

A Review of Climate Change, Fodder Degradation and Access Deprivation as Drivers of Farmer - Herders' Conflict, Unsustainable Livestock Production and Insecurity in North-Western Nigeria

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Abstract

Climate change-induced fodder degradation and access deprivation have emerged as significant drivers of conflict between farmers and herders, exacerbating insecurity in North Western Nigeria. This review article delves into the intricate relationship between climate change, livestock production, resource access, and conflict dynamics in the region. The impacts of climate change on fodder availability and quality, compounded by unsustainable grazing practices, have led to dwindling resources for livestock, thereby heightening competition and tension between farmers and herders. Drawing upon geographic, ecological, and socioeconomic perspectives, this review analyses the environmental and socioeconomic contexts shaping the conflict landscape in North Western Nigeria. Moreover, it examines the concept of relative deprivation among herders, exploring how perceived disparities in resource access fuel intergroup conflicts. The study also underscores the multifaceted nature of conflict root causes, including environmental degradation, climate variability, population growth, historical grievances, and governance challenges. Additionally, it highlights the role of policy interventions and sustainable resource management strategies in mitigating conflict and promoting peaceful coexistence between farmers and herders in the region. Ultimately, this review underscores the urgent need for holistic approaches that address both environmental degradation and socioeconomic disparities to foster sustainable development and peace in North Western Nigeria.

Keywords: Access Deprivation; Climate Change; Farmers-Herdsmen Conflict; Fodder Degradation; Insecurity; Livestock Production.

1.0 Introduction

Climate change, primarily driven by the emission of greenhouse gases (GHG), leads to increased temperatures and atmospheric warming (IPCC, 2013). The livestock sector is a significant contributor to global GHG emissions, accounting

for about 14.5% (Gerber *et al.*, 2013). Rising GHG emissions globally result in severe land degradation, loss of biodiversity, reduced water availability, and increased air pollution (Bellarby *et al.*, 2013; Thornton & Gerber, 2010, Birendra & Ashisan, 2016). Climate Change poses significant threats to global livestock systems due to its impacts on global warming and associated changes in climate variables, affecting animal feeds, water resources, animal health, and production, and impacting the processing, storage, transport, retailing, and consumption of livestock products (Godde *et al.*, 2021).

Livestock production has been crucial to human civilization, responsible for 12% of anthropogenic GHG emissions (Petr *et al.*, 2014). Sustainable intensification of livestock production systems, supported by sustainable fodder production, may become a key climate mitigation technology. However, livestock production systems vary globally, and the potential impacts of climate change on these systems are a significant concern (Godde *et al.*, 2021). The global demand for livestock products is expected to double by 2050, driven by improvements in living standards. However, climate change threatens livestock production by affecting the quality of forage, livestock feed, water availability, disease incidence, and overall biodiversity (Melissa *et al.*, 2017). Livestock production is a vital agricultural activity, contributing significantly to global food security by providing 17% of global kilocalories and 33% of global protein consumption (Melissa *et al.*, 2017). Recent data indicates that the livestock sector contributes 15% and 31% of global per capita calorie and protein supply, respectively, with regional variations (FAOSTAT, 2020). These changes can be attributed to the impact of climate change on livestock production globally.

Climate change has directly or indirectly influenced agricultural production worldwide, including crops, forage, horticulture, vegetables, forests, livestock, and fisheries. Significant changes in ecological systems have been recorded, and rapid climate change affects ecosystems and species' ability to adapt, increasing biodiversity loss (Birendra & Ashisan, 2016). Fodder crops play a crucial role in combating climate change across different regions. However, climate change has reduced grazing areas, leading to fodder crises, decreased green fodder yield (GFY), and reduced milk and meat production. These effects can result in loss of rural household income, unemployment, and dietary nutrition supply worldwide (Birendra & Ashisan, 2016). Sustainable fodder/forage/pasture management can offer ways to provide quality feed to dairy cattle, reduce livestock emissions, build and store carbon in the soil, and mitigate the effects of climate change (EIP-

AGRI, 2020). More research is needed to improve fodder yield and livestock feeds, particularly in understanding the interaction between climate change and livestock production (IPCC, 2014; Aydinalp & Cresser, 2008).

Livestock production in Nigeria faces challenges such as communal land disputes, cattle rustling, and limited access to grazing resources (Saifullahi *et al.*, 2021). Unsustainable grazing practices and climate change contribute to the degradation of grazing lands (Ayansina & Stephen, 2019). Climate change directly impacts food security and the rural economy in Northern Nigeria (Grace, *et al.*, 2016). Unsustainable grazing has affected vast grazing lands in Northern Nigeria, leading to relative deprivation among herdsmen (Kingsley & Charles, 2020).

The root causes of Farmer-Herder's conflict in North-Western are both natural and man induced. Climate change contributed to loss of available grazing lands and water sources. The social and economic conditions as well contributed to escalating condition of violence. Farmer herder conflict is one of the major problems militating against rural economic development and consequently affecting Gross Domestic Product (GDP). The problem led to many security challenges such as banditry, kidnapping and robbery. The review intends to examine how climate change affect vegetal and grazing land degradation, resource access deprivation such water and fodder which are considered as drivers of forest and fodder degradation leading to farmer-herder's Conflict and Insecurity in north- western Nigeria. This review also aims to examine causes of farmer-herders conflict as found by different researchers and recommend possible solutions to the problems examined.

2.0 Conceptual Clarifications

2.1 Climate Change

Climate Change is the long term-shift in climatic variables or elements and weather patterns. These changes may be natural, but anthropogenic activities has been identified as the major driver of climate change, primarily due to burning of fossil fuels such coal, oil and gas which produces Green House Gases (GHGs). The resulting changes in global climate is altering the complex web of systems that allow life to thrive on earth such as rainfall, wind patterns, ocean currents and distribution of plant and animal species. Climate change is already affecting regions around the world. Unabated, its future negative impacts will likely be vast, costing much more than preventing it (IPCC, 2018, IRENA, 2019a, IRENA, IEA and REN21, 2018).

2.2 Access Deprivation

The social science approach to access deprivation describes it as the state of lacking access to resources and opportunities that are necessary for social well-being. These resources consist of the occupational status, educational level, financial status, socio-economic status and residence in a deprived area. The concept of social deprivation and social exclusion share a similar focus on the inability of individuals to participate fully in the life of their community or society. Two types of access deprivation are identified, Absolute Deprivation (AD) and Relative Deprivation (RD). Absolute Deprivation refers to lack of basics of life such as water, shelter, water and fuel. While Relative Deprivation is, the type experienced when individuals living status is less when compared with others, this made those individuals feels deprived (Atkinson et al, 2014). Natural resources deprivation in this context will be a situation whereby access to natural capital such as water, vegetation, soil, and other natural endowments are deprive for individual or community.

3.0 The Study Area

3.1 North Western Nigeria Geographic Outlook

North western Nigeria is located between latitudes 12°N to 14°N and longitudes 3.000°E to 10.350°E, comprising seven states: Katsina, Kano, Jigawa, Sokoto, Kebbi, Kaduna, and Zamfara. The region covers approximately 226,662 km², representing one-fourth of Nigeria's total land area. The area falls within the Sudan Savanna region, characterized by a tropical savanna climate (Tropical wet and dry climate described as Aw climate by Koppen) with distinct wet and dry seasons. Annual rainfall ranges from 450mm in the North to about 1000mm in the Southern part, with an unpredictable and unreliable pattern. The mean annual temperature is between 26°C and 28°C, but can exceed 40°C at the beginning of the rainy season (Udo, 1970, Hess *et al.*, 1996; Mortimore & Adams, 1999, Zakariyya & Muhammed, 2018 and Maiwada *et al.*, 2020).

Ecologically, the Sudan Savanna zone of North western Nigeria is dominated by grasses suitable for livestock grazing and scattered trees that can withstand drought. Human activities such as grazing and land cultivation have largely modified the vegetation, leading to its degradation. Indigenous and exotic plants are found in farmlands, forest reserves, and settlements, Some of the indigenous plants include, *Parkia biglobosa*, *Prosopis africana*, *Annegesus leocarpus*, *Tamarindus indica*, *Diospyros mespiliformis*, *Vitex doniana*, *Adansonia digitata*,

Balanites aegyptiaca, *Brudella farruginea*, *Andropogons gayanus*, *Emperata Cylindrica*, *Casia hirtusa*, *Casia saberiana*, *Acacia nilotica*, *Acacia seyel*, *Combretum glutinosum*, *Combretum mole*, *Ziziphus mucronata*, *Ziziphus spina Christie*, *Ziziphus mauritiana*, *Feidherbia albida*, *Cretiva adansonii* etc, and some of the exotic plants includes *Azadirachta indica*, *Eucalyptus cameldulensis*, *Lacocina lacocipala* etc (Tukur, *et al*, 2013).

North western Nigeria is an area of long historical richness of social, cultural and economic endowments that characteristically displayed common system of living. This has gone beyond the reaches of other tribes in the other parts of the country. Economically, agriculture has been the major livelihood strategy of the people. Agriculturally, animal husbandry and field cultivation form the major primary source of production and has been sustainable and catered for the teaming population of the area. Rain-fed and irrigation are two major means of cultivation which directly affect the teaming population by providing job throughout the year. Abundance of grazing and vast agricultural lands contributes to long historical successful of agricultural production. The area specialises in cereals (maize, millet sorghum, rice) and leguminous (peanut, cowpea, soya beans) crop production, with production of more than seventy percent of the grain demand in Nigeria and Neighbouring countries such as Niger, Benin, Chad, Cameroun and Mali (Tukur, *et al*, 2013).

4.0 Climate Change Impact

4.1 Climate Change and Livestock Production in North Western Nigeria

Nigeria experiences two distinct rainy seasons: the long rainy season from April to October and the short rainy season from November to March. Climate change has disrupted these patterns, resulting in irregular rainfall and prolonged droughts in some regions. As a consequence, the availability of natural pastures and water sources for livestock has dwindled, affecting their health and productivity (IPCC, 2014). Changes in local fodder crops composition are being brought on by changes in temperature and precipitation pattern which is a consequent of climate change. As a result of the decline in their nutritional content or an increase in their susceptibility to pest and diseases, several traditional fodder species may no longer be viable for livestock grazing. This emerging trend in the field of livestock production led to the introduction of potential resilient and adaptive fodder species to curtail the perceived problem of fodder shortage and scarcity (World Bank, 2019).

Climate change in Nigeria is manifesting in the form of rising temperatures, prolonged droughts, and increased frequency of extreme weather events. According to the Intergovernmental Panel on Climate Change (IPCC) report, temperature in Nigeria is projected to increase by 1.5 to 2 degrees Celsius by the mid-21st century. These temperature increases are already contributing to reduced fodder quality and availability. High temperatures can inhibit plant growth and decrease the nutritive value of forage crops, thereby compromising livestock health and productivity (IPCC, 2018). The changing climate patterns have also led to increased precipitation variability and prolonged droughts in certain regions of Nigeria. In the northern regions, for example, there has been a noticeable decline in annual rainfall, negatively affecting pasture growth and availability. This has direct implications for livestock farming, as the shortage of fodder can result in reduced animal weight gain, lower milk production, and increased mortality rates (FAO, 2020).

The expansion of arid and semi-arid areas due to desertification and land degradation poses a direct threat to fodder production. In Nigeria's northern regions, where livestock farming is prevalent, these environmental changes have led to the depletion of grasslands and the encroachment of deserts, making it difficult for pastoralists to find suitable grazing lands (FAO, 2019). The impacts of climate change are majorly manifested on desertification and drought occurrences. This is attributed to the climate change vulnerability characteristics of the area (Olagunju, 2015). The effects of climate change on rangelands are highly variable, depending on geographical location, but there is a broad consensus that climate change has altered, and will continue to alter, the onset, duration and intensity of extreme events.

Forage sector is an important part of agriculture, as it makes availability of quality feed to animals. Climate change causes multiple environmental problems which affected fodder crop production. It causes remarkable changes in the composition, growth and development of pastures (Ziervogel *et al.*, 2006, Polley *et al.*, 2013 and Hopkins and Del Prado, 2007). It was observed that factors such as changing precipitation pattern and rates, enhanced evaporation rate, decreased soil moisture content etc. are responsible for changes in diversity of perennial grasses and trees for fodder (Stokes *et al.*, 2008). The area is a zone of intensive grazing and cultivation for the fact that it is characterized with moderate to medium fertile soil for cultivation and fodder growth for grazing activities. However, recent and long fluctuation of climatic variables had contributed too many changes in the physical

characteristics of grazing lands and farm lands. According to Iro (2017) in Adewuyi and Olofin (2018) livestock production in Nigeria is faced with many problems (drought, herdsman-farmers conflict, diseases, climate variability) that affected sustainable animal production particularly North western Nigeria. These problems are of varying nature and degrees, the North suffered dwindling and poor pasture resources status, while the South is more of land scarcity (Moretimore & Wilson, 1965; Awogbade, 1980).

Studies by Babatunde *et al.* (2017) and Ogunwale *et al.* (2019) provide evidence of the adverse effects of climate change on forage production and quality in Nigeria. It was found that the decreased forage availability and increased lignin content in grasses have direct consequences for livestock productivity and health. As a result, it is imperative for farmers, policymakers, and researchers to develop adaptive strategies to mitigate these impacts, such as introducing drought-resistant forage species or implementing sustainable land management practices to maintain forage quality and quantity in the face of a changing climate.

The changing climatic conditions of North western Nigeria is one of the driving force of climate variability and desertification and this has negative effect of pressure on land resources particularly fodder and water for animals (Cecchi & Melesse 2016). Although livestock production has been growing for decades, though with dwindling resources that largely affected by human and environmentally induced factors. The lack of adequate grazing land and climatic variability has restricted livestock production from keeping pace with the growing demand for livestock products. High demand for land resources by the growing population had created land hunger unsustainable production system and consequent poverty among rural and urban dwellers and this leads to a stronger struggle and competition for natural capital among farmers and herders in most part of the region resulting to violent clashes and conflict, thus leading to the loss of innocent lives and property. The escalation of violence in the region led to severe insecurity and threatens agricultural activities and sustainability of livestock production (Ibrahim *et al.* 2018; Bollig 2006; Ayantunde *et al.* 2014; Theisen *et al.* 2013 and Ayantunde *et al.* 2011).

5.0 Drivers of Farmer-Herder Conflict and Insecurity in North western Nigeria

5.1 Forest and Fodder Degradation

Forest resource in Nigeria is facing serious set-backs due to quite a number of reasons that are acting on it which are directly or indirectly acting on the resource

(Forest). Some of the direct factors include; illegal mining, illegal grazing, lumbering, expansion of farmlands, woodfuel extraction etc. while the indirect factors include; population increase which consequentially aggravate demand for environmental resources leading to degradation. Some of these factors/reasons were not addressed squarely by both government and the Nigerian citizenry. The generality of Nigerians does not consider forest as resource that need to be given outmost protection for many generations use. The understanding of the Nigerian populace on forest resource led to its degradation to the current level. It is widely considered that forest in Nigeria is communally owned, hence its massive and unsustainable use.

The consequential effect of forest degradation in northern Nigeria has manifested in recent times, when Nigeria is experiencing multiple violence over vegetal resource among the users. Notably in the vast savannah region of the country where grazing and cultivation is more pronounce and being the major livelihood option for rural majority and some urban households. As identified by Macaulay (2014) more than 80% of the inhabitants of Northern Nigeria are farmers in different aspect of agricultural production (crop production, pastoral farming and nomadic pastoralism). These agricultural activities require sustainable use of the available land, which if not managed properly may lead to the over-exploitation of the natural resource and consequently, degradation. The current condition of natural resource particularly vegetation and water in north western Nigeria is disheartening due to high level degradation leading to scarcity of forage (fodder) for grazing. Barbier (2014) reported that forage degradation and scarcity leads to movement of many poor pastoralists and farmers in Africa (Nigeria inclusive) often resort to moving southwards of the country to a new piece of land for cultivation and grazing. Moreover, Fulani herdsmen in Nigeria were considered as migrant from neighboring countries of West Africa according to some historical evidences, this assertion of many Nigerians has made things so difficult for them in the North not even south. As such moving southward rendered their integrity un-identifiable with other Nigerian ethnicity; access to land resources to its fullest is cumbersome.

Many factors were responsible for herdsmen-farmers' conflict in Nigeria, depending on the cause of the conflict. Farmland and farm produce destruction play a vital role in this case. The struggle for land for grazing by the herdsmen and on the other hand farmers struggling for land to cultivate had overwhelmingly increases the conflict. Other factor also contributes such as; poor governance,

cattle rustling, poor infrastructure, climate change, transformation and problems in agriculture and pastoralism, armed group and attack, impunity and ineffective governance (Gulsah, 2020 and John, 2018).

5.2 Resources Access Relative Deprivation

The concept, Relative Deprivation (RD) has been widely used by different academic disciplines such as Economics, Political Science, Sociology and History to explain violence and its causes among people (Stouffer, 1949, Merton, 1957, Pettigrew, 1967 & Gurr, 2010). Sociologists view Relative Deprivation (RD) as a concept that has been viewed as social comparison between people's interpersonal and intergroup relationships (Smith *et al.*, 2012). On the other hand, political scientists emphasize people's present situation compared with either their past/future desires or deserves selves. However, the basic structure of RD is moderately similar across the different social science disciplines. According to the relative deprivation theory, which Samuel Stouffer first put forth in 1949, people compare their circumstances to those of others in their social group, and the impression of relative disadvantage can result in a variety of psychological and behavioral reactions. When herders in Northern Nigeria perceive a lack of access to grazing pasture, water supplies, or feed in comparison to neighboring herders or other resource users in the area, they are said to be experiencing relative deprivation with relation to vegetative resources (Gurr, 2010).

Agricultural communities in northern Nigeria are currently facing multi-faceted conflict between pastoralists and farmers. The conflicts have caused the loss of human life as well affected resources such as crops, water, grazing lands and livestock negatively. Relative deprivation among herders in Northern Nigeria can lead to heightened competition and conflicts over limited vegetative resources. Research by Mustapha *et al.* (2018) and Smith (2018) in northern Nigeria, highlights how disputes over grazing land and water sources have escalated due to perceived disparities in resource allocation. Relative deprivation among herders in Northern Nigeria has been linked to heightened competition and conflicts over limited vegetative resources. The scarcity of suitable grazing land and forage due to population pressure and climate change exacerbates tensions among herding communities. Livelihood vulnerability is one of the consequences of relative deprivation to herders in northern Nigeria. Relative deprivation can render herders more vulnerable to environmental and economic shocks. When herders have limited access to quality grazing land and forage, their livestock's health and

productivity may decline, increasing the risk of economic instability (Nmadu, 2019).

Another consequence of relative deprivation of vegetation to herders is Migration and Displacement of the Herders. In response to relative deprivation, herders may resort to migration in search of better resources, potentially leading to overgrazing and further resource degradation in new areas. This can result in conflicts with local communities and pose challenges to sustainable resource management (Adejuwon & Bello, 2020). Social Tension is another consequence of relative deprivation, Relative deprivation can strain social relations within and between herder communities and with settled agricultural communities. Research by Adamu and Mshelia (2016) discusses the social tensions that arise when resource disparities lead to perceived injustices, this leads to relative difficulty in recognizing the consequences of relative deprivation on herders in Northern Nigeria. This is as well crucial for the development of policies and interventions aimed at addressing resource disparities and promoting sustainable pastoralism. Government and non-governmental organizations should consider these effects when designing programs for conflict resolution, resource management, and economic support for herder communities. The excessive use of limited vegetal resources driven by relative deprivation can contribute to environmental degradation, such as soil erosion and desertification, further exacerbating the challenges faced by herders. Relative deprivation of vegetal resources can threaten the livelihoods of herders in Northern Nigeria, particularly during periods of drought and resource scarcity. It may lead to increased poverty and food insecurity among herding families (Mustapha & Lawal, 2017 and Bello, 2015).

6.0 Consequential Effects of Climate Change and Fodder Degradation in North western Nigeria.

6.1 Herder-Farmers' Conflict and Insecurity

Competition for resources among users existed when communal resources are scares and stretched. Water and grazing lands are the most crucial resources to the herders while arable land on the other hand is more advantageous to the farmers. The two competing and conflicting land uses had driven the users into a dilemma, leading to unpredictable economic, socio-cultural and political uncertainties. Various research findings indicated that violence among farmers and herders is a long historic event that led to destabilisation of many communities and nations.

The root cause of conflict among farmers and herders could be seen in to two forms; the short term and the long term causes. The short term (immediate) are destruction of crops by cattle, contamination of drinking water source, Sexual harassment of women by herders, harassment of herders by host community, cattle rustling, disregard of herders to constituted authority. While long term (remote) causes are ethnic and religious inclination, poverty, climate change effect, land tenure, land use change or land conversion and rapid population growth, Enwelu *et al* (2015). Moreover, Ofuoku and Isife, (2009) reported that conflicts between farmers and herders in north western Nigeria mainly are destruction of crops by livestock, contamination and blockages of water sources, disregard for traditional authority by pastoralists, over-grazing, women harassment by the herders, bush burning, indiscriminate defecation by cattle on roads, theft and cattle rustling. Tonah (2006) on the other hand viewed farmers-herders conflict in some parts of south and western of Nigeria due to the southward movement of pastoralists into the humid and sub-humid zones of the country. This is promoted by the successful diseases control and the widespread availability of veterinary facilities and improved farming system.

It was majorly found and agreed by majority of the researchers in this field that crop destruction is among the major causes of conflict, though other causes existed. For example; the work of Rabi'u *et al*, (2021) on resource use in Gassol Local Government Area of Taraba state indicated that farmland encroachment/crop destruction, stealing of fish and fishing implements were among the major causes of conflict among farmers, fishermen and herders in the area. Moreover, in attempt to make a general statement on the causes of farmer-herder conflict SPARC (2023) report indicated that there are many causes (cultural, economic, political, social and religious) that interplay. However, there appears to be no consistent narrative in the media on the causes of farmer-herder conflict and a lack of robust evidence. A wide range of causes is given by different authors and sometimes within the same publication, resulting in a complex and often confused picture of the whole process. Further reports of (*The Sun*, 2022), (Boateng, 2022) and (Chime, 2021) in SPARC (2023) indicated that more often, herders and their practices are blamed, for example; Deliberate destruction of crops by pastoralists and cattle rustling by bandits; Destruction of farmland and the terrorizing of farmers by non-resident herders who invade the area illegally; and climate-induced scarcity and related migration as well as crop destruction and encroachment on transhumance corridors, using language such as 'climate wars' and transhumance bringing pastoralists into 'collision' with

farming communities. Table 1 provides a comprehensive outlook of the short and long term causes of farmer-herder conflict in Africa.

Table 1: Causes of Farmer-Herder Conflict

Conflict root cause	Operating variables
Environmental scarcity	Resources scarcity, limited resources, degradation and environmental changes
Climate Change	Climate Change and other description of climate
Population growth	Population growth and population displacement
Historical grievances	Historical grievances and colonization
Corruption	Corruption, bribery, groups with interest in corrupt practices, and concealment of stolen funds
Violence and human insecurity	Broader violence unrelated to farmer–pastoralist conflict, cattle raiding, human insecurity, and weapons proliferation
Tenure insecurity	Tenure insecurity, expropriation, blocked or limited access and insecure land rights
Pastoral mismanagement	Management of land, crop destruction, overgrazing, too many livestock and pastoralist and increased migration.
Poor relationship and ethnic bias	Deteriorating relationship, breakdown of trust, lack of respect, animosity, fear, unaddressed grievances, ethnic bias and negative levels.
Weak or exclusive governance	Poor and exclusive governance system, Policy ; general problems, biases for or against certain groups, pluralism, Institutions ; weak or biased institution. Process ; changes in the livestock sector, modernization, bias, commercialization and privatization, land use change and effects, absence of accountability, politicization, marginalization, exclusion, inequality and power differentials.

Source: modified from SPARC (2023)

It was presented/deliberated extensively at various international forums that herders and their practices can also be blamed, among the main causes of conflict in many sub-Saharan and other African countries. Mariam A, a member of the United Nations (UN) Permanent Forum on Indigenous Issues, at a conference

organized by United Nations in 2019 on the 'Impact of cross-border transhumance on sustainable peace and development in West Africa and the Sahel' disclosed that conflict arise between farmers and herders due to largely scarce resources and how they are allocated and used. The scarcity of the vegetal and water resources pushed out many herders look for pasture for their livestock, and the transhumance characteristics of the herders is a spark in herder-farmer clashes SPARC (2023).

The menace need to be addressed and treated with utmost urgency and importance so as to safeguard the environment and human from degradation. The most disheartening and biased behavior among public is the continuous blame on the herders, however other sectors had also contributed to the problem. To strategically and systematically address the issue, there are key aspects that need to be addressed squarely as reported by SPARC (2023);

“The sheer volume of causes saturating the public domain creates a free-for-all interpretation with ample scope for cherry-picking among policy- and decision-makers, as well as groups with potentially vested interests. Causes can easily be selected and tailored to justify particular actions or interventions, such as: 1) Passing grazing bans to restrict the ‘indiscriminate grazing’ of pastoralists (Olufemi, 2021). 2) Using degradation narratives to ‘legitimize and pave the way for agricultural investments and environmental conservation under a “green economy”’ (Bergius et al., 2020). 3) Using scarcity narratives and the different interpretations of this narrative to justify decisions taken in terms of using ‘underutilized’ resources (Mehta et al., 2019; Scoones et al., 2019). 4) Securitizing and politicizing climate change by linking climate-change-driven migration with violence and insecurity (Benjaminsen and Ba, 2021; Wiederkehr et al., 2022). finally, and perhaps most dangerously, extremist groups and politicians using and manipulating farmer-herder grievances to further specific ends (Boas et al., 2020; Cline, 2020; Ugwueze et al., 2022).

Climate change is among many causes of farmer-herder conflict in north western Nigeria. Many reports indicated that shrinking of grazing lands due to drying of forest reserves and consequent conversion of the land to agricultural lands had pushed herders to the wall of resistivity. Many water sources in most grazing land dried up, leaving the herders with no enough water source for their livestock (Ayansina, 2019).

7.0 Review Findings and Contribution to knowledge

The review made a comprehensive examination of the complex interplay between climate change, environmental degradation, resource access deprivation, and conflict dynamics, particularly within the context of north western Nigeria. The review found out that:

- a. Climate change, manifested through rising temperatures, prolonged droughts, and erratic precipitation patterns, this directly affects livestock production and agricultural livelihoods in north western Nigeria. Some of the specific climatic challenges faced by the region, are dwindling pasture availability and reduced fodder quality, the article contributes to a deeper understanding of the localized impacts of climate change on agricultural systems.
- b. Through the lens of relative deprivation theory, the review sheds light on how resource scarcity, exacerbated by climate change and population pressures, can lead to heightened competition and conflicts over limited vegetal resources among pastoralist communities. This was so by highlighting the vulnerability of herding communities to environmental and economic shocks, the review underscores the need for targeted interventions to support sustainable pastoralism and mitigate conflict risks.
- c. By examining the root causes of farmers-herders conflicts in both the short and long term, the review offers valuable insights into the multifaceted nature of these conflicts. From immediate triggers like crop destruction and water source contamination to deeper structural factors such as land tenure insecurity and historical grievances, the review provides a nuanced understanding of the underlying drivers of conflict in the region.
- d. The review underscores the importance of addressing the underlying drivers of conflict through targeted policy interventions and community-based initiatives. By highlighting the potential consequences of resource access deprivation, such as migration, displacement, and social tensions. The review emphasizes the need for comprehensive approaches that address both immediate conflict triggers and long-term structural factors.

- e. The decline of forests and grazing lands has severe consequences for livestock production. It leads to reduced availability of quality fodder, decreased livestock productivity, and increased vulnerability to environmental stressors. Livestock farmers face difficulties in maintaining animal health and productivity due to limited access to adequate grazing resources. Additionally, the depletion of forests and grazing lands affects biodiversity, leading to the loss of valuable plant species that serve as natural fodder sources.
- f. Overall, the review contributes to knowledge by providing a holistic understanding of the complex interactions between climate change, environmental degradation, resource access deprivation, and conflict dynamics in north western Nigeria. By synthesizing existing research and offering insights into policy implications and intervention strategies, the review offers valuable guidance for policymakers, practitioners, and researchers working to address the challenges faced by pastoralist communities in the region.

8.0 Recommendations based on the review of findings

- i. The impact of forest depletion on fodder availability is compounded by the increasing frequency and intensity of extreme weather events. Prolonged droughts, erratic rainfall patterns, and rising temperatures further degrade grazing lands, reducing the quality and quantity of available fodder. Livestock farmers in North western Nigeria must adapt to these changing conditions by implementing sustainable land management practices and exploring alternative fodder sources.
- ii. Efforts to mitigate forest and fodder depletion should focus on promoting sustainable land use practices, afforestation, and reforestation initiatives. It is crucial to raise awareness among local communities about the importance of preserving forests and grazing lands for long-term livestock productivity. Additionally, research and development efforts should aim to identify and promote resilient and adaptive fodder species that can thrive in the region's changing climate.
- iii. Efforts to improve fodder yield and livestock feeds in the area should focus on several key strategies. Firstly, introducing and promoting drought-resistant forage species can enhance the availability of quality fodder during periods of water scarcity. These species should be selected based on their adaptability to the region's climatic conditions and their nutritional value for livestock.

- iv. Implementing sustainable land management practices is crucial for maintaining and improving fodder production. This includes practices such as rotational grazing, which allows pastures to recover and regenerate, and agroforestry, which integrates trees and shrubs into grazing systems to provide additional fodder sources and improve soil health. Sustainable land management practices also help mitigate the impacts of climate change on fodder production by enhancing soil moisture retention and reducing erosion.
- v. Additionally, investing in research and development is essential for improving fodder yield and livestock feeds. This involves conducting studies to identify the most suitable forage species for the region, developing innovative farming techniques, and promoting the adoption of best practices among livestock farmers. Collaboration between research institutions, government agencies, and local communities is crucial for the successful implementation of research findings and the dissemination of knowledge.
- vi. Furthermore, capacity-building programs for livestock farmers are vital for enhancing their knowledge and skills in fodder production and livestock management. Training programs should focus on sustainable farming practices, efficient feed utilization, and strategies to cope with climate variability. Providing farmers with access to information and resources will empower them to make informed decisions and adopt practices that improve fodder yield and livestock productivity.
- vii. Finally, policy support and investment in infrastructure are necessary to create an enabling environment for improving fodder yield and livestock feeds. This includes developing irrigation systems to ensure a reliable water supply for fodder crops, establishing storage facilities for fodder preservation, and promoting market access for livestock products. Policy interventions should also address land tenure issues and provide incentives for sustainable land management practices.
- viii. In conclusion, improving fodder yield and livestock feeds in North western Nigeria requires a multi-faceted approach that includes introducing drought-resistant forage species, implementing sustainable land management practices, investing in research and development, capacity-building programs for farmers, and policy support. By adopting these strategies, livestock farmers in the region can enhance their resilience to climate change, improve fodder availability, and ensure sustainable livestock production.

9.0 Conclusion

In conclusion, the intertwined relationship between climate change, fodder degradation, access deprivation, and the resulting farmers-herders conflict in North Western Nigeria underscores the complex challenges facing agricultural communities in the region. Climate change, driven largely by human-induced factors such as greenhouse gas emissions, has led to erratic rainfall patterns, prolonged droughts, and rising temperatures, significantly impacting fodder quality and availability. This, in turn, has disrupted the delicate balance between farmers and herders, exacerbating existing tensions over limited vegetal resources.

The degradation of forests and fodder resources, coupled with competition for land and water, has intensified conflict dynamics, resulting in loss of lives, destruction of crops, and displacement of communities. Relative deprivation among herders, stemming from perceived inequities in resource allocation, further fuels tensions and escalates conflicts over grazing lands and water sources.

10.0 Specific Recommendations

- (a) Addressing the root causes of farmers-herders conflict requires a multifaceted approach that incorporates sustainable land management practices, climate adaptation strategies, and conflict resolution mechanisms. Policy interventions aimed at promoting equitable resource allocation, strengthening governance frameworks, and fostering dialogue between stakeholders are crucial for mitigating conflict and enhancing the resilience of agricultural communities.
- (b) Moreover, there is a pressing need for increased research and investment in climate-resilient agricultural practices, including the promotion of drought-resistant fodder species and sustainable pasture management techniques. By addressing the underlying drivers of conflict and promoting environmental sustainability, stakeholders can work towards building peaceful and prosperous agricultural landscapes in North Western Nigeria and beyond.

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