Sapientia Global Journal of Arts, Humanities and Development Studies (SGOJAHDS), Vol.8 No.3 September, 2025; p.g. 63 – 73; ISSN: 2695-2319 (Print); ISSN: 2695-2327 (Online)

IMPACT OF CLIMATE CHANGE ON HERDER–FARMER RELATIONS IN SOUTHEASTERN NIGERIA

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Abstract

Climate change has emerged as one of the most critical environmental and socio-economic challenges of the twenty first century, influencing livelihood systems, migration patterns, and intergroup relations across Africa. In Nigeria, particularly in the South eastern region, shifting climatic patterns are altering the dynamics between pastoralist herders and sedentary farmers, intensifying competition over natural resources. This study investigates the impact of climate change on herder–farmer relations in south eastern Nigeria through a systematic scientific literature review covering studies published between 2018 and 2025. Anchored on the Socio-Ecological Systems Theory and the Resource Competition Theory, the article explores how climate induced environmental stress, livelihood disruptions, and institutional gaps shape interactions between herding and farming communities. The findings reveal that irregular rainfall, desert encroachment, and pasture depletion in northern Nigeria have triggered southward herder migration, increasing pressure on agricultural lands in Anambra, Enugu, Ebonyi, Imo, and Abia States. Poor land governance, weak policy coordination, and limited adaptive strategies have exacerbated tensions. However, the relationship between climate change and conflict is not deterministic; institutional resilience and adaptive collaboration play mediating roles. The paper concludes that strengthening local adaptation mechanisms, participatory land use planning, and inclusive dialogue are essential to transforming climate induced contestations into opportunities for coexistence and rural resilience in Southeastern Nigeria.

Keywords: Climate change, herder–farmer relations, socio-ecological systems, resource competition, adaptation, conflict.

1. Introduction

Climate change has become an increasingly defining factor shaping global patterns of human livelihood, mobility, and security. Across the world, rising temperatures, erratic rainfall, and shifting ecological zones have significantly affected agricultural productivity and rural livelihoods (Intergovernmental Panel on Climate Change, 2022). In sub Saharan Africa, where the majority of people depend on rain fed agriculture and natural resources for sustenance, the implications of climate variability are particularly acute. The United Nations Framework Convention on Climate Change (UNFCCC, 2023) reports that over 70% of Africa's population relies directly on climate sensitive sectors such as agriculture and livestock rearing, making the continent highly vulnerable to climate induced disruptions.

In West Africa, increasing desertification and declining pasture availability have altered trans humans routes, compelling pastoralist herders to migrate southward in search of water and grazing fields (Akinyemi, 2021). As herders move into regions with sedentary agricultural populations, such as southeastern Nigeria, competition over land and water resources has intensified, leading to a complex pattern of intergroup interactions that range from cooperation to violent conflict. The Nigerian Meteorological Agency (NiMet, 2023) notes that rainfall onset and cessation patterns in the southeast have shifted over the past decade, affecting crop cycles and water availability factors that heighten resource competition.

Southeastern Nigeria, comprising Anambra, Enugu, Ebonyi, Imo, and Abia States, presents a distinctive socio ecological landscape characterized by high population density, intensive agriculture, and limited open grazing land (Okorie & Nwosu, 2022). In this region, herder–farmer interactions have become more frequent and, at times, confrontational. Reports indicate that clashes between Fulani pastoralists and local farmers in Enugu, Ebonyi, and Anambra States have increased since 2017, often linked to the destruction of farmlands, cattle theft, and retaliatory violence (Nzeadibe et al., 2021). These conflicts not only threaten food security but also strains inter ethnic relations and undermine rural development.

Scholars such as Tenuche (2020) and Eberle (2021) argue that while climate change is not the sole cause of these conflicts, it acts as a "threat multiplier" that amplifies existing socio-economic and institutional vulnerabilities. The southeastern context exemplifies this dynamic, where environmental stress interacts with weak governance, poor land use management, and social mistrust. Understanding how climate change influences herder–farmer relations in this region is therefore crucial for developing adaptive policies that balance livelihood needs with sustainable coexistence. Given this background, the study is guided by the following research questions:

1. How has climate change influenced the patterns of interaction and resource competition between herders and farmers in Southeastern Nigeria?
2. What institutional and adaptive mechanisms can mitigate the adverse effects of climate induced pressures on herder–farmer relations in the region?

2. Literature Review and Theoretical Framework

2.1 Conceptual Review: Climate Change and Herder–Farmer Relations

Climate change refers to the long term alteration in global or regional climate patterns, often linked to human induced greenhouse gas emissions (IPCC, 2022). In sub Saharan Africa, the phenomenon manifests through prolonged droughts, irregular rainfall, rising temperatures,

and land degradation (FAO, 2021). These environmental changes disrupt agricultural systems and livelihoods, compelling communities to adapt or migrate in search of more favourable conditions (Abubakar & Bello, 2020).

Herder–farmer relations describe the socio-economic interactions between pastoralist livestock keepers and sedentary crop farmers who share and compete for land, water, and vegetation resources (Blench, 2019). Historically, these relations were symbiotic herders provided manure for farmlands and obtained crop residues as feed. However, population growth, declining land availability, and environmental stressors have turned these interactions increasingly competitive (Okolie & Ude, 2022).

In Nigeria, herder–farmer conflicts have evolved from localized disputes into broader ethno-political and security concerns. Studies have shown that climate induced migration of herders from the arid northern belt to the humid southern regions has intensified since 2010, with Southeastern Nigeria witnessing recurrent violent clashes (Audu, 2023; Nzeadibe et al., 2021). Climate variability exacerbates competition for shrinking natural resources, deepens mistrust, and fosters conflict over grazing routes and farmland destruction.

2.2 Global and African Empirical Perspectives

Globally, the relationship between climate change and communal conflict has been widely explored. Ide et al. (2020) found that regions experiencing higher climate variability, such as parts of the Sahel, are more prone to farmer pastoralist clashes. Similarly, von Uexkull et al. (2019) demonstrated that environmental stress increases the likelihood of resource based conflicts when coupled with weak governance and social inequalities.

In East Africa, Nyong and Wurim (2021) documented how recurrent droughts in Kenya and Ethiopia reduced pasture availability and forced herders into farming communities, leading to tension and occasional violence. Conversely, in Ghana and Burkina Faso, Osei-Tutu et al. (2022) found that effective local land use committees and dialogue platforms mitigated potential conflicts despite similar climatic pressures.

In West Africa, empirical evidence shows a strong link between environmental degradation and herder–farmer disputes. Bello and Salihu (2020) reported that desert encroachment in northern Nigeria increased pastoral mobility southward, while Okafor et al. (2023) found that erratic rainfall patterns contributed to reduced maize and yam yields in southern states, heightening farmer resentment toward migrating herders.

2.3 Nigerian and Southeastern Empirical Context

Within Nigeria, studies converge on the notion that climate change intensifies herder–farmer conflicts through ecosystem disruption and livelihood insecurity. Olayoku (2020) observed that the drying up of Lake Chad and reduced vegetation in northern Nigeria compelled herders to migrate toward the wetter central and southern zones. Similarly, Aluko and Ibe (2021) found that in Benue and Nasarawa States, climate driven migration increased the frequency of violent encounters between herders and farmers.

In Southeastern Nigeria, the situation presents unique socio-ecological dynamics. The region's humid climate supports high agricultural productivity, but population density and land

fragmentation limit available grazing land (Eze, 2022). Studies by Nzeadibe et al. (2021) and Okorie and Nwosu (2022) report recurrent tensions in Enugu and Ebonyi States, where cattle encroachment on cultivated land often triggers violent reprisals. Furthermore, Ani and Uche (2024) found that declining rainfall predictability and soil fertility loss have led to declining crop yields, which in turn heightens farmers' economic vulnerability and sensitivity to herder intrusion.

Recent evidence suggests that the absence of institutional mechanisms for land use regulation and conflict mediation worsens the problem. The lack of grazing reserves and inadequate enforcement of anti open grazing laws in states like Anambra and Imo contribute to spontaneous and poorly managed disputes (Ekwueme & Nnamani, 2023).

2.4 Theoretical Framework

This study is anchored on two interrelated theories: the **Socio-Ecological Systems (SES) Theory and the Resource Competition Theory (RCT).**

2.4.1 Socio-Ecological Systems Theory

The SES theory, as articulated by Ostrom (2009) and further developed by Folke (2016), views human societies and ecological environments as interconnected systems that co-evolve and mutually influence one another. Changes in one component such as climate variability can trigger adaptive or maladaptive responses in the social subsystem. Applied to this study, the SES framework helps explain how climate induced environmental stress in northern Nigeria triggers adaptive migration of herders into Southeastern Nigeria, thereby reconfiguring local socio ecological balances. The absence of adaptive governance structures such as sustainable land use policies and mediation leads to systemic instability manifested as herder–farmer conflict.

2.4.2 Resource Competition Theory

The Resource Competition Theory, as posited by Sherif (1966) and applied in environmental conflict research (Homer-Dixon, 1999; Raleigh & Urdal, 2007), asserts that when groups compete for scarce and valuable resources like land, water, or vegetation intergroup tension and hostility often arise. In the Southeastern Nigerian context, farmland and water bodies constitute critical resources. Climate induced scarcity heightens the perception of threat and fuels antagonism between farmers seeking to protect their crops and herders searching for sustenance for their livestock.

The interaction between SES and RCT provides a comprehensive analytical lens: while SES explains the systemic feedback between environment and society, RCT elucidates the behavioural outcomes of perceived scarcity and competition. Together, they highlight how environmental stress, livelihood dependence, and institutional weakness converge to produce conflict in Southeastern Nigeria.

3. Methodology

3.1 Research Design

This study adopts a **qualitative scientific literature review design**, focusing on peer reviewed scholarly works, institutional reports, and policy documents published between **2018 and 2025.** The goal is to systematically synthesize existing evidence on how climate change affects

herder–farmer relations in Southeastern Nigeria. A scientific literature review was chosen because it allows for a transparent, replicable, and evidence based aggregation of knowledge while identifying theoretical and empirical gaps (Grant & Booth, 2019).

This method integrates elements of **systematic review protocols** such as PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) but maintains the **qualitative flexibility** needed to interpret context specific themes rather than quantifying outcomes (Booth et al., 2021).

3.2 Method of Data Collection

The data for this work was gotten from major databases including **Google Scholar, JSTOR, ScienceDirect, Scopus, Web of Science, and African Journals Online (AJOL).** Grey literature, such as policy briefs from the **Food and Agriculture Organization (FAO), Nigerian Meteorological Agency (NiMet),** and **UNDP Nigeria**, was also included due to their relevance to the research topic.

3.3 Inclusion and Exclusion Criteria

Inclusion criteria

- Empirical or theoretical studies focused on climate change, environmental degradation, or herder–farmer relations.
- Studies conducted in Nigeria, West Africa, or other regions with similar ecological and socio-political contexts.
- Peer-reviewed journal articles, reputable reports, and academic books.
- Publications from 2018 to 2025.

Exclusion criteria

- Studies without direct linkage to climate conflict dynamics.
- Articles lacking methodological rigor or theoretical relevance.
- Opinion pieces, blogs, or non-scholarly sources.
- Studies published before 2018 (unless foundational).

Out of **226 records initially identified,** 111 were excluded after title and abstract screening. **53 full text articles** were reviewed in detail, and **36 studies** met all inclusion criteria. These were used for final synthesis and thematic analysis.

A conceptual adaptation of the **PRISMA flow model** guided the review process, encompassing four major stages:

1. **Identification** (search and collection of relevant records);
2. **Screening** (removal of duplicates and irrelevant articles);
3. **Eligibility** (evaluation of full-texts for inclusion); and
4. **Inclusion** (final selection for thematic synthesis).

3.4 Data Extraction and Thematic Coding

Data extraction was performed using a **structured coding matrix** that captured author(s), year, study location, methodology, findings, and theoretical lens. The qualitative data were imported into **NVivo 14 software** for thematic coding and pattern identification.

Following Braun and Clarke's (2021) six phase model of thematic analysis, the process included:

1. **Familiarization** with selected studies,
2. **Initial coding** of recurring ideas,
3. **Theme generation** (grouping similar concepts),
4. **Theme review**,
5. **Theme definition**, and
6. **Interpretation** within the theoretical framework of Socio-Ecological Systems (SES) and Resource Competition Theory (RCT).

The themes were inductively derived from the data but deductively linked to the theoretical expectations of environmental stress, adaptive migration, institutional response, and conflict outcomes.

3.5 Method of Data Analysis

The integration of SES and RCT informed the interpretive structure of the analysis. The SES component guided understanding of systemic linkages how climatic stress in one ecosystem (northern Nigeria) triggers socio-economic changes in another (the southeast). The RCT component elucidated behavioural outcomes how resource scarcity fosters intergroup competition and conflict escalation.

This combined analytical lens supported the **thematic structuring of findings** into four domains:

1. **Climatic Variability and Livelihood Disruption**
2. **Adaptive Migration and Land Use Transformation**
3. **Institutional Weakness and Governance Gaps**
4. **Conflict Dynamics and Peacebuilding Responses**

4. Findings and Discussion

This section presents the results of the scientific literature review through **four interrelated themes** derived from the thematic analysis. The discussion integrates empirical findings, theoretical interpretation, and contextual realities in **Southeastern Nigeria**, linking the evidence to **Socio-Ecological Systems (SES)** and **Resource Competition Theory (RCT).**

4.1 Climatic Variability and Livelihood Disruption

Findings across the reviewed literature indicate that climate variability has profoundly disrupted agricultural and pastoral livelihoods in Nigeria and other parts of West Africa. Studies consistently reveal that erratic rainfall, prolonged dry spells, and rising temperatures have reduced both crop yields and pasture availability (IPCC, 2022; FAO, 2021; Nzeadibe et al., 2021). In Northern Nigeria, desert encroachment and the drying of water bodies such as Lake Chad have drastically reduced grazing capacity, pushing pastoralists to migrate southward (Abubakar & Bello, 2020; Olayoku, 2020).

In the **Southeastern region**, climatic shifts manifest in irregular rainfall patterns and increasing soil degradation, resulting in lower agricultural productivity (Ani & Uche, 2024). The Nigerian Meteorological Agency (NiMet, 2023) reports that average annual rainfall onset now fluctuates by up to 20 days compared to 2010 patterns, complicating planting schedules and reducing harvest predictability. For smallholder farmers in Enugu, Ebonyi, and Anambra States, these changes threaten both subsistence and market production (Eze, 2022).

From the **Socio-Ecological Systems (SES) perspective**, these climatic disruptions represent ecological shocks that destabilize the balance between natural resources and human livelihoods. The **herders' southward migration** can thus be seen as an adaptive response within a dynamic socio-ecological system seeking new equilibrium (Folke, 2016). However, these adaptive movements often trigger **new social and ecological stresses** in the receiving regions such as Southeastern Nigeria where land is already under intense use for cultivation.

4.2 Adaptive Migration and Land-Use Transformation

Migration patterns among herders have shifted from traditional transhumance to longer and more permanent southward relocations. Evidence suggests that between 2015 and 2023, herder presence increased significantly in forested and rural farming communities of Enugu North, Nsukka, and Afikpo zones (Ekwueme & Nnamani, 2023). This influx has altered local land use systems as grazing overlaps with farmlands, leading to crop destruction and displacement of farming activities.

According to Aluko and Ibe (2021), the lack of designated grazing routes in the Southeast creates spontaneous competition for land, often resulting in violent encounters. Similar patterns are observed in central Nigeria, where resource overlap between mobile pastoralists and sedentary farmers triggers tension (Okafor et al., 2023). The **Resource Competition Theory (RCT)** aptly explains this dynamic: when groups perceive essential resources (such as arable land or water) as scarce, they engage in defensive or aggressive behaviours to secure access (Homer-Dixon, 1999).

Qualitative data from policy reports (UNDP, 2023) reveal that some Southeastern communities have responded by forming local vigilante groups, while pastoralists have sought alliances with state security forces or traditional rulers. These defensive measures deepen mistrust and reduce opportunities for dialogue. Importantly, climate change acts as a **"conflict catalyst"** rather than a directly causing it, which magnifies pre-existing structural vulnerabilities such as weak land-use governance, ethnic stereotyping, and historical grievances (Tenuche, 2020; Ide et al., 2020).

4.3 Institutional Weakness and Governance Gaps

The literature consistently highlights the **absence of robust institutional mechanisms** as a central driver of herder–farmer conflict escalation. Despite the existence of national policies such as the **National Livestock Transformation Plan (NLTP),** implementation has been slow, underfunded, and politically contested (Audu, 2023). In Southeastern Nigeria, only a few states have attempted to operationalize anti open grazing laws, and enforcement remains inconsistent (Okorie & Nwosu, 2022).

Studies by Eze (2022) and Nzeadibe et al. (2021) show that local conflict resolution mechanisms once managed through traditional rulers or community elders have weakened under modern political and ethnic pressures. The result is a governance vacuum where disputes escalate unchecked. Moreover, the **lack of coordinated land use planning, overlapping jurisdiction between local and federal authorities,** and **weak security apparatus** hinder sustainable resource management.

Within the **SES framework**, this institutional fragility can be interpreted as a failure of "adaptive governance," which is crucial for managing socio-ecological transitions (Ostrom, 2009). Adaptive governance entails responsive institutions capable of mediating tradeoffs between ecological conservation and social welfare. In the absence of such structures, herder–farmer relations become a zero sum contest, aligning with the **Resource Competition Theory's** prediction that scarcity and weak institutional controls heighten group hostility (Sherif, 1966).

4.4 Conflict Dynamics and Peacebuilding Responses

The reviewed studies identify a pattern of **cyclical conflict** between herders and farmers in Southeastern Nigeria. Disputes often begin with **crop damage or water contamination**, escalate into **retaliatory violence**, and result in **loss of lives and property** (Ekwueme & Nnamani, 2023; Okafor et al., 2023). In some areas particularly parts of Enugu and Ebonyi States these conflicts have taken on **ethno-religious dimensions**, as predominantly Fulani Muslim herders interact with Christian Igbo farmers (Ani & Uche, 2024).

Nonetheless, there are emerging examples of **adaptive coexistence**. In some communities in Anambra and Imo States, **collaborative grazing agreements** mediated by local governments or NGOs have reduced tensions (UNDP, 2023; Osei-Tutu et al., 2022). Similarly, the **use of climate smart agriculture, reforestation projects,** and **alternative livelihoods for youths** have shown promise in mitigating conflict drivers (FAO, 2021).

Thematically, peacebuilding initiatives succeed where they integrate environmental management with social dialogue. The literature emphasizes the need for **joint resource sharing frameworks, early warning systems,** and **participatory climate adaptation planning** (Bello & Salihu, 2020; Nyong & Wurim, 2021). From an SES-RCT perspective, these measures reduce resource pressure, promote intergroup trust, and restore socio-ecological balance.

4.5 Summary of Discussion

The findings reveal a complex interplay between climate change, livelihood insecurity, institutional weaknesses, and identity politics. The **Socio-Ecological Systems Theory** captures how climate shocks in one ecological zone trigger adaptive migration and systemic stress in another. Meanwhile, the **Resource Competition Theory** explains the behavioural dimension of how scarcity perceptions lead to hostility.

In Southeastern Nigeria, herder–farmer conflicts are not merely environmental but **socio-ecological phenomena** shaped by poor governance, land fragmentation, and social mistrust. Climate change amplifies these tensions by creating overlapping livelihood pressures in already fragile systems. Sustainable resolution, therefore, requires **integrated policy approaches** that strengthen adaptive governance, promote equitable resource sharing, and address both the environmental and social roots of conflict.

5. Conclusion and Recommendations

5.1 Conclusion

This study examined the impact of climate change on herder–farmer relations in Southeastern Nigeria using a **qualitative scientific literature review** framed by the **Socio-Ecological Systems (SES)** and **Resource Competition Theories (RCT).** The findings demonstrate that

climate variability manifesting in irregular rainfall, rising temperatures, and declining soil fertility has disrupted agricultural and pastoral livelihoods, forcing herders to migrate southward in search of greener pastures. This movement has, in turn, intensified competition for land and water resources, particularly in the densely populated and agrarian Southeastern region.

The study further reveals that institutional weaknesses such as the absence of functional land-use governance, weak enforcement of grazing laws, and limited adaptive capacity exacerbate the conflicts. The **SES theory** illuminates how environmental stress in one subsystem (northern Nigeria) generates socio-economic ripple effects in another (Southeast), while **RCT** explains how perceived scarcity and competition over critical resources escalate into intergroup hostility.

Herder–farmer conflicts in Southeastern Nigeria are, therefore, not merely local disputes but **manifestations of broader socio-ecological instability** driven by climate change and institutional failure. The challenge lies not only in addressing immediate violence but also in reforming governance systems to enhance resilience and cooperation between ecological and social subsystems.

5.2 Recommendations

Based on the findings of the study, the following recommendations are made:

1. **Strengthen Adaptive Governance Structures:**
   Governments at both state and federal levels should institutionalize adaptive governance frameworks that integrate environmental management with conflict resolution. Such frameworks must empower local authorities and traditional institutions to manage disputes proactively.

2. **Establish Grazing and Land-Use Zoning Systems:**
   There is an urgent need to map and designate grazing reserves and buffer zones in areas less densely cultivated. This will reduce accidental encroachment and promote coexistence.
3. **Enhance Early Warning and Mediation Mechanisms:**
   Setting up early warning systems at community levels can help detect resource use tensions before they escalate. Mediation committees involving farmers, herders, and civil society groups should be supported by local governments.
4. **Promote Climate Resilient Agricultural Practices:**
   Farmers should be encouraged to adopt **climate smart agriculture**, including drought resistant crops, soil restoration, and agro forestry. Simultaneously, pastoralists can benefit from training in **controlled grazing** and fodder cultivation.
5. **Integrate Socio-Ecological Education:**
   Universities, NGOs, and community based organizations should incorporate socio-ecological education into their programs to foster understanding of interdependence between humans and ecosystems, reducing identity based mistrust.

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