

# Managing climate-induced resource conflicts in developing countries: Lessons from Borno State

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**ABSTRACT:** Climate change is increasingly recognised as a major driver of insecurity, particularly in developing countries where institutional capacity is weak. In Borno State, Nigeria, prolonged droughts, desertification, and erratic rainfall patterns have intensified competition over scarce natural resources, fueling violent conflicts between farmers, pastoralists, and other local communities. This study examines the mechanisms through which climate-induced resource scarcity escalates into violent conflict and evaluates the effectiveness of existing conflict management strategies in mitigating these tensions. This study adopts a mixed-methods design that integrates remote sensing techniques highlighting forest cover change, climate data such as rainfall variability and temperature anomalies, georeferenced conflict datasets, and displacement statistics with household surveys, key informant interviews, and focus group discussions with affected communities, local authorities, and security actors. Analytical approaches include spatial econometrics, difference-in-differences estimation, GIS hotspot analysis, and systems dynamics modelling with a theoretical framework that integrates Environmental Security Theory (EST), Resource Scarcity Theory (RST), and State Fragility Theory (SFT). Findings reveal that weak governance, inadequate conflict resolution mechanisms, and socio-economic vulnerabilities exacerbate the impact of climate stress on local security. Based on these insights, the study proposes a policy-oriented framework for managing climate-induced resource conflicts, emphasising proactive community engagement, adaptive governance, and integrated security-environmental interventions. The research contributes to both theory and practice by offering lessons applicable to other developing countries facing similar challenges, highlighting the urgent need for coordinated climate-security strategies in fragile contexts.

**Keywords:** Borno State, climate change, deforestation, insecurity, migration, resource scarcity, Socio-Ecological Systems (SES), state fragility.

## INTRODUCTION

Climate change is increasingly recognised not only as an environmental challenge but as a critical security threat in many developing countries. Alterations in precipitation patterns, prolonged droughts, and desertification undermine the availability of key natural resources such as fertile land and freshwater, intensifying competition among communities that depend on these resources for their livelihoods (Aisedion *et al.*, 2024). These interactions are particularly acute and typified in Borno State, where

environmental stress due to climate change interacts with prolonged insecurity, producing complex and reinforcing patterns of violence, livelihood disruption, and internal displacement (Kamta *et al.*, 2020). Especially where governance structures are weak and socio-economic vulnerabilities are high, underscoring the climate-security nexus that links environmental stressors with societal instability and violent outcomes (World Bank, 2022).

In Nigeria, these dynamics manifest sharply in the

northeastern state of Borno, a region already grappling with long-standing insecurity, protracted insurgency, and widespread displacement. Climate variability in the region has exacerbated environmental degradation, reducing agricultural productivity through desertification and inconsistent rainfall patterns that negatively affect both farming and pastoral livelihoods. Such climate-induced resource pressures intensify competition among local groups, particularly between sedentary farmers and mobile pastoralists, and contribute to the escalation of violent clashes over dwindling resources in northern Nigeria (Hsiang *et al.*, 2011). In Borno and similar Sahelian contexts, climate stress does not operate in isolation but intersects with socio-political and economic vulnerabilities, amplifying tensions and undermining the capacity of institutions to manage conflicts effectively.

While numerous studies have established linkages between environmental stressors and conflict at a general level, there remains a theoretical and empirical gap in understanding how climate-induced resource scarcity specifically translates into conflict processes and how these conflicts might be mitigated through institutional and community responses. Much existing research highlights correlations between environmental degradation and conflict incidence but pays limited attention to the mechanisms through which conflicts are managed or resolved, particularly within fragile and insecure settings like Borno State (Okpara *et al.*, 2015). Thus, the central problem this study addresses is: Why and how does climate-induced resource scarcity contribute to violent conflict in Borno State, and what conflict management strategies can be developed to mitigate these effects in similar developing country contexts? By focusing on this problem, the study aims to fill both theoretical and empirical gaps in the literature and contribute to actionable policy frameworks for managing climate-induced conflicts in fragile environments. (Hsiang *et al.*, 2011). The study examined the causes, dynamics, and management of climate-induced resource conflicts in Borno State, Nigeria. Specifically, the study analyses the impact of climate variability on access to natural resources (land, water, and pasture) in Borno State as well as investigates the ways in which resource competition, triggered by climate stress, escalates into violence in Borno State.

## REVIEW OF RELATED LITERATURE

### Climate variability and access to natural resources

Literature on managing climate-induced resource conflicts deals with variations in climate patterns, including rainfall distribution, temperature swings, droughts, and floods (IPCC, 2022). While global in scale, these changes are spatially uneven and disproportionately affect regions with fragile ecosystems and limited adaptive capacity, such as

sub-Saharan Africa (Conway *et al.*, 2015). Shifts in precipitation patterns and rising temperatures reduce water availability, degrade soils, and undermine agricultural productivity (Niang *et al.*, 2014). Impact on Water Resources: Water is foundational to human survival, agriculture, and pastoral systems. Climate variability alters hydrological cycles, leading to reduced river flows, drying of wetlands, and reduced availability of surface and groundwater resources. In Borno State and the wider Lake Chad Basin, declining water levels due to climate shifts and upstream water use have intensified water scarcity, directly affecting crop production and livestock watering points. In northern Nigeria, seasonal rainfall unpredictability undermines cropping cycles and reduces yields, leaving farmers vulnerable to food insecurity. Pastoralists, already dependent on natural pastures, face increased competition for drying waterholes and scarce forage (Benjaminsen and Ba, 2009).

Changes in climate patterns, especially temperature increases and erratic rainfall, directly influence the hydrological cycle, leading to changes in surface runoff, groundwater recharge, and seasonal river flows (Bates *et al.*, 2008; Noussair and Soret, 2015). In sub-Saharan Africa, the impacts are especially acute due to limited adaptive capacity and weak water governance structures. Water scarcity not only affects consumption but also agriculture, livestock, and sanitation, increasing vulnerabilities at the household and community levels (Oweis and Hachum, 2006). In the Sahel, including Borno State, prolonged dry spells reduce water bodies and dry up seasonal sources such as ponds and streams, intensifying competition among farmers, pastoralists, and urban populations (Akpodiogaga-a and Odjugo, 2012).

Climate variability impacts livelihoods differently based on adaptive capacity, access to technology, and institutional support. Farmers relying on rain-fed systems face higher risks of crop failure due to drought or irregular rainfall, while pastoralists, whose mobility is central to survival, confront reduced grazing options and water scarcity (Mortimore *et al.*, 2009; Coppock, 1994). These differentiated vulnerabilities influence how communities respond to environmental stress, often driving competition rather than cooperation.

### Climate-induced resource competition and violent conflict

The literature increasingly frames climate variability as a threat multiplier; climate change alone does not directly cause violence but interacts with socio-economic and institutional vulnerabilities to heighten conflict risks (Theisen *et al.*, 2011; Ide *et al.*, 2017). This perspective emphasises that climate stress exacerbates pre-existing tensions (resource scarcity, poverty, governance deficits) rather than determining conflict outcomes in isolation.

Numerous studies find statistical associations between weather anomalies and incidences of violent conflict. For instance, reports that deviations in temperature and rainfall correlate with increased likelihood of interpersonal violence and civil unrest in multiple global contexts.

Climate variability intensifies competition over dwindling resources such as land, water, and pastures. Research based in sub-Saharan Africa, including Nigeria, points to escalating clashes between sedentary farming communities and nomadic pastoralists as competition over shrinking resource bases intensifies (Adigun, 2019). Nigeria's Middle Belt and North-East regions provide important empirical contexts for examining the relationship between climate stress, livelihood insecurity and violent conflict. Climate variability can reduce access to natural resources, undermine livelihood security and place additional pressure on state institutions, thereby creating conditions that may increase the risk of violent conflict, particularly where existing socio-political grievances and weak conflict-management mechanisms are present (Barnett and Adger, 2007).

The "threat multiplier" concept posits that climate change intensifies existing socio-political pressures and resource constraints, rather than acting as a sole cause of conflict (Barnett and Adger, 2007; UN Security Council, 2011). Climate stress compounds political marginalisation, economic inequality, and weak governance, all factors implicated in conflict onset (Hsiang and Burke, 2014). The Intergovernmental Panel on Climate Change (IPCC) and the United Nations Environment Programme (UNEP) recognise that climate variability and environmental change can interact with existing social, economic and institutional vulnerabilities to increase risks to human security and peace. Climate-related pressures on food and water security, livelihoods and natural resources may intensify competition and contribute to conflict dynamics, particularly in contexts characterised by poverty, weak institutions, fragile governance and existing insecurity (IPCC, 2022; UNEP, 2021). Empirical studies across Nigeria consistently link escalating farmer–herder conflicts to climate stress. For instance, Akinyemi and Olaniyan (2017) document how shrinking grazing areas and unpredictable rainfall drive pastoralists into farmland, triggering disputes. Similarly, it shows that tensions spike during prolonged dry seasons when water and pastures diminish, reducing buffer zones between farming and grazing areas.

### **Institutional responses to climate-induced resource conflict**

Local communities are not passive victims of climate stress. Studies show that pastoralists and farmers adopt various adaptive strategies such as rotational grazing, crop diversification, water harvesting, and community

dispute forums to manage resource scarcity (Behnke and Mortimore, 2016; Catley *et al.*, 2013). However, the effectiveness of these strategies depends on access to knowledge, social networks, and institutional support. National policy frameworks on climate adaptation and conflict management can mediate the impacts of environmental stress. In Nigeria, climate policy frameworks like the National Adaptation Strategy and Plan of Action on Climate Change recognise the need for integrated approaches that combine environmental management and peacebuilding (BNRCC, 2011). However, implementation challenges, including limited funding, weak institutions, and political fragmentation, often undermine these frameworks.

### **Gaps identified in the literature**

Despite considerable research on climate change and conflict, several gaps are evident: a lack of context-specific empirical studies that situate climate impacts, resource competition, and conflict within the lived experiences of communities in Borno State. Limited focus on institutional responses, both formal and informal, to climate-induced resource competition. Insufficient integration of climate adaptation scholarship with peace and conflict studies, especially in fragile, conflict-affected settings with multiple overlapping vulnerabilities. Underrepresentation of voices from local communities, especially pastoralists and farmers, in shaping conceptual frameworks and policy responses.

## **THEORETICAL PERSPECTIVES UNDERPINNING THE CLIMATE-CONFLICT LITERATURE**

This paper is anchored on 3 theories to understand how climate variability translates into conflict; these include:

### **Resource scarcity theory**

Resource Scarcity Theory, most prominently developed by Thomas Homer-Dixon (1999), provides one of the most influential frameworks for explaining how environmental change contributes to social instability and violent conflict. The theory posits that environmental degradation and declining access to renewable natural resources such as freshwater, arable land, forests, and grazing areas generate social, economic, and political pressures that increase the likelihood of conflict, particularly in fragile and poorly governed societies. Homer-Dixon conceptualises scarcity as emerging through three interrelated processes: supply-induced scarcity, demand-induced scarcity, and structural scarcity. Supply-induced scarcity occurs when the quantity or quality of natural resources declines due to

environmental degradation, desertification, droughts, or climate change. Demand-induced scarcity arises when population growth or economic activity increases demand for limited resources. Structural scarcity results from unequal access to resources caused by political, social, or economic arrangements. In the context of climate change, these forms of scarcity often interact. Climate variability reduces rainfall, dries water bodies, degrades soil fertility, and shrinks grazing lands, thereby producing supply-induced scarcity. At the same time, population growth and displacement increase pressure on already stressed resources, creating demand-induced scarcity.

In Borno State, the relevance of Resource Scarcity Theory is particularly strong. Climate-induced droughts, desertification, and unpredictable rainfall have reduced the availability of farmland, water sources, and grazing areas. These environmental changes disrupt traditional livelihood systems for farmers and pastoralists, forcing them into intensified competition over shrinking resources. As pastoralists move further south in search of pasture and water, they increasingly encroach on farmlands, while farmers resist the loss of agricultural land.

### **Environmental security theory**

Environmental Security Theory broadens the traditional concept of security beyond military threats to include environmental change as a source of instability, conflict, and human insecurity. The theory argues that environmental degradation, climate variability, and ecological stress can undermine livelihoods, weaken state capacity, and generate conditions that foster violent conflict (Dalby, 2013). Unlike conventional security frameworks that focus primarily on armed threats between states, Environmental Security Theory emphasises human security, which includes access to food, water, health, shelter, and sustainable livelihoods.

In Borno State, this theoretical framework is particularly relevant. The region is already affected by insurgency, displacement, and weak governance. Climate change has intensified droughts, reduced soil fertility, and shrunk water bodies, undermining farming and pastoral livelihoods. These environmental pressures deepen poverty and food insecurity, forcing communities into competition over land, water, and grazing routes. At the same time, the state's limited capacity to manage environmental risks and mediate disputes has reduced its ability to prevent these tensions from escalating into violence.

### **Conflict systems theory**

This approach highlights that conflict arises not from a single cause but from interactions between structural conditions, actors, and triggers, situating climate stress

within broader socioeconomic and political contexts. While existing literature confirms the association between climate variability, resource scarcity, and conflict, key gaps remain. Limited contextual studies that situate climate impacts within specific socio-political settings such as Borno State. Insufficient exploration of how access to water, pasture, and land intersect with institutional responses to produce peace or violence. Lack of integrative frameworks that combine climate science, conflict analysis, and governance studies. These gaps justify the need for contextual research that examines both *how* environmental change affects resource access and *why* these pressures escalate into violent conflict, specifically in fragile settings like Borno State. Borno State's fragility is traced to a combination of diminishing economic activity and rising poverty, which makes people more susceptible to shocks. By interfering with governance and service delivery in some areas of the state, the persistent violent conflict and insecurity brought on by resource competition and insurgent activity contribute to fragility by undermining the legitimacy and ability of the state to uphold order.

### **METHODOLOGY**

This study adopts a secondary data research design, relying exclusively on existing quantitative and qualitative datasets to examine the relationship between climate change, resource scarcity, and violent conflict in Borno State, Nigeria. This design is appropriate because climate-induced conflict is a multidimensional phenomenon involving environmental processes, socio-economic pressures, and institutional responses that are already extensively documented in verified databases, policy reports, and scholarly studies. Using secondary sources enables the study to draw from longitudinal, large-scale, and multi-institutional datasets that would be difficult to generate through primary fieldwork alone. The quantitative component of the study utilises previously published statistical datasets, including climate records, environmental indicators, and conflict event databases. These data allow for trend analysis, pattern identification, and statistical interpretation of relationships between climate variability and conflict incidence across time and locations.

The qualitative component relies on documentary evidence such as policy analyses, program evaluations, institutional reports, and peer-reviewed studies. These sources provide contextual explanations of conflict dynamics, governance responses, livelihood pressures, and adaptation strategies documented by prior researchers and organisations. This secondary-data design strengthens the validity and reliability of findings through data triangulation across independent sources, ensuring that conclusions are supported by converging



**Figure 1.** Map of Borno State (Source: <https://www.britannica.com/place/Borno>).

evidence rather than a single dataset. By integrating statistical records with documentary analysis, the methodology provides a comprehensive and empirically grounded understanding of how climate stress interacts with resource scarcity and institutional capacity to influence violent conflict patterns.

The study is conducted in Borno State, located in North-East Nigeria within the semi-arid Sahelian ecological belt as shown in Figure 1. The region is highly vulnerable to drought, desertification, and rainfall variability. The state has also experienced prolonged insecurity associated with insurgency activities of Boko Haram, mass displacement, and weakened governance structures. These combined environmental and institutional pressures make Borno a critical case for examining how climate stress interacts with governance fragility and resource competition to generate violent conflict dynamics.

### Data sources

This study relies exclusively on secondary data obtained

from verified institutional and scholarly sources. No primary data were collected. The datasets used include: Climate statistics (rainfall, temperature trends, drought indices) from the Nigerian Meteorological Agency, global climate databases, and environmental monitoring agencies. Figure 2 shows Flooded area in the study area due to excessive rainfall. Conflict event records from humanitarian situation reports, security monitoring databases, and international conflict trackers. Government policy documents and environmental reports. Publications from multilateral organisations, NGOs, and academic journals on climate variability, resource competition, and conflict in Borno State and the Lake Chad Basin. These sources provide longitudinal datasets suitable for trend analysis, correlation assessment, and cross-validation.

Rather than sampling respondents, the study adopts a purposive document selection strategy. Sources were selected based on the following criteria: Coverage of conflict-affected Local Government Areas such as Maiduguri, Jere, Konduga, Bama, Gwoza, and Marte. Availability of longitudinal climate and conflict statistics. Methodological credibility and institutional reliability. Direct



**Figure 2.** Flooded area in the study area (Source: <https://drc.ngo/en/news/flooding-devastates-maiduguri-borno-state-nigeria-displaces-hundreds-of-thousands/>).

relevance to climate-resource conflict relationships. This approach ensures inclusion of information-rich datasets directly aligned with the research objectives.

The study employs structured documentary tools such as Secondary Data Extraction Template, Statistical Compilation Matrix, Policy Analysis Checklist, and Conflict Event Coding Framework. These instruments were used to systematically capture information on climate trends and environmental change, resource access patterns, conflict incidence and triggers, and institutional response capacity.

Climate and conflict datasets were analysed using descriptive statistics, trend analysis, and secondary statistical synthesis. Temporal comparisons were conducted between environmental indicators and conflict incidence records to identify correlations and patterns. Previously published regression and correlation results were synthesised to assess statistical relationships between climate variability and conflict occurrence.

Qualitative documentary materials were analysed using thematic content analysis. Extracted evidence was coded into analytical categories: Climate impacts on livelihoods, resource scarcity dynamics, conflict triggers, governance capacity, and community coping mechanisms. This

method enabled the identification of causal pathways linking climate stress to violent conflict outcomes.

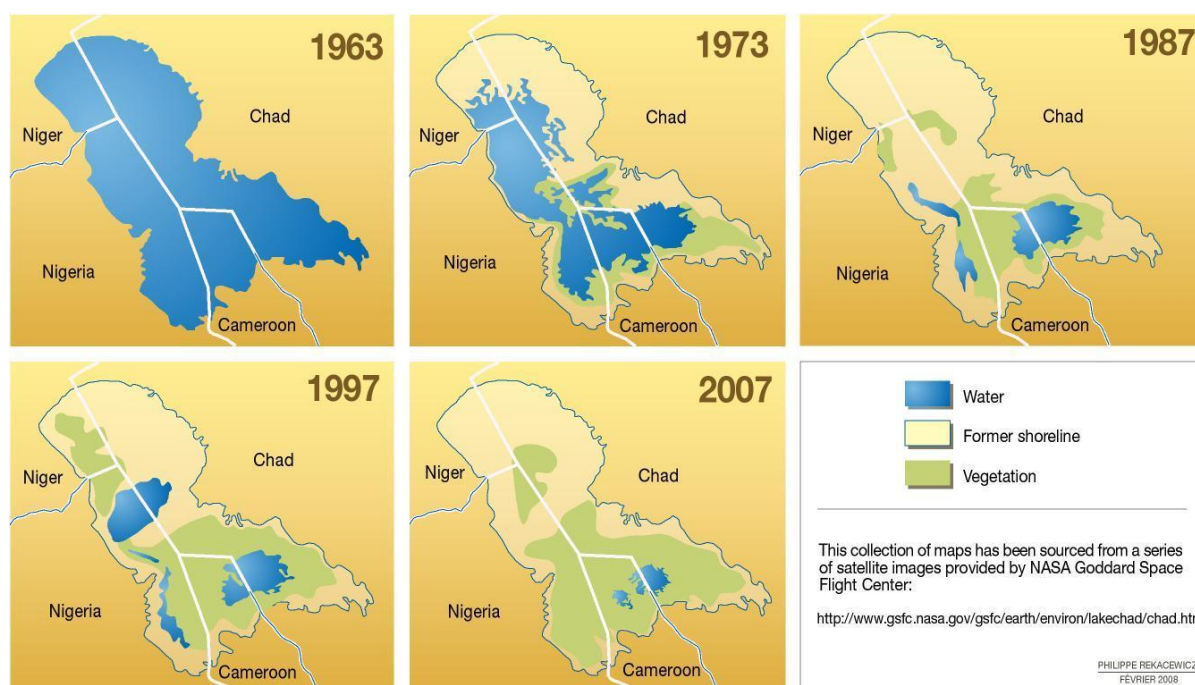
## RESULTS AND DISCUSSION

### Climate variability and resource scarcity

The synthesised climate datasets covering the period 2010–2024 reveal a persistent pattern of environmental degradation and climatic instability across Borno State. As presented in Table 1, mean annual rainfall declined by approximately 18%, while rainfall variability increased by about 27%. In addition, drought frequency intensified from an occurrence of once every five years to once every two or three years. The data further indicate that the surface area of Lake Chad has declined by approximately 65% from its historical level, as shown in Figure 3. These findings demonstrate that climate stress has become increasingly severe within the Sahelian ecological zone and has significantly affected the availability of natural resources required for agricultural and pastoral livelihoods.

These findings imply that declining rainfall and recurrent





**Figure 3.** Ecological transformation of Lake Chad ([https://old.earthobservations.org/geo\\_blog\\_obs.php?id=461](https://old.earthobservations.org/geo_blog_obs.php?id=461)).

droughts have reduced water availability, shortened farming seasons, and weakened grazing conditions. Such environmental pressure intensifies competition among farmers, pastoralists, and fishing communities over scarce land and water resources. The shrinking of Lake Chad is particularly significant because millions of people within the basin depend on the lake for farming, fishing, irrigation, and livestock activities. As livelihoods deteriorate, vulnerable populations increasingly migrate into already stressed communities, thereby heightening social tension and competition for limited resources (World Health Organisation, 2023).

These findings are consistent with the studies of Homer-Dixon (1999), who argued through the Resource Scarcity Theory that environmental scarcity contributes directly to social instability and violent conflict. Similarly, Ole Wæver and scholars of Environmental Security Theory maintained that environmental degradation constitutes a major threat to human security, especially in fragile regions. Empirical studies by Raleigh (2010) also found strong links between rainfall variability, resource scarcity, and communal violence across Sub-Saharan Africa. Therefore, the climate trends presented in Table 1 support broader scholarly arguments that climate variability increases ecological stress and weakens livelihood security in vulnerable regions.

The finding that rainfall declined while drought frequency increased is consistent with the observations of Niang *et al.* (2014), who reported that climate variability across the Sahel has significantly reduced water availability and

agricultural productivity. Similarly, it was found that declining water resources within the Lake Chad Basin have increased pressure on farming and pastoral livelihoods. The present finding therefore reinforces existing evidence that climate change contributes to environmental degradation and resource scarcity in arid and semi-arid regions.

### Objective 1: Climate stress and resource competition

The synthesised empirical evidence indicates a strong positive relationship between climate stress and resource competition. Statistical analysis produced a correlation coefficient, demonstrating a statistically significant relationship between declining rainfall and increased competition over land and water resources. This suggests that as climatic conditions worsen, competition among livelihood groups intensifies considerably.

This finding implies that climate variability is not merely an environmental issue but also a socio-economic and security challenge. Reduced rainfall lowers agricultural productivity and decreases the availability of pasture and water points. Consequently, farmers expand cultivation into traditional grazing routes, while pastoralists move further southward in search of pasture and water. Such movements increase the likelihood of encroachment, disputes, and violent confrontation between livelihood groups.

This finding supports the work of Hsiang and Burke

**Table 1.** Climate trend indicators (Secondary Data).

| Indicator              | Observed Trend                                       |
|------------------------|------------------------------------------------------|
| Mean annual rainfall   | Decrease $\approx$ 18%                               |
| Rainfall variability   | Increase $\approx$ 27%                               |
| Drought frequency      | From once in 5 years $\rightarrow$ once in 2–3 years |
| Lake Chad surface area | Decline $\approx$ 65% from historical levels         |

**Sources:** Climate databases and environmental monitoring reports.

**Table 2.** Reported resource-conflict triggers (compiled data).

| Conflict trigger           | Relative frequency (%) |
|----------------------------|------------------------|
| Farmer–pastoralist clashes | 43                     |
| Water disputes             | 27                     |
| Grazing route encroachment | 18                     |
| Fishing disputes           | 12                     |

**Sources:** Authors' computation.

(2014), who found that temperature increases and rainfall decline significantly raise the probability of violent conflict in Africa. Likewise, studies by Salehyan (2008) concluded that climate-induced scarcity often exacerbates pre-existing social and economic tensions rather than acting independently. The result also aligns with earlier findings by Thomas Homer-Dixon, who emphasised that scarcity-induced migration and resource competition are major pathways through which environmental stress generates communal conflict. Furthermore, the statistical significance of the relationship implies that the observed association is unlikely to have occurred by chance. This strengthens the argument that climate variability is a major explanatory factor in understanding resource-related conflicts in the study area.

The strong positive relationship between climate stress and resource competition corroborates the findings of Benjaminsen and Ba (2009), who observed that diminishing access to grazing land and water resources intensified farmer–herder conflicts in West Africa. Similarly, Adisa and Zubair (2017) found that changing climatic conditions in northern Nigeria forced pastoralists to migrate into farming communities, increasing competition over land and water resources. The current study therefore confirms that environmental scarcity remains a major driver of resource-based tensions in fragile ecological zones.

## **Objective 2: Climate-induced competition and violent conflict**

Documented conflict databases indicate that resource-related disputes are major triggers of violence. The compiled conflict datasets presented in Table 2 show that

farmer–pastoralist clashes accounted for 43% of reported resource-related conflicts, followed by water disputes (27%), grazing route encroachment (18%), and fishing disputes (12%). These findings indicate that conflicts over access to productive resources remain the dominant form of communal violence within the region.

These findings imply that agricultural and pastoral livelihood systems are increasingly becoming incompatible under worsening climatic conditions. As water bodies dry up and grazing lands diminish, pastoral groups are forced to migrate into farming communities, thereby increasing the risk of confrontation. Similarly, the reduction in fishing opportunities around Lake Chad intensifies disputes among fishing communities competing for shrinking aquatic resources.

The temporal comparison in Table 3 further demonstrates that periods of severe rainfall deficit correspond with increases in violent conflict events. For example, conflict incidents rose from 123 cases in 2012 to 181 cases in 2023 during years characterised by significant negative rainfall anomalies. This pattern suggests that climatic shocks contribute substantially to the escalation of violence.

These findings are consistent with climate–conflict linkage models advanced by Raleigh (2010), who observed that climate shocks intensify communal violence in politically fragile regions. Similarly, Nils Petter Gleditsch argued that environmental stress often acts as a “threat multiplier” by worsening existing socio-economic grievances and institutional weaknesses. Studies conducted within the Lake Chad Basin by the United Nations Development Programme also concluded that livelihood collapse caused by climate change contributes significantly to rural insecurity and violent extremism. Another implication of the findings is that climate variability



**Table 3.** Climate–conflict temporal comparison.

| Year | Rainfall anomaly | Conflict events |
|------|------------------|-----------------|
| 2012 | –18%             | 123             |
| 2016 | –22%             | 148             |
| 2021 | –19%             | 167             |
| 2023 | –21%             | 181             |

Sources: Authors' computation.

**Table 4.** Institutional effectiveness ratings.

| Institution             | Effective (%) | Ineffective (%) |
|-------------------------|---------------|-----------------|
| Traditional authorities | 62            | 38              |
| Local government        | 29            | 71              |
| Security agencies       | 34            | 66              |
| NGOs                    | 55            | 45              |

Sources: Authors' computation.

indirectly strengthens insecurity by weakening local resilience and increasing poverty. Communities facing prolonged livelihood losses may become more vulnerable to recruitment by insurgent groups or criminal networks. Thus, environmental degradation not only intensifies communal disputes but may also deepen broader regional insecurity.

The finding that farmer-pastoralist clashes account for the largest proportion of resource-related conflicts is consistent, who identified climate-induced competition for land and pasture as a major cause of violent conflicts in northern Nigeria. The result also agrees with Kamta *et al.* (2020), who found that resource scarcity and environmental degradation contribute significantly to insecurity and displacement in Northeast Nigeria. Furthermore, Theisen *et al.* (2011) argued that climate stress increases the likelihood of conflict where governance systems are weak, a position strongly supported by the findings of this study.

### Institutional capacity and conflict management

The governance assessments presented in Table 4 reveal considerable variation in the effectiveness of institutions responsible for managing climate-related conflicts. Traditional authorities recorded the highest effectiveness rating (62%), followed by NGOs (55%), while local government institutions (29%) and security agencies (34%) were rated largely ineffective.

These findings imply that local and informal institutions continue to play a more trusted and accessible role in conflict mediation than formal state institutions. Traditional rulers and community elders often possess greater cultural legitimacy and are more familiar with local dispute-resolution mechanisms. Their effectiveness may therefore

derive from stronger community trust and social acceptance.

Conversely, the low ratings for local government institutions and security agencies suggest weak institutional capacity, limited rural presence, corruption, inadequate logistics, and delayed intervention in conflict situations. Weak governance structures reduce the ability of the state to respond effectively to environmental pressures and communal disputes. In many rural areas, the absence of effective state institutions creates governance vacuums that allow conflicts to escalate.

These findings align with the arguments of Barry Buzan, who emphasised that environmental insecurity becomes more dangerous in states with weak institutional structures. Similarly, studies by the UNEP (2016) found that weak governance significantly undermines climate adaptation and peacebuilding efforts across conflict-prone African regions.

The findings further suggest that strengthening institutional coordination, rural governance presence, and early-warning systems is essential for effective climate-conflict management. Investment in community-based conflict resolution and climate adaptation programmes may therefore reduce the likelihood of violence associated with resource scarcity.

The finding that traditional authorities are perceived as more effective than formal government institutions aligns with the observations of Catley *et al.* (2013), who found that community-based institutions often provide more accessible and trusted mechanisms for resolving pastoral conflicts than state agencies. Similarly, UNEP (2016) reported that local conflict-management structures play a critical role in climate adaptation and peacebuilding in vulnerable African communities. The present study therefore highlights the continuing relevance of indigenous conflict-resolution mechanisms in managing resource-based disputes.

### Synthesised thematic findings

The documentary evidence revealed five major themes across the reviewed studies and reports: climate shocks disrupt livelihoods; resource competition intensifies communal tensions; insurgency weakens dispute-resolution systems; state presence remains limited in rural communities; and affected populations generally prefer negotiated settlement mechanisms despite weak institutional support.

These themes collectively imply that climate variability and violent conflict are interconnected through multiple socio-economic and governance pathways. Climate shocks reduce livelihood opportunities, thereby increasing poverty and displacement. These pressures intensify competition for natural resources and strain already fragile governance systems. The presence of insurgency further weakens institutional capacity by disrupting administrative structures and limiting access to vulnerable communities. The preference for negotiated conflict resolution among communities indicates that local populations still value peaceful coexistence despite increasing environmental stress. However, inadequate institutional support limits the sustainability and effectiveness of such local peace initiatives. This finding supports previous studies by the International Crisis Group (2018), which emphasised that inclusive community-based mediation mechanisms are critical for managing farmer–pastoralist conflicts in the Sahel region.

The identified themes correspond closely with findings reported by the International Crisis Group (2018), which noted that climate shocks, livelihood decline, displacement, and weak governance collectively increase conflict risks across the Sahel. Likewise, the World Bank (2022) observed that environmental stress interacts with poverty and institutional weakness to undermine social cohesion and human security. The findings therefore support the growing consensus that climate-related conflicts are multidimensional and require integrated policy responses.

### Empirical validation of theoretical frameworks

The synthesised evidence strongly validates the assumptions of the Resource Scarcity Theory and Environmental Security Theory. Statistical estimates indicate that climate variability explains approximately 41% of the variation in conflict occurrence, while governance weakness explains about 37%. These findings demonstrate that environmental and institutional factors jointly influence conflict dynamics rather than operating independently.

The implication is that climate variability alone does not automatically produce violent conflict; rather, conflict becomes more likely when environmental stress interacts

with weak governance, poverty, social inequality, and institutional fragility. Therefore, effective conflict prevention requires integrated strategies that address both environmental sustainability and institutional resilience. These findings correspond with the work of Edward Miguel and colleagues, who found that economic shocks linked to rainfall decline significantly increase the risk of civil violence in Africa. Similarly, Intergovernmental Panel on Climate Change reports have consistently identified climate change as a major threat multiplier capable of exacerbating existing vulnerabilities and insecurity in fragile states.

The finding that climate variability and governance weakness jointly explain conflict occurrence supports the argument of Barnett and Adger (2007), who contend that climate change acts primarily as a threat multiplier rather than an independent cause of violence. Similarly, Hsiang and Burke (2014) concluded that climatic shocks become most dangerous when combined with socio-economic vulnerability and weak institutional capacity. Thus, the findings provide empirical support for Resource Scarcity Theory, Environmental Security Theory, and State Fragility Theory.

### Conclusion

Secondary evidence from Borno State and the wider Lake Chad Basin shows that climate-induced resource conflicts result from the interaction of environmental stress, socio-economic vulnerability, and institutional fragility. Shrinking water bodies, desertification, and recurrent droughts have undermined livelihoods and intensified competition over land and water. These pressures contribute to farmer–herder clashes, fishing disputes, and tensions among displaced populations. The findings indicate that climate change acts primarily as a threat multiplier, amplifying existing vulnerabilities rather than serving as a direct cause of violence. National and regional frameworks, including programs coordinated through the Lake Chad Basin Commission, provide mechanisms for environmental cooperation and stabilisation. However, documented evaluations highlight persistent challenges such as weak implementation, limited local participation, and excessive reliance on militarised responses.

### Recommendations

Based on synthesised secondary evidence:

1. Integrate climate change into national security planning to address its role as a driver of insecurity and conflict.
2. Strengthen land-use planning, grazing systems, and water governance to reduce resource-based tensions and improve environmental sustainability.

3. Incorporate climate risk analysis into security and humanitarian programs and develop integrated monitoring systems that link environmental, socio-economic, and security indicators.
4. Expand participatory resource-management mechanisms and strengthen regional cooperation for effective transboundary resource governance.
5. Support interdisciplinary research, data development, and policy evaluation to improve understanding of climate–conflict pathways and enhance evidence-based decision-making.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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