

Perspective

From drought to displacement: Assessing the impacts of climate change on conflict and forced migration in West Africa's Sahel Region

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ABSTRACT

Across Africa's semiarid Sahel region, temperatures have risen faster than the global average, resulting in severe threats to water access, food security, and human health. Key climate factors such as desertification interact with ethnic and economic tensions, exacerbating violence between pastoral and farming groups competing over degraded productive land and water resources. Mounting climate pressures act as threat multipliers for both violent conflict and internal displacement across countries spanning Senegal to Sudan. This perspective examines intersections of climate change, violent clashes, and forced migration using incidents in Nigeria and Burkina Faso—where droughts, floods and agricultural losses continue to worsen. With 8 million internally displaced persons in the region now, urban areas face overburdened infrastructure while attempting to host influxes of traumatized, impoverished migrants facing further risks. This article argues that integrated policy action is urgently needed to mitigate climate change, enhance community resilience, and protect vulnerable groups to ease cascading humanitarian crises and achieve development goals amid spiraling environmental pressures across West Africa.

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1. Introduction

The United Nations 28th Climate Change Conference of the Parties (COP28) Joint Statement on Climate, Nature and People recognizes the existential threats climate change poses to ecosystems globally while noting that biodiversity underpins sustainable development and livelihoods for billions worldwide [1]. The Sahel region, a semi-arid belt stretching from Senegal to Sudan, is one of the most vulnerable regions to climate change globally. The West African Sahel, as defined by the United Nations Integrated Strategy for the Sahel (UNISS), includes Burkina Faso, Cameroon, Chad, The Gambia, Guinea, Mali, Mauritania, Niger, northeastern Nigeria, and Senegal, all of which share deep historical, cultural, political, and socio-economic ties [2].

Over the past several decades, temperatures in the Sahel have risen 1.5 times faster than the global average, profoundly affecting water resources, land use, food security, and human health [3,4]. The Sahel is highly susceptible to climate change, with impacts that vary across different regions. The area is projected to become progressively hotter, and projections suggest the mean annual temperature could rise by 6 °C by the end of the century [5]. Additionally, some parts of the Sahel are experiencing erratic rainfall patterns, while others face reduced precipitation [2,6]. These shifts, combined with desertification and resource scarcity, are exacerbating climate-related challenges in the region [2,6].

These climate pressures have intensified violent conflict and forced displacement across the West African Sahel [7]. Competition for dwindling resources, including land, water, and grazing areas, has led to violent clashes, particularly in Nigeria, Mali, and Burkina Faso [8,9]. Violent non-state actors have exploited these climate stresses and weak state presence in rural areas [10–12]. This paper underscores that climate change is a significant contributor to the escalation of conflicts, undermining human security, and driving

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displacement, with profound implications for the psychosocial well-being of affected populations.

2. Climatic shifts in the Sahel

The Sahel is experiencing significant global climatic shifts, expected to intensify in the coming decades. These shifts include rising temperatures, changing precipitation patterns, desertification and extreme weather events.

2.1. Rising temperatures

The annual number of very hot days —days with temperatures exceeding 35 °C—is projected to rise substantially [2]. Under the medium-to-high emissions scenario (RCP6.0), regions like northeastern Guinea and southwestern Mali could experience an additional 125 very hot days per year by 2080 [2,13]. This increase in extreme heat poses severe risks to human health, agriculture, and water resources [13,14].

2.2. Changes in precipitation patterns

Higher global temperatures increase the atmosphere's water vapor capacity, intensifying precipitation [2,15]. In the Sahel, these changes manifest in regionally distinct patterns, emphasizing the complexities of climate change impacts as droughts and floods are two phenomena of the same water cycle [2,15]. For instance, northern Chad is projected to experience an additional 7.6 days heavy precipitation days annually by 2080 [2]. Other areas, including parts of Niger, Nigeria, and Cameroon, are also expected to see increases in the frequency of heavy rainfall events [2]. Recent data confirms these trends as August 2024 data shows rainfall levels across Chad and Niger were 120% to 600% above the 1991–2020 average [16]. Meanwhile, western Sahel areas like Mauritania and Senegal are projected to see fewer heavy rainfall days, with northwestern Mauritania's annual heavy precipitation days dropping from 7 in 2000 to 5 by 2080 [2]. These variations demand region-specific climate responses.

2.3. Desertification and land degradation

The Sahel is among the most rapidly desertifying regions globally, with rising temperatures and erratic rainfall accelerating the degradation of arable land. Currently, approximately 80% of the region's farmland is considered degraded, a figure that continues to climb as climatic conditions intensify [17]. This degradation is driven by a combination of factors, including prolonged dry spells and irregular rainfall patterns [18]. As desertification progresses, soil fertility diminishes, further reducing the land's capacity to sustain vegetation and agriculture [18]. This not only threatens food security but also increases the vulnerability of communities reliant on subsistence farming [3]. Effective land management and climate adaptation strategies are crucial to address these challenges.

3. Climate change impacts: intersection of conflicts and displacement in West Sahel

3.1. Internal displacement figures and trends

The West African Sahel is increasingly experiencing the convergence of climate stress and conflict, which heightens insecurity and leads to forced displacement. Climate change is exacerbating conflicts, particularly between pastoral and farming communities, as rising temperatures and increased climate variability threaten the region's fragile ecosystems and biodiversity [9,19,20]. Rising temperatures and erratic weather fuel resource scarcity, reducing economic opportunities, increasing communal conflicts and violence, and

undermine human security, safety and health (Fig. 1: Climate-Conflict-Displacement Nexus) [21]. Resource scarcity due to climate variability often interacts with other conflict drivers, complicating the identification of its direct impacts; however, resource scarcity due to climate variability remains a key factor [22]. For example, an analysis of conflicts from 1997 to 2014 found a 1 °C temperature rise increased herder-farmer conflict by 54% in shared regions, compared with just 17% in areas with single livelihood groups [23]. This interplay of stressors fuels political instability and contributes to state fragility in Chad, Mali, Niger, and Nigeria, all ranking high on the Fragile States Index [24]. Projections suggest that by 2050, over 86 million people in sub-Saharan Africa may be forced to relocate internally due to climate change [25,26]. Within the Sahel, Chad hosts the largest number of refugees and asylum seekers, with half a million, followed by Niger with 250,000 [2]. Burkina Faso, similarly saw internal displacement rise from 72,000 in 2018 to nearly 1 million by 2020 due to violence and drought [2].

The region has become a high-risk area for escalating instability, with the number of internally displaced persons (IDPs) in West Africa surging and climate change being a significant contributor [8,9,21]. For example, Jihadist groups in Mali and Boko Haram in Nigeria have intensified existing ethnic and communal conflicts, displacing even more people [19,27]. Following the collapse of the Libyan regime in 2011, armed uprisings in Mali spread into neighboring countries, contributing to over 4 million displaced persons in the region [2]. As of 2023, over 13.4 million IDPs were recorded in the region, with 8 million in 2022 [27,28]. Nigeria, Burkina Faso, and Cameroon account for 44%, 25%, and 13% of the total IDP population, respectively [26]. This displacement compounds pre-existing pressures, such as weak state institutions, ethnic tensions, and competition for critical resources like land, pasture, and water, while also escalating the risk of recurring attacks by non-state armed groups [2]. Understanding how climate stressors—such as desertification, droughts, and flooding—drive resource scarcity, fuel conflicts, and trigger displacement is essential. Addressing these interconnected challenges is crucial for mitigating resource shortages, supporting vulnerable populations in climate hotspots like the Sahel, and preventing future crises.

3.2. Flooding in the Sahel: A growing threat to lives and livelihoods

Flooding is a destructive consequences of climate change in the Sahel, increasingly endangering lives, livelihoods, and infrastructure. Intensifying precipitation linked to rising temperatures has led to catastrophic disasters, displacing millions and destroying vital resources [16,29,30]. Climate projections consistently warn of worsening extreme precipitation and flood events across West Africa as temperatures rise [29]. In 2022 alone, floods in Nigeria displaced 1.3 million people, destroyed over 80,000 homes, and submerged vast farmland, crippling food production and livelihoods [31].

Scientists link exceptional rainfall and repeated Niger and Benue River flood events to shifting climate systems, warning of increasing future flood exposure [32]. Niger and Burkina Faso face similar threats from the overflowing Niger River, exacerbating human and economic vulnerabilities. Economic and humanitarian tolls from such disasters could eclipse the record-breaking damage of 2022 if urgent interventions are not implemented. Alarming, the region's resources for disaster risk reduction, early warning systems, and climate adaptation remain grossly insufficient, leaving millions exposed to recurrent losses of life, shelter, and food security [29].

Flooding also worsens existing social and political vulnerabilities. In Nigeria and Burkina Faso, environmental stresses caused by floods intensify resource competition among natural resource-dependent groups, further fueling displacement and violence [31]. Extremist factions exploit these vulnerabilities, with insurgents and militias deepening societal instability. Over time, conflicts driven by environmental stresses shift toward political and sectarian violence,

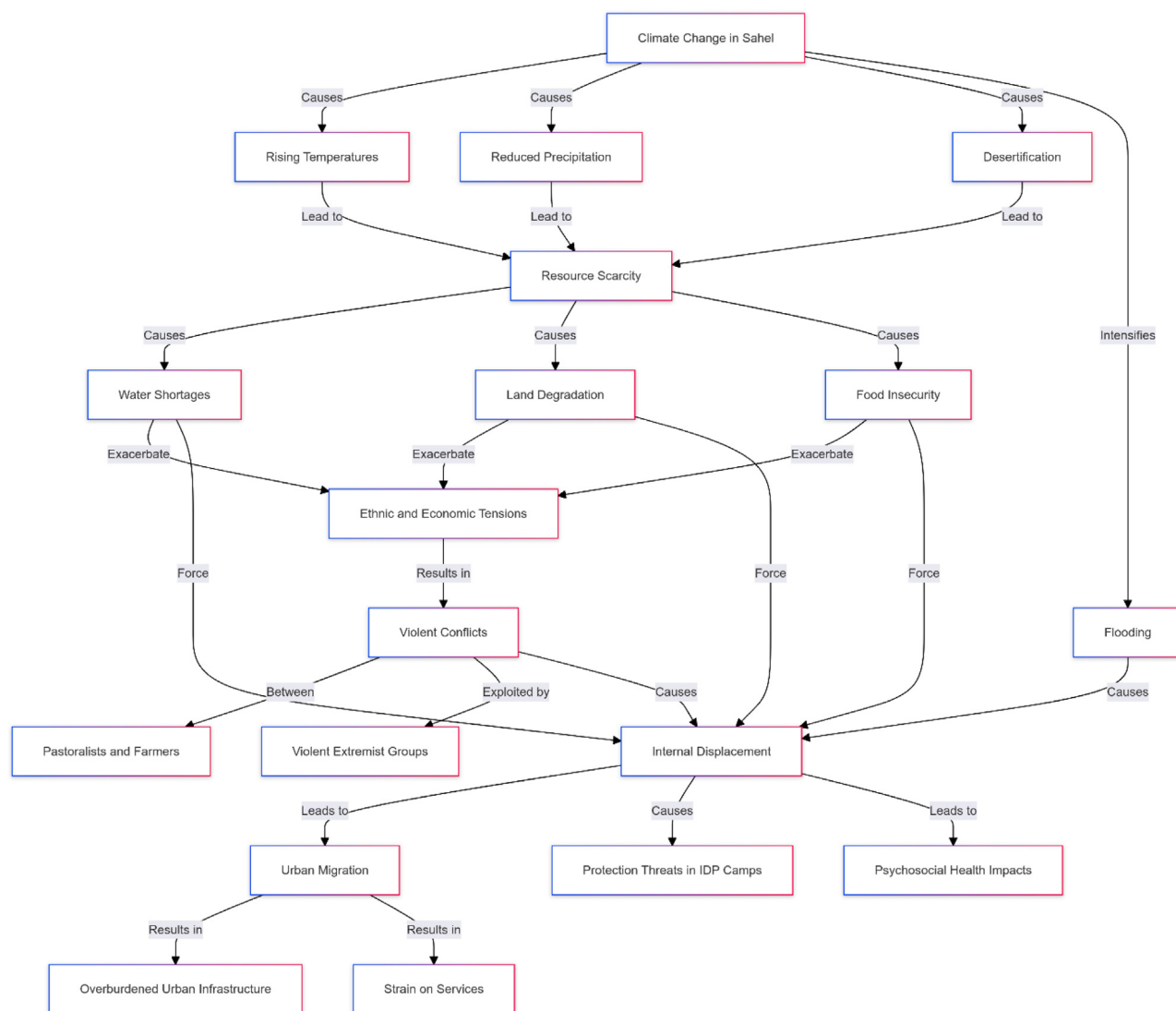


Fig. 1. The climate-conflict-displacement nexus.

highlighting climate change as a "threat multiplier" rather than a direct cause of conflict or displacement [33]. Robust, localized strategies to mitigate flood risks and build community resilience are essential to break this cycle of flooding, displacement, and crises.

3.3. Desertification, drought and ecosystem losses

Research unambiguously links rising desertification across the West African Sahel to more frequent and intense drought episodes in recent decades [34]. The Sahara Desert is estimated to expand at over 11,000 km²/year [35]. In Nigeria, desert features cover 580,841 km², or 63.8% of the landmass, impacting 30 million people, or 17% of the population, across 15 states [36]. Between 1984 and 2016, Nigeria lost 49.3% of its vegetation cover due to rising temperatures, worsening food insecurity and economic instability [18]. Agriculture remains the dominant sector in the Sahel, employing >75% of the population and contributing roughly one-third of the Gross Domestic Product (GDP) [37]. However, reliance on rain-fed agriculture makes the region highly vulnerable to climate impacts, with desertification and droughts having destabilized subsistence farming, depleting water, pasture, and fertile soil and worsening food insecurity [2].

As a result, traditional grazing and croplands are turning to desert, pushing pastoral groups southward in search of resources. Southern

farmers face threats to crops, land, and water, igniting violent confrontations [19]. This migration, combined with the region's limited capacity to support, has led to violent conflicts over land and water [8,19]. Lake Chad, which lost 95% of its surface area due to overuse and climate shifts, exemplifies this destruction, impacting food and water access for over 50 million people across Chad, Cameroon, Niger, and Nigeria [18,38,39]. Consequently, conflicts have erupted over remaining water resources and arable land, forcing extensive internal and cross-border migration of distressed and displaced pastoral groups [38].

For example, in Nigeria, armed groups like Boko Haram have exploited these vulnerabilities, positioning themselves as protectors of herding communities, expanding recruitment and operations in northern Nigeria [10–12]. Since 2009, the insurgency has displaced over 2 million people, creating one of the world's worst humanitarian crises [10–12]. A similar dynamic is unfolding in Mali, Niger, and Burkina Faso, where tensions between farmers and herders have escalated [28]. In Burkina Faso alone, approximately 1.9 million internally displaced persons (IDPs) have been displaced, with increasing violence tearing apart food supply chains and livelihoods for millions [28]. The economic impact of climate extremes is significant, with African countries losing 2–5 % of their GDP annually [40]. Sub-Saharan nations are expected to divert up to 9% of their budgets to

address these challenges, with the cost of adaptation projected at \$30–50 billion annually over the next decade, or 2–3% of the region's GDP [40].

3.4. Pressures on urban areas and infrastructure

The migration of internally displaced persons (IDPs) is reshaping the demographic landscape and urban environments across the Western Sahel. Extreme weather events are having a particularly devastating impact on human settlements and economic hubs, especially in densely populated urban areas. For example, In 2020, heavy rainfall caused the Niger River to overflow, shutting down Niamey and affecting over 240,000 people [2].

By 2050, the region is expected to host >86 million internal migrants, as rural communities increasingly escape climate-related threats and violence [26]. Poor urban infrastructure is overwhelmed by IDP inflows, increasing risks of disease, malnutrition, and food insecurity. Nigeria's Federal Capital Territory, Abuja, currently hosts 31,000 IDPs in 19 camps [41,42]. Additionally, the town of Ouahigouya in Burkina Faso absorbed an influx of 130,000 IDPs as of April 2022—more than doubling its prior population. This influx strains urban infrastructure, services, job opportunities, and amenities, potentially sparking conflicts with host communities. The lack of essential resources threatens progress toward the United Nations Sustainable Development Goals (SDGs), particularly Goal 3: Good Health and Well-Being, Goal 6: Clean Water and Sanitation, Goal 10: Reduced Inequalities, and Goal 11: Sustainable Cities and Communities. These goals aim to ensure healthy lives, equitable access to clean water, reduced disparities, and the development of sustainable urban environments [43]. Adverse conditions in IDP camps hinder progress on eliminating extreme poverty, ensuring healthy lives, and achieving stability. Young people, especially adolescents, face heightened risks of violence, exploitation, limited access to services, and failure to support them risks perpetuating cycles of crisis.

3.5. Protection threats and mental health and psychosocial impacts

Physical security threats and mental health impacts in IDP camps also raise severe protection concerns. Traumatized, displaced groups already struggling with the loss of homes, assets, and livelihoods face further victimization in camps through violence, abuse, forced labor trafficking and early marriage. Similarly, the disruption of social networks and loss of livelihoods contribute to mental health disorders among displaced populations [44]. Approximately 25 % of IDPs exhibit conditions such as depression, anxiety, and posttraumatic stress disorder, which are linked to trauma exposure and a lack of care [44,45]. Studies indicate far higher rates of these disorders among IDPs than among the general population, with children profoundly impacted [46]. In addition, the risks of suicide, substance abuse and addiction likewise increase with trauma exposure among displaced people [47]. Furthermore, there is disruption in access to mental healthcare among IDPs with existing mental health conditions. Additionally, significant psychological distress has been associated with climate-related events such as extreme weather and prolonged droughts. For example, heat and food insecurity are linked to increased morbidity and mortality rates attributable to mental illnesses, as well as the frequency of psychiatric emergencies [44]. This calls for effective psychosocial interventions to mitigate these impacts [44,45,48].

4. Future perspectives and research priorities

Addressing the internal displacement crisis across the West African Sahel requires urgent aid and policy efforts at the national, regional and global levels. Immediate priorities should include the following:

- Improving climate resilience and shock preparedness for rural communities via climate-smart agriculture, water resource protection and other adaptation initiatives to reduce future displacements.
- Expanding physical, food, health and psychosocial assistance programs tailored to the complex needs of displaced women, men, children, and minority groups.
- Strengthening human security and gender-based violence prevention measures in urban IDP camps and settlements
- Fostering social cohesion and sustainable integration prospects for IDPs within transitional communities
- Improved data collection and coordinated regional strategies dedicated to climate-displaced populations should be established.

In parallel, ambitious international cooperation is essential to address climate change risk and reduce future environmental migration drivers over the long term. Investment in adopting and ensuring the safety of IDPs remains vital as the region faces worsening climate impacts.

4.1. Future research directions

Further research is critical to inform effective solutions and address gaps in understanding the complexities of this crisis:

- **Climate and Conflict Displacement:** Investigate the connections between climate-induced shocks, conflict, and displacement to develop targeted intervention strategies.
- **Vulnerable Populations:** Explore tailored approaches for displaced women, children, and minority groups to ensure inclusive and effective support.
- **Adaptation Effectiveness:** Assess the success of climate adaptation initiatives in reducing displacement risks and strengthening community resilience.
- **Longitudinal Integration Studies:** Evaluate the long-term success of reintegration efforts for IDPs to refine best practices.
- **Innovative Policy Solutions:** Develop regional and international governance frameworks for a coordinated and sustainable response to displacement challenges.

Through collaborative efforts and evidence-based research, stakeholders can develop sustainable solutions that safeguard the rights and well-being of displaced communities while addressing the root causes of environmental migration.

5. Conclusion

Climate change acts as a threat multiplier across the West African Sahel, interacting with ethnic, social, and economic tensions to escalate violence and displacement. The resulting migration patterns risk overwhelming urban areas hosting millions of IDPs, while uprooted groups face health risks, exploitation, trauma, and barriers to integration. Protecting Sahelian communities obliges national policies to increase climate resilience, aid access, and safe resettlement options for IDPs, in line with the COP28 Joint Statement's emphasis on integrated climate-nature action for human security [1]. Regional governments and humanitarians must also cooperate to prepare vulnerable groups for intensifying environmental shocks. Further research is critical to understand the evolving dynamics of climate-conflict displacement, assess the effectiveness of adaptation strategies, and develop innovative solutions for sustainable integration and human security. Prioritizing climate action and support for displaced populations remains imperative to ease escalating humanitarian crises across West Africa.

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Ejemai Eboreime: Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Omelayo Anjorin:** Writing – review & editing, Project administration. **Chisom Obi-Jeff:** Writing – review & editing, Writing – original draft. **Tunde M. Ojo:** Writing – review & editing. **Attila Hertelendy:** Writing – review & editing.

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