved coordination between humanitarian, development, and security actors.

d) Community-based conflict resolution mechanisms for farmer-herder disputes.

Medium-term strategies must focus on:

a) Investment in climate-resilient agriculture and water management infrastructure.

b) Economic diversification programs reducing dependence on climate-sensitive sectors.
c) Education and employment programs targeting vulnerable youth populations.
d) Strengthened local governance institutions capable of managing resource disputes. Long-term approaches:
a) Regional climate adaptation strategies addressing transboundary challenges.
b) Integrated water resource management for shared river basins and lakes.
c) Sustainable land management practices aiming to reduce desertification.
d) Regional security cooperation addressing climate-related displacement and conflict.

7. Conclusion

This analysis demonstrates that climate change functions as a significant threat multiplier in the Sahel, creating conditions that non-state armed groups exploit for expansion and recruitment. While climate change rarely causes conflict directly, it amplifies existing grievances around resource access, livelihood security, and governance failures that groups like Boko Haram manipulate for strategic advantage.

The Lake Chad Basin exemplifies how environmental degradation enables extremist group operations through resource control, recruitment from displaced populations, and exploitation of economic desperation. The shrinking of Lake Chad has devastated traditional livelihoods for 40 million people while creating opportunities for Boko Haram to establish territorial control and recruitment networks.

Current international responses, while increasingly recognizing climate-security linkages, remain insufficient to address the root causes of vulnerability. UN Security Council Resolution 2349 provides an important legal framework for climate security responses, but implementation requires enhanced coordination between humanitarian, development, and security actors.

Moving forward, effective responses must integrate climate adaptation with conflict prevention, addressing both immediate security threats and underlying environmental vulnerabilities. This requires long-term investment in climate resilience, economic diversification, and governance strengthening rather than purely security-focused approaches.

The Sahel's experience offers important lessons for other climate-vulnerable regions where environmental stress intersects with security challenges. As climate change intensifies globally, understanding and addressing these linkages becomes essential for maintaining international peace and security.

Conflict of Interest

The authors hereby declare that they have no financial interest in this manuscript.

Notes on Contributors

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References

African Union. (2018, September 18). Conflicts between pastoralists and farmers on the continent take more lives than terrorism. https://au.int/en/pressreleases/20180918/conflicts-between-pastoralists-and-farmers

Blench, R. (2001). *You can't go home again: Pastoralism in the new millennium*. Overseas Development Institute Report.

Buhaug, H. (2015). Climate-conflict research: Some reflections on the way forward. *WIREs Climate Change*, *6*(3), 269-275.

Foreign Affairs. (2019, January 23). *The deadliest conflict you've never heard of*. Retrieved June 10, 2025 from https://www.foreignaffairs.com/articles/nigeria/2019-01-23/deadliest-conflict-youve-never

Funk, C., Rowland, J., Adoum, A., Eilerts, G., & White, L. (2012). A climate trend analysis of Chad: Updated rainfall and temperature data. *U.S. Geological Survey*.

Galaty, J. (2015). Pastoralism in Anthropology. *International Encyclopedia of the Social & Behavioral Sciences*. https://doi.org/10.1016/B978-0-08-097086-8.12124-5

Goodman, S. (2024). *Threat Multiplier: Climate, Military Leadership, And The Fight For Global Security*. Island Press.

Higazi, A., & Abubakar Ali, S. (2018). *Pastoralism and Security in West Africa and the Sahel: Towards Peaceful Coexistence*. United Nations Office for West Africa and the Sahel (UNOWAS). Retrieved June 10, 2025 from

https://unowas.unmissions.org/pastoralism-andsecurity-west-africa-and-sahel

Ide, T., Kristensen, A., & Bartusevičius, H. (2021). First comes the river, then comes the conflict? A qualitative comparative analysis of flood-related political violence in Africa and Asia. *Political Geography*(86), 102-117.

Ide, T., Link, P., Scheffran, J., & Schilling, J. (2016). The Climate- Conflict Nexus: Pathways, Regional Links, and Case Studies. *R-Discovery*. https://doi.org/10.1007/978-3-319-43884-9_12

Institute for Security Studies. (2025). Violent extremism erodes local climate resilience in the Sahel.

Intergovernmental Panel on Climate Change. (2021). *Climate change 2021: The physical science basis. Contribution of working group I to the sixth assessment report*. Cambridge University Press.

International Crisis Group. (2020). *The central Sahel: A perfect sandstorm*. Crisis Group Africa Report Nr.227.

Lal, R. (2004). Soil carbon sequestration impacts on global climate change and food security. *Science*, *304*(5677), 1623-1627. https://doi.org/10.1126/science.1097396

Mach, K. J., Kraan, C. M., Adger, W. N., Buhaug, H., Burke, M., Fearon, J. D., Field, C. B., Hendrix, C. S., Maystadt, J.-F., O'Loughlin, J., Roessler, P., Scheffran, J., Schultz, K. A., & von Uexkull, N. (2019). Climate as a risk factor for armed conflict. *Nature*, *571*(7764), 193-197. https://doi.org/10.1038/s41586-019-1300-6

National Bureau of Statistics Nigeria. (2022). *Labour force statistics: Unemployment and underemployment report Q4 2020*. NBS Press.

Nigerian Meteorological Agency. (2021). *Nigeria climate review bulletin: Annual assessment 2020* (NIMET Publications, Issue.

Okafor, G., & Piesse, J. (2017). Empirical investigation into the determinants of terrorism: Evidence from fragile states. *Defence and Peace Economics*, *29*(6), 697-711. https://doi.org/10.1080/10242694.2017.1289746

Onuoha, F. C. (2009). Environmental degradation, livelihood and conflicts: A focus on the implications of the diminishing water resources of Lake Chad for North-Eastern Nigeria. *African Journal on Conflict Resolution*, *8*(2), 35-62. https://doi.org/10.4314/ajcr.v8i2.39425

Tony Blair Institute. (2024). *From Crisis to Conflict: Climate Change and Violent Extremism in the Sahel*. Retrieved June 10, 2025 from https://institute.global/insights/geopolitics-and-security/from-crisis-to-conflict

United Nations (UN). (2023). *UN Biodiversity Lab*. Retrieved June 10, 2025 from https://unbiodiversitylab.org/en/

United Nations Department of Political and Peacebuilding Affairs. (2019). *Climate security mechanism: Annual report 2018-2019*.

United Nations Environment Programme. (2004). *Global International Waters Assessment: Lake Chad Basin, GIWA Regional Assessment 43*. UNEP Report.

United Nations High Commissioner for Refugees (UNHCR). (2021). *Climate Risk Profile Sahel region*. Retrieved June 10, 2025 from https://www.unhcr.org/61a49df44.pdf

United Nations High Commissioner for Refugees (UNHCR). (2023). *Global trends: Forced displacement in 2022*. UNHCR Statistical Yearbook.

United Nations News. (2019, March 28). Central Mali: Top UN genocide prevention official sounds alarm over recent ethnically-targeted killings. https://news.un.org/en/story/2019/03/1035661

United Nations Office for West Africa and the Sahel. (2018). *Pastoralism and security in West Africa and the Sahel: Towards peaceful coexistence*. UNOWAS Press.

United Nations Office for West Africa and the Sahel (UNOWAS). (2023). *UNOWAS mandate and activities: 2022- 2023 report*. UNOWAS Publications.

United Nations Peacekeeping. (2023). *United Nations peacekeeping operations: Annual review 2022- 2023*. United Nations Department of Peace Operations. Retrieved June 10, 2025 from https://peacekeeping.un.org/sites/default/files/a4p_progressreport3_final_aug_1_2023_0.pdf

United Nations Security Council. (2017, March 31). *Resolution 2349: Peace and security in Africa (Lake Chad Basin). S/RES/2349*.

United Nations Staff College. (2021). *Joint efforts for sustaining peace: The UN climate security mechanism*. Retrieved June 10, 2025 from https://www.unssc.org/news-and-insights/blog/joint-efforts-sustaining-peace

World Bank. (2023). *World development indicators: Employment and unemployment statistics*. Retrieved June 10, 2025 from https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS