ESTABLISHING THE EMPIRICAL NEXUS BETWEEN CLIMATE CHANGE AND FARMER-HERDER CONFLICT IN PLATEAU STATE OF NORTH CENTRAL NIGERIA, 1999 – 2019: A REVIEW STUDY

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Abstract
Climate change today represents the greatest global human development challenge and one of such challenges is the farmer-herder conflicts. Consequently, the main objective of the study is to empirically establish the nexus between climate change and farmer-herder conflict in Plateau State of north central Nigeria. Using primary source of data and eco-violence theory the study investigates and examines uncertainty in the Rainfall Pattern in the Last 20 Years among others. Data for this study were obtained from 384 respondents sampled through a multi-stage sampling procedure. A structured questionnaire was used to collect data using a five point Likert Scale (LS). Three (3) Focus Group Discussions (FGDs) and interviews were conducted to enhance the reliability of the findings. Data were analyzed using descriptive statistics and frequency distribution. Finding reviewed that those who engages in farming are more than those that are engaging in livestock rearing. Findings show a significant climate change (uncertainty in rainfall) leading to late farming activities and irregular migration of herders for grazing their livestock. Finding also reviewed that both farmer and herder agreed that they have been in conflict with each resulting from farming on grazing routes, herder's encroachment leading to damage and destruction of farmland, economic trees and crops. From these findings, the study inferred that farmer-herder conflicts have been exacerbated by the phenomenon of climate change, whose dynamics tend to have been aggravating natural resource conflicts across the world and submitted that these conflicts situation have far reaching implications. It recommends the creation of grazing corridors and ranches rather than creating grazing reserves in order to solve the issue of herders encroachment on farmlands and vice versa.
Keywords: Climate change, Conflict, Farmer, Herders

Introduction

Climate change has emerged as the greatest threat facing humankind today (Clime, 2009).The adverse effects of climate change undermine economic development, human security, and people's fundamental rights (United Nations Development Programme, 2007). Climate change worsens the poverty situation and obstructs the achievement of the Sustainable Development Goals (SDGs) of the least developed countries (Vashist & Das, 2009). With climate change leaving no room for doubt, the year 2007 became the watershed in terms of study on the security implications of climate change in Africa.

It was the year that both African Union and the Security Council of the United Nations, held their first ever debate on the security implications of climate change. Further, at Durban, South Africa, the issue occupied the front burner during the 17th meeting of the Conference of the parties to the Kyoto Protocol in November, 2011. There is no doubt that the world has invested resources in combating climatic hazards yet, the world is experiencing and recovering from a series of climate and environmental-related disasters, such as the Japanese tsunami and nuclear crisis, the Haiti earthquake, the Indian Ocean tsunami, Hurricane Katrina, the Lagos, Ibadan and Kogi floods, among others, which have killed, displaced millions, and destroyed properties worth millions of dollars (Odoh & Chigozie, 2012).

Over the past years, talks about climate change have continued. When scientists began to uncover worrying evidence of human-induced climate change in the 1970s and 1980s, the emerging problem of global warming was ignored by policy-makers as a peripheral and inconsequential environmental issue. In the 1990s, as climate modeling became more sophisticated, it became clear that reducing greenhouse gas emissions would have dramatic impact on the way we generate power and transport goods and services. Seeing that doing so would necessitate drastic changes in the use of fossil fuels, climate change was seen as an economic and energy policy issue. In the late 1990s, as science has revealed the speed and scope of climate change, analysts have begun to realize that it holds potentially serious implications for international, national and human security (UNDP, 2007).

So the subtle nature of climate change usually blurs its paroxysm to the extent that it is not usually seen as a major security threat. Ezirim and Onuoha observed this when they noted that:

"Climate change does not fit into the mode of traditional threats to national security such as war, terrorism, insurgency, espionage or sabotage. Yet its non-violent and gradual dynamics of manifestation serve only to disguise its impact on livelihoods, social order, peace and stability" (Ezirim & Onuoha, 2008).

Vashist and Das (2009) argued that climate change, by redrawing the maps of water availability, food security, disease prevalence, coastal boundaries and increasing forced population distribution, raises tensions and triggers new conflicts. Climate change no doubt, represents a serious security challenge both nationally and internationally as it exacerbates the scarcity of natural resources. As a global problem, climate change affects everyone regardless of race, ethnicity, sex and level of income as its impact does not respect national borders nor restricted to the physical environment. Climate change is global and its impact is more heavily felt by poor nations, communities and people whose human security is not assured.

Indeed, climate change is particularly complex and it affects many aspects of international politics, economics, migration, human rights, development, trade, health and environmental systems and act as a stressor making situations of instability, conflict and humanitarian crises more likely and severe. The interaction between these threats intensifies the challenges for international politics and do have a 'chain reaction' with unpredictable consequences.

Dupont and Pearman (2006) outlined the link between climate change and security to include situation where volatile weather patterns, coupled with changes in rainfall and temperature, have the capacity to reshape the productive landscape of an entire region and exacerbate food, water and energy scarcities which could contribute to destabilizing an unregulated population movements (so called "climate refugees"). This would bring previously separate groups into competition for the same dwindling resources.

Climate change in Nigeria has over time disrupted the normal functioning of the ecosystem that interacts with humans, and affects how they access certain vital resources for their survival. When climate change hazards such as heavy droughts leading to erratic weather seasons and in some areas like in the northern part of the country with a prolonged dry spells. It is normally viewed in relation to environmental degradation, natural resource scarcity, migration and food shortage as little or no attention is paid to how climate change induces conflicts.

Conflict is a struggle or contest between people with opposing needs, ideas, beliefs, values and goals. Defined in broadest terms, conflict denotes the incompatibility of subject positions (Diez et al, 2006). This definition emphasises opposition or incompatibility at the heart of conflict, and initially leaves open the exact nature of these incompatibilities. That is, whether they are between individuals, groups or societal positions, whether they rest in different interests or beliefs; or whether they have a material existence or come into being only through discourse.

The change in climate partly engendered by relative lack of adequate rainfall and depletion in the ozone layer has led to increase in heat wave, dryness of the rivers and inadequate pasture for cattle to graze amongst others. This has made life uncomfortable for the pastoralists in the extreme northern part of Nigeria (Abugu and Onuoba, 2015).

In this sense, it is problematic in the north central as observed by both pastoralists and farmers. According to one pastoralist,

our herd is our life because for us, every nomad life is worthless without his cattle. What do you expect from us when our source of existence is threatened? The encroachment of grazing fields and routes by farmers is a call to war… Wherever we turn we find the land reserved for our cattle to feed, taken over by farmers… It becomes difficult for our herd to move and graze without veering into crop fields…

Once that happens, the farmers confront us and we have no option but to fight back (Abbas, 2012).

On the part of the farmers, the complaints are similar in nature:

In the past the migration used to be more in the middle of the dry season and after harvest but nowadays it is throughout the year, worse of all during planting season. The herdsmen and their cattle walk on seeds planted, and in most cases a lot of the seeds fail to germinate. This has caused huge loss to us. The damage is usually the cause of our conflicts with the Fulani herdsmen. It is a yearly battle between us (Abbas, 2012).

Between the year 1999 and 2019, no month passed without report of conflict between the pastoralists and one community or the other in north central Nigeria. From Plateau to Nasarawa, Benue, Kwara, Niger, and Kogi, the media is awash with reports of conflicts between the pastoralists and farmers. These conflicts have often resulted in the death of both pastoralists and farmers and their families member or sometimes the entire host communities as seen in Agatu in Benue state and Barkin Ladi in Plateau state (Sun Newspaper of June 30th, 2014). The case of Plateau State remains pathetic in the sense that the Fulanis bear more sophisticated arms and ammunition than their host communities. They easily displaced the owners of the land and they have become an army of occupation. Mostly, conflict in north central geo-political zone of Nigeria and specifically in Plateau State arises from religious, ethnic and political differences, poverty, resource scarcity or combination of all. However, only very few attempt has been made by scholars to interrogate how climate change precipitates conflict between Fulani herdsmen and farmers in north central geo-political zone of Nigeria and specifically in Plateau State at an empirical level.

Hence, the study investigates the link between climate change and conflict in north central geo-political zone of Nigeria and specifically in Plateau State. It examines the role that climate change play in most conflicts involving Fulani herdsmen and farmers in north central geo-political zone of Nigeria and specifically in Plateau State at an empirical level.

Statement of Problem

African continent, the least responsible for greenhouse gas emissions is the worst affected by climate change and a broad climate change projections paints a disturbing picture of increasingly scarce water, collapsing agricultural yields, encroaching desert and damaged coastal infrastructure for the African continent and these challenges threaten to undermine the carrying capacity of large parts of Africa and thereby resulting to destabilizing population movements and raising tensions over dwindling strategic resources.

Frequent eruption of violent conflicts usually has some destructive effects on the socio-economic development of any society. First, the culture of investment is discouraged as a result of high level of perceived insecurity. Second, the social elements in the society become excessively socialized into the culture of violence thereby threatening the evolution, growth and consolidation of credible civic culture. Third, the youths in that society who are looked up to as builders are turned into destroyers. Fourth, resources which would have been invested in expanding the frontiers of societal development are rather used to respond to emergencies generated by the violent conflicts thereby threatening the national security of such society.

In recent time, violent conflicts in Plateau State of north central Nigeria and specifically between farmers and herders resulting from climate change have been on the increase. Climate change can no longer be considered as merely an environmental problem or an energy challenge. It is also a huge development challenge because Climate Change is redrawing our coastlines, altering where we can grow food, changing where we can find water, exposing us to fiercer storms or more severe droughts and forcing large numbers of people to move from their homelands (Schreck & Semazzi, 2004).

Many developing countries are vulnerable to the adverse consequences of climate change as it affects their economic and agricultural base thereby undermining their comparative advantage on world markets. It stresses their existing mechanisms for sharing resources like trans-boundary Rivers and migratory fish stocks. It has now become clear that climate change holds the potential to exacerbate existing tensions and even trigger new ones.Consequently this paper argues that, climate change resulting in confrontation between the farmers and herders has become a critical factor in the farmer-herder conflicts across the length and breadth of Plateau State in north central Nigeria thereby empirically support the claim of an existing dynamic in the relationship between climate change and conflict in Plateau State in north central Nigeria

Objective

The main objective of the study is to empirically establish the nexus between climate change and farmer-herder conflict in Plateau State of north central Nigeria.

Literature Review: The Nexus between Climate Change and Conflict

The widely held belief that resource scarcity and loss of livelihoods due to climate extremes have the potential to instigate violent conflict (Ban, 2007; Obama, 2009) has led the United Nations Intergovernmental Panel on Climate Change (IPCC) to consider the threat of armed conflict explicitly in its fifth Assessment Report (Adger et al, 1999). Thus far, quantitative research has produced mixed results, including reports that conflict risks increases with higher rainfall (Hendrix and Salehyan 2012; Theisen 2012), loss of rainfall (Bohlken and Sergenti, 2010; Hendrix and Glaser, 2007) or higher temperatures (Burke et al. 2009; O'Loughlin et al. 2012).

Another set of studies finds no systematic climate effect (Buhaug, 2010; Koubi et al. 2012) implying an overall lack of scientific consensus on the proposed connection between climate change and conflict. Research by Bernauer and Koubi (2012); Deligiannis (2012); Gleditsch (2012); Salehyan (2008); Scheffran et al (2012); Theisen, Gleditsch, and Buhaug (2013); World Bank (2010); Burke and Miguel (2013), aside from their incompatible findings, there is a common feature in nearly all contributions to the quantitative climate and conflict literature that their analyses are limited to Sub-Saharan Africa. This is understandable, considering that African societies are often considered the most vulnerable to climatic shocks, many of her populations are in poverty, discriminatory political structures, dependent on rain fed agriculture, and a history of violence. The nexus between climate change and conflict constitutes a transnational challenge and this relationship has become a subject of growing public debate and academic inquiry leading to the outpouring of scholarly literature (Blench, 2003; Onuoha, 2007; Abbas, 2012). The prevailing thinking in this regard is that climate change gives rise to certain environmental changes and outcomes, which often result in conflict (Blench, 2003; Onuoha, 2007). Also there is now widespread agreement that the changes now underway in the earth's climate system have no precedent in the history of human civilization (IPCC, 2007). As a macro driver of many kinds of environmental changes such as coastal erosion, declining precipitation and soil moisture, increased storm intensity, and species migration, climate change poses risks to human kind (McCarthy, Canziani, Leary, Dokken, and White, 2001). Other forms of environmental conditions include: environmental degradation; desertification/desert encroachment; loss of wetlands; inadequacy of rainfall/ droughts; and extreme climate variability and volatility (Blench, 2003; Onuoha, 2007; Olorunfemi; 2009; Nchi, 2013). These environmental conditions interface to produce the dynamics of environmental misfortunes with far reaching implications for individuals, groups or the whole community and nation. For instance, the land hunger in the semi-arid zones has caused a major migration of farmers southwards, both seasonally and permanently. Many uncultivated areas in river flood-plains are now farmed by migrants, leading to disputes with their traditional owners (Blench, 2004) of such lands. Climate change is an environmental, social and economic challenge on a global scale (Scholze and Prentice, 2006; Mendelsohn and Williams, 2006). It can be exacerbated by human induced actions such as the widespread use of land, the broad scale deforestation, the major technological and socioeconomic shifts with reduced reliance on organic fuel, and the accelerated uptake of fossil fuels (Millennium Ecosystem Assessment, 2005).

The most devastating adverse impacts of climate change in Nigeria and other subtropical countries according to Ishaya and Abaje (2008) includes frequent drought, increased environmental damage, increased infestation of crops by pests and diseases, depletion of household assets, increased rural-urban migration, increased biodiversity loss, depletion of wildlife and other natural resource base, changes in the vegetation type, decline in forest resources, decline in soil conditions (soil moisture and nutrients), increased health risks and the spread of infectious diseases and changing livelihood systems (Reilly, 1999; Abaje and Giwa, 2007). There is every reason to worry about the impact of these changes on human systems given that the rate of change is unprecedented in the past 10,000 years, and that climatic variations have triggered large-scale social disruptions in the past. The association between El Nino events and famine that killed tens of millions across the tropics in the late 19th century has been well documented by Davis (2001). Davis (2001) argues that famine was triggered by drought, but caused by the way political and economic colonization deprived people of their entitlements to natural resources. Most analyses of famines now identify poverty, inequality, market failures, and policy failures as the deeper causes of what ostensibly seems to be natural disasters (de Waal, 1997). Davis' arguments about the ways climatic variations have combined with stressed social ecological systems to result in dramatic social change is reinforced by Diamond (2005) who examines many cases of catastrophic social change and finds that environmental change was a common factor in all of them, and climate change in particular was a cause of many.

The shrinking of environmental space creates an atmosphere of eco-scarcity which raises the stakes and premium on the available resources. What usually results from this is fierce competition and desperate struggle for subsistence. In this context, therefore, conflict does not only become inevitable; it simply becomes a matter of survival.

With reference to the herder-farmer conflicts, Blench (2004) observes that the environmental dynamics engendered by climate change tend to drag various land users into conflictive relations in the context of resource scarcity and want. This situation has been made worse by the claims and contestations over land ownership and tenure rights. Hence, as farmers take up more of the river-bank for farms, they come into conflict with the other users, especially the herders and fish-folk. The herders have been coming to the river for many years for the grass and tend to consider they have ownership rights. When they arrive and find their grazing space now covered by crops such as tomatoes, vegetables, etc, they may become angry.

The farmers, often desperate to feed their families in a situation where the old rain-fed systems no longer work, regard the herders as dangerous and intrusive (Blench, 2004).

Climate change is exacerbating drought and aridity in the Sahelian zone with consequences for Nigeria. The northern part of the country, especially the northeast zone, has been the worst hit by these environmental trends (Onuoha, 2008). Climate-related drought in the region is hastening desert encroachment, which is engulping most states in the north - Sokoto, Kebbi, Kano, Jigawa, Bauchi, Yobe, and Borno states. Further southwards, fast moving desert conditions have caught up with Katsina, Adamawa, Gombe, and Kwara states. This has significantly affected vegetation and pasture in the north. Consequently, desertification has virtually affected the entire Sahel and savanna landscape of the country (The Guardian newspaper of 5 march, 2008).The incidence of drought in the north over the years, coupled with the shrinkage of Lake Chad partly due to climate change, has made the seasonal movement of the Fulani pastoralists to the southern part of Nigeria through the north central to become relatively more permanent. Before, these pastoralists would migrate to the south through the north central during the dry season and move back to the north during the rainy season. However, because of the deteriorating environmental situation in the north, many of the pastoralists are now settling down in some areas of north central and the southern part of Nigeria which has contributed to resource conflicts in these areas with the potential to spill over to ethnic clashes (Onuoha. 2010).

To say the least, therefore, the relationship between climate change and farmer-herder conflicts is such that the former brings about conditions that make the latter not only possible but also more or less compelling. As Fulani pastoralists undertake their movement from the far northern part of the country to the southern part of the country through the north central as dictated by the imperative of climate change, they regularly clash with farmers as the herdsmen allow their cattle to trespass farmlands and eat up the crops. Altercations that follow usually end up in violence, with loss of lives and properties by both sides (Nchi, 2013).

When the people's sources of livelihood are threatened as a consequence of the environmental vicissitudes and vagaries associated with climate change, desperate tactics are employed to ensure survival. This arguably explains the perennial pastoralist-farmer violent conflicts in Plateau State of north central region of Nigeria. For instance, between the year 2000 and 2015, no month passed without report of conflict between the pastoralists and the indigenes of Plateau State in north central Nigeria. From Barkin Ladi to Bassa, Bokkos, Wase, Jos North, Jos South, Jos East, Kanam, Kanke, Langtang North, Langtang South, Mangu, Mikang, Pankshin, Qua'anpan, Riyom and Shendam,

the media is awash with reports of conflicts between the pastoralists and farmers, and these conflicts have often resulted in the death of both pastoralists and farmers and their families and sometimes the entire host communities as seen in Plateau state (Sun Newspaper of June 30th, 2014). The case of Plateau State remains pathetic in the sense that the Fulanis are bearing more sophisticated arms and ammunition and easily displace the owners of the land and have become an army of occupation to the inhabitants of the areas. Though the literature seeks to determine that independent variable (climate change) is an important cause of change in the dependent variable (incidence of conflict) but fails to explain the empirical nexus between the two variables (climate change and conflict).

Gap in literature

Though most conflicts in Nigeria and specifically in Plateau State of north central geopolitical zone arise from poverty, resource scarcity or religious, ethnic and political differences or a combination of all, an examination of the literature on climate change and conflict reveals a number of commonalities in the methods used to explore the relationship between the phenomena. However, what is not clear in the literature however is lack of strong empirical evidence to support the claim of an existing relationship between climate change and conflict in Plateau State of north central Nigeria which is the gap this study seeks to fill. The research generates data and carries out empirical study on climate change and examines the extent to which climate change causes conflicts in Nigeria with specific reference to Plateau State of north central zone.

Theoretical Framework

To adopt a theoretical framework that best explains and guides us in understanding the nexus between climate change and farmer-herder conflict in Plateau State of north central Nigeria requires caution because every conflict has many causes, and people do not automatically start fighting when the weather heats up, and drought and desertification ensue. So it is proper to understand environmental problems as resource scarcities. Resources can be roughly divided into two broad groups: non-renewable, like oil, iron ore, etc and renewable, like fresh water, forests, fertile soils, grassland and the earth's ozone layer. The latter category also includes renewable goods such as fisheries and timber, and renewable services such as regional hydrological cycles and a benign climate. The commonly used term environmental change refers to a human-induced decline in the quantity or quality of a renewable resource that occurs faster than it is renewed by natural processes. But this concept actually limits the scope of environment-conflict research.

Environmental resources and conflict linkages have engaged the minds of various scholars (Baechler, 1998; Percival, Val, and Homer-Dixon, 1998; Homer-Dixon, 1999; Gleditsch, 2001). Homer-Dixon develops the theory of eco-violence. Homer-Dixon and Blitt (1998) argue that large populations in many developing countries are highly dependent on four key environmental resources that are very fundamental to crop production: fresh water, cropland, forests and fish. Scarcity or shrinking of these resources as a result of misuse, over-use or degradation under certain circumstances will trigger off conflicts.

According to Homer-Dixon (1999), decreases in the quality and quantity of renewable resources, population growth, and unequal resource access act singly or in various combinations to increase the scarcity, for certain population groups, of cropland, water, forests, and fish. This can reduce economic productivity, both for the local groups experiencing the scarcity and for the larger regional and national economies. The affected people may migrate to a new land. Migrating groups often trigger ethnic conflicts when they move to new areas, while decreases in wealth can cause deprivation conflicts (Homer-Dixon and Blitt, 1998).

The fundamental assumption of the theory is that resource scarcity is the product of an insufficient supply, too much demand or an unequal distribution of a resource as a result of environmental hazards that forces some sector of a society into a condition of deprivation and violence. These four sources of scarcity are in turn caused by variables such as population growth, economic development, pollution and obviously climate change. Thus, environmental resource scarcity will constrain agricultural and economic productivity, further inducing the disruption of economic livelihoods, poverty and migration. Migration can occur either because the environmental quality of a habitat has become unlivable or, more commonly, because the migrant's economic outcome is likely to be better in areas with greater resource availability. Both constrained productivity and migration are likely to strengthen the segmentation around already existing religious, class, ethnic or linguistic cleavages in a society (Gleditsch, and Urdal, 2002) and thus precipitate conflicts.

It is fundamental to state that one basic feature of Fulani herdsmen is migration and climate change is one of the drivers of migration. Within the context of Fulani herdsmen and farmer conflict, the eco-violence theory is analytically fecund to capture and explicate the intricate linkages that can develop between climate change and conflict. This is because the four environmental resources (fresh water, cropland, forests and fish) are resources that climate change affects. As a result of climate change, seas have dried up leading to shortage of fish and fresh water. Drought and desertification have also eaten up crop lands and forest thereby making these environmental resources that trigger violence in short supply

To avert these situations, individuals especially herdsmen stray to where they will get moderate weather, market opportunity, green – vegetation, forage and food, thereby threatening the means of production and reproduction of some other people who would not brook such encroachment. Though factors such as economy play a dominant role in explaining why people move (Harris and Todaro 1970; Massey 1988; Massey 1999; Lall et al. 2006), while social networks, geographic obstacles, and cost concerns also offer significant insights into where individuals migrate to (Menjívar 1999; Bauer et al. 2000).

This migration in itself engenders conflict. And when they are accepted, the long run effect will be pressure on land, food shortage, conflict of interests, cultural differences, over population, social disorganization, religious, social, and cultural intolerance which are in themselves conflict triggers. So the cause of herdsmen and farmer conflict in the north central is resource scarcity and that the remote cause is climate change which has through drought and desertification led to natural resource scarcity and therefore intensified the conflict between the two. Natural resource scarcity is the immediate cause of Fulani herdsmen-farmer conflict while climate change constitutes the remote cause. This is because drought, feed and water shortages caused partly by desertification and drought have sent nomadic pastoralists, most of them ethnic Fulanis, wandering outside their normal grazing routes.

most of them ethnic Fulanis, wandering outside their normal grazing routes.

At the same time, a mix of weather-related factors has pushed farmers in Plateau state of north central Nigeria to cultivate more land each year, leaving wanderers fewer places to water and graze their stock. The resulting contests have been responsible for the deaths of several hundred in Plateau state of north central Nigerians. Further, most of the impact of climate change is directly on agriculture. The theory helps us to explain the link between climate change and conflict in Plateau state of north central Nigeria. That agriculture has been neglected in Nigeria generally and in Plateau state in particular is no longer news. This situation has worsened considerably over the years as a result of government insensitivity to climate adaptation and mitigation and puts more pressure on the populace who suffer more as a result of climate change in Plateau state of north central Nigeria. As a result of low yield, farmers cultivate more lands in Plateau state of north central Nigeria now than they hitherto do, living little land for grazing of cattle. It is within this context that the link between climate change and conflict in Plateau state of north central Nigeria can be understood.

Methodology: Research Design

Research design is a comprehensive plan for data collection in an empirical study such as this. This study employed the cross-sectional survey design. The approach enables the researcher to study a group of people in the population, by collecting and analyzing data from only a few people and items considered to be representative of the entire group (population). Thus, rather than obtain data from the whole population being studied only a sample is selected from the whole through a sampling process. It used both quantitative and qualitative approaches to gather data and knowledge on climate change and the occurrences of conflicts in Plateau State of north central Nigeria. The study employed a combination of both primary and secondary sources of data to interrogate the subject matter under investigation. Under primary data, the study made use of instruments such as questionnaire, key informant interview and focus group discussion. Under secondary data, the study reviewed relevant literature on climate change and conflict. This section discussed the various methods for carrying out the study.

Research Area

The study area which is Plateau State of north central zone of Nigeria, comprises Bassa, Barkin Ladi, Bokkos, Wase, Jos East, Jos South, Jos North, Kanke, Kanem, Langtang South, Langtang North, Pankshine, Mangu, Riyom, Mikang, Qua'anpan, and Shendam. However, three local government areas, Barkin Ladi, Bokkos and Wase LGAs are the focus of this study as shown in Figure 1. The reason for choosing Plateau state is that the outbreak of conflicts between farmers and herdsmen in Plateau State of north central Nigeria is more pronounced in the State than any other states in the zone.

One Local Government Area (LGA) each based on the three senatorial (North, Central and South) zones in Plateau State is chosen and also these three Local Government Areas (Figure 2) are chosen based on location that represents both the upper and lower Plateau and which gives a representation of the climatic condition of the entire north central zone. The Local Government Areas are Barkin Ladi (North Senatorial Zone), Bokkos (Central Senatorial Zone) and Wase (South Senatorial Zone) as shown in figure 2.

Types of Data

The study employed a combination of both primary and secondary sources of data through a combination of quantitative and qualitative methods of data collection to enquire into the subject matter under investigation. Methodological triangulation was used in collecting the data, which is, obtaining data from different sources, such as questionnaire, documentation and oral interviews (Olseen, 2004). This according to Senbeta (2009), helps to harness diverse ideas about the same issue and assists in cross-checking the results, and consequently helps to increase the reliability and validity of the findings and eases data analysis.

Primary Data

To generate data to address the nexus between climate change and farmer-herder conflict in Plateau State of north central Nigeria in the three selected LGAs data were collected by using Survey Questionnaire, Focus Group Discussions (FGD) and Key Informant Interviews (KIIs). These sources provided information from the principal actors in the face to face encounter with farmer – herder conflict issues in Plateau State of north central Nigeria.

Secondary Source of Data

Secondary data were collected from relevant publications such as books, research journals, national population and housing census reports, magazines, newspapers, internet materials, the commission for nomadic education and libraries among others, were consulted and relevant information were sourced.

Population

The target populations of this study were drawn from: Farmers; Herders; Government officials (such as NEMA, SEMA, Security personnel); Representatives of farmers and herders associations; community leaders, and the victims of the violent conflicts in the region living in various internally displaced persons (IDP) camps.Plateau State during the 2006 census had a total population of 3,206,531 people with an annual growth rate of 2.94% (FRN, 2010). The population of each of the LGAs is then projected to the year 2019 (Table 1) for the purpose of this study using the method of Mehta (2004). The method is determined as:

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Where: Pn = population in the current year
Po = population in the base year.
R = annual growth rate.
n = number of intermediary year.

Table 1: Projected Population Size of Sampled LGAs in Plateau State

Sampled LGAs	Population (2006)	Projected Population (2019)
Barkin Ladi	175,267	234,174
Bokkos	178,454	238,432
Wase	125,000	167,012
Total	**478,721**	**639,618**

Source: NPC (2006)

Sample Size

Data on Climate change and Farmer-Herder conflicts in North central Nigeria in the study area were collected through the administration of structured questionnaire, Focus Group Discussions (FGDs) and Key Informant Interview (KIIs). In order to determine the sample size of the population, Krejcie and Morgan (1970) method of determining sample size of a given population was adopted. Based on the method, the sample size used for this research work was 384. The formula is given as:

$$S = \frac{X^2 NP(1-P)}{d^2(N-1)+X^2P(1-P)} - 2$$

Where: S = sample size.

X2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size.

P= the population proportion (assumed to be 0.50 since this would provide the maximum sample size.

d = the degree of accuracy expressed as a proportion (0.05)

The study communities in these LGAs (Barkin Ladi: Bisichi, Kassa, Kurrafalls; Bokkos: Mbar, Matol, Mangor; and Wase: Kadako, Gazum, Zongo) according to the 2006 census had a total population of 478,271 people with an annual growth rate of 2.94% (FRN, 2010). The population of each of the communities in the LGA is then projected to the year 2019 (Table 2, 3 & 4) for the purpose of this study using the method of Mehta (2004) the same as above.

Table 2: Projected Population Size of Sampled LGAs in Plateau State and Number of Respondents

Sampled LGAs	Population (2006)	Projected Population (2019)	Number of Respondents
Barkin Ladi	175,267	234,174	14I
Bokkos	178,454	238,432	143
Wase	125,000	167,012	100
Total	**478,721**	**639,618**	**384**

Source: Krejcie and Morgan (1970); NPC (2006)

Table 3: Sampled Communities in Barkin Ladi Local Government Area and Number of Respondents

Sampled Communities	Population (2006)	Projected Population (2019)	Number of Respondents
Bisichi	2,647	3,537	71
Kassa	2,110	2,819	57
Kurrafalls	478	639	13
Total	**5,235**	**6,995**	**141**

Source: Krejcie and Morgan (1970); NPC (2006)

Table 4: Sampled Communities in Bokkos Local Government Area and Number of Respondents

Sampled Communities	Population (2006)	Projected Population (2019)	Number of Respondents
Mbar	656	876	72
Matol	249	333	28
Mangor	392	523	43
Total	**2,083**	**2,784**	**143**

Source: Krejcie and Morgan (1970); NPC (2006)

Table 5: Sampled Communities in Wase Local Government Area and Number of Respondents

Sampled Communities	Population (2006)	Projected Population (2019)	Number of Respondents
Kadako	2,235	2,986	76
Gazum	414	553	14
Zongo	308	412	10
Total	**855**	**1,966**	**100**

Source: Krejcie and Morgan (1970); NPC (2006)

Since the occurrence of the farmer-herder conflicts did not involve all the communities but only the sampled LGAs and due to the homogenous nature of the population in the sampled LGAs in terms of cultural background among others, three (3) communities (Table 2, 3 and 4) were sampled in each of the three LGAs and the questionnaire as administered to the sampled communities proportionally.

Sampling three communities in each of the LGAs also helped in making the sampling survey more thorough taking into consideration the time and cost involved in administering the questionnaire and monitoring the respondents.

The study utilized snowball sampling technique in sampling the relationship between climate change and farmer-herder conflicts in Plateau State of north central Nigeria. This sampling technique was used based on previous identified respondents (farmer and herder conflicts respondents) to recommend others who have or share the same characteristics as the respondents already in place. This technique really helped in gathering information from hidden respondents who would have been difficult for the researcher to access.

The literature reviewed gave background knowledge of the study area and helped in designing the questionnaire. Both close and open ended questions were used. The closed-ended questions were in the form of Likert Scale (LS) and fixed question format. The interview schedule had two sections 'A' sought information on the socio-economic characteristics of the respondents (gender, age, literacy level, among others). While questions on the nexus between climate change and farmer-herder conflict were in section 'B'. Survey questions for FGD and KII were focused on a more comprehensive range of climate change and farmer-herder conflict in Plateau State of north central Nigeria.

Instruments for data collection

For the primary sources, three instruments were used to collect data and these include: Structured interview (use of questionnaire), Focus Group Discussion (FGD) and Key Informant Interview.

Description of the Instruments

Questionnaire was used to collect data on nexus between climate change and farmer-herder conflicts in Plateau State of north central Nigeria and the response from the various communities in the study area. Both close and open ended questions were used for this purpose. The interview questions were focused on comprehensive range of issues including socioeconomic characteristics of the respondent, the dynamics of perennial farmer-herder conflict, and the nature of climate change induced farmer-herder conflicts, impacts of such conflicts on Plateau State of north central Nigeria.

Three (3) Focus Group Discussions (FGD) were conducted; one from each of the three sampled LGAs. Each FGD was made of nine (9) people. The main objective of the FGD was to gather information on the relationship between climate change and farmer-herder conflicts in Plateau State of north central Nigeria in recent years. Both male and female participants were involved in the FGDs.

The FGD for each of the LGAs took place in one of the three sampled communities that is having the highest population of the respondents. Participants from the other two communities were transported to the venue with the help of the research assistants. In Barkin Ladi LGA, the FGD took place in Bisichi community; that of Bokkos took place in Mbar community; whereas, in Wase, the FGD took place in Kadarko community respectively (see Tables 3, 4 and 5)

Key informant Interview (KII) was carried out with some stakeholders in the study area. Convenience sampling method was utilized in the selection of the stakeholders. The stakeholders interviewed include: government official (3), security personnel (4), community leaders (5), representatives of farmers and herders (4) and the victims of the violent conflicts in the region living in various IDP camps (8).The objective was to get in-depth information on their role in the community in terms of the relationship between climate change and farmer-herder conflicts in north central Nigeria.

Questionnaire Administration

Ten (10) Research Assistants (RAs) that understand the local dialects of the rural inhabitants were trained by the researcher to conduct the interview. The interview was conducted between December and January, 2017. One of the RAs has Master degree in Political Science, while three of the RAs are holders of first degree in Political Science and six has Nigeria Certificate in Education (NCE) specializing in geography. Three RAs administered questionnaire in each of the LGAs with the researcher and one of the RAs monitoring them for effectiveness.

The questionnaire were purposively administered to sample respondents who were 18 years and above, based on purposive sampling, and those that have been affected by the conflicts. The basis for this was to enable the gathering of information from respondents who have had experience in climate change induced conflicts. Only respondents who were willing and interested in the subject matter under inquiry were randomly administered questionnaire. Since majority of the respondents are farmers and herders, they were mostly interviewed in their homes around 12noon to 3 pm, and also in their farms for the farmers who are also involved in irrigation farming between 10am to 12 noon. For the herders, the interviews were conducted in places where grazing of their cattle were taking place between 10am to 2 pm. Approximately 50 minutes were spent to complete a questionnaire. FGDs were held between 11am to 1pm. The respondents were sampled from each categories that includes gender, ethnicity and education. Regular supervision exercise was carried out to ensure effective questionnaire administration and collation. The main reason for this was to prevent poor completion of the questionnaire based on the fact that some of the target groups do not have the capacity to read or write so the research assistant assisted such people in filling their questionnaire.

Also because of the volatile security environment of the areas, all interviews were concluded before 4 pm each day.

Ethical Consideration

Verbal permission was sought from all relevant political heads or gate keepers and respondents associated with the study. The purpose of the study was comprehensively explained to them and they were given the opportunity to decide whether or not they would like to partake in the study.

Method of data analysis

Since this study consisted of both qualitative and quantitative methods, the data analysis in this study was kept simple as analysis was based on the research questions and scope of the study. Data and information were arranged according to category, issues, objective and ranked.

For qualitative data that emerged from these participatory activities and interviews such as exploring the relationship between climate change and farmer-herder conflicts; examining the nature of climate change induced conflicts; determining the impact of climate change induced conflicts; analyzing what successive governments over the years have done to tackle farmer-herder conflicts and investigating other factors responsible for farmer-herder conflicts in Plateau State of north central Nigeria, data were analyzed using a five point Likert Scale (LS). Each respondent was required to respond by ticking any of the options namely, 'strongly agree' 'agree' 'undecided' 'disagree' and 'strongly disagree'. Values assigned to these options were 5,4,3,2, and 1 respectively.

The mean score (x) of the respondents was based on the five point LS is computed as:

$$5+4+3+2+1=15/5=3.00$$

Factors with mean score less than 3.00 were taken as not significant while those with mean score equal or above 3.0 were taken as significant, then ranked in ascending order (Allen & Siman, 2007; Abaje, 2016). So Frequency distribution and ranking were employed in data analysis.

Discussion: Establishing the empirical nexus between climate change and farmer-herder conflicts in Plateau State of North Central Nigeria

The relationships between climate change and farmer-herder conflicts in Plateau State of north central Nigeria are presented in Table 6. The most significant relationship between climate change and farmer-herder conflicts in Plateau State of north central Nigeria is the quest for greener pasture by the herdsmen (ranked 1) with a mean score () of 4.51 and all the LGAs were found to be significant with Bokkos having the highest mean score (= 4.26) followed by Barkin Ladi (= 4.23) and Wase (= 4.12). The result of the relationship is supported by the work of Abaje et al (2014) that the occurrence of desertification in some particular areas pushed herders to migrate to where they can find greener pasture and in the process bring them into violent conflicts with farmers in areas migrated to,

ranked 3,5 and 11 with a mean scores of 4.50; 4.29 and 3.74 states that drought has sent herdsmen to wander outside their normal grazing routes; increase occurrence of drought/desertification has made migration of herders towards the north central irregular in the last 17 years and that the death of livestock is increasing because of growing desertification/drought.

The nexus between climate change and related conflict has been established by scholars (blench, 2003, 2004; Onuoha, 2007; Abbas, 2012). The prevailing thinking in this regard is climate change gives rise to certain changes in weather and their outcomes, which often precipitate conflict (Blench, 2003; Onuoha, 2007). In agreeing with this result the widely held belief that resource scarcity and loss of livelihoods due to climate extremes have the potential to instigate violent conflict (Ban, 2007) and is considered as a threat of armed conflict explicitly in its fifth Assessment Report Intergovernmental Panel on Climate Change (IPCC) Adger et al (1999). Abaje et al (2014) stated that the advancement of the desert has done havoc to agriculture, and frictions are arising because of people moving from the far north into north central. Also, according to Emordi (2013), a researcher at the University of Nigeria's Centre for Environmental Management Control, stated that most of the social conflicts in the middle belt are because of desert encroachment. According to his findings, the desert is advancing as much as 15 kilometers a year, he stated that in the past 60 years, the desert has claimed about 351,000 square kilometers, almost the size of Germany, of Nigeria's land, putting 28 million people and 58 million livestock at risk.

Decrease in rainfall leading to decreasing water sources (= 4.50) was the second significant relationship in the study area that was ranked two (2) by the respondents. Also along this result are the consistent reduction in rainfall, leading to a reduction in the natural regeneration rate of land resources (= 4.36) ranked 4; increase/decrease in raining/dry that has made planting and harvesting period irregular for farmers in the last 17 years (= 4.21) ranked 6 and that the yearly rains are not enough to support crop production in the last 17 years (= 3.94) ranked 10. This result of the relationship between climate change and farmer-herder conflicts is in line with the projection of Ringler et al (2011) that crop production in Sub-Saharan Africa is projected to decline by a net 3.2% in 2050 as a result of climate change.

All the participants of the FGDs and KIls in the study area also supported this. A participant from Kassa community in Barkin ladi LGA during the FGD, who is a male and 40 years, said that:

> As a farmer we have particular month which we plant and harvest our crops in time past but the last few years of our planting and harvesting have changed from those usual months because of uncertainty of rainfall and this has made our planting and harvesting irregular.

Other significant relationships between climate change and farmer herder conflicts in the study area are mix of weather-related factors have pushed farmers to cultivate more land each year (x = 4.14) ranked 7 ; rising temperature resulting in decline in crop yields in the last 17 years (= 4.05) ranked 8 and high temperature leading to decrease in soil fertility in the last 17 years (= 3.99) ranked 9 which also agreed with Abaje et al (2014) that the availability of pasture as a result of the favourable rainfall, abundance of sources of water supply and the temperate climate of Plateau State make it conducive for livestock rearing, thus the location of the National Veterinary Research Institute, Vom in Plateau State was not an accident. The fact that most of the respondents are farmers and herders coupled with their long time experience with the environment made it possible for them to easily notice the changes in climate in terms of changes in rainfall pattern, increase/decrease dry season and desertification/drought.

Historically, farmers and herders in Nigeria enjoyed a fairly symbiotic relationship. Herders' livestock provided farmers with daily goods, as well as manure to fertilize their farmlands. In turn, herders obtained grain and other farm products from the farming communities. However, this system increasingly broke down as the growth of herders grazing activities drastically became irregular. The herds and flocks of herders now frequently encroach upon cultivated fields, much to the outrage of local farmers. Confrontations quickly degenerate into armed clashes that poison and strain communal relations and lead to further instances of violence.

Table 6: The Empirical Nexus Between Climate Change and Farmer - Herder Conflict in Plateau State of North Central Nigeria

Statement	Mean Scores				
	Wase	B/Ladi	Bokkos	Average	Rank
Quest for greener pasture by the herdsmen usually brings them into violent conflict with farmers	4.52*	4.30*	4.72*	4.51*	1
Decrease in rainfall has led to decreasing in water sources	4.43*	4.37*	4.70*	4.50*	2
Drought has sent herdsmen to wander outside their normal grazing routes	4.60*	4.41*	4.48*	4.50*	3
Consistent reduction in rainfall, leading to a reduction in the natural regeneration rate of land resources	4.16*	4.27*	4.66*	4.36*	4
Increase occurrence of drought/desertification has made migration of herders toward the north central irregular in the last 20 years	4.04*	4.25*	4.57*	4.29*	5
Increase/decrease in raining/dry season has made planting and harvesting period irregular for farmers in the last 20 years	4.07*	4.27*	4.28*	4.21*	6
A mix of weather-related factors has pushed farmers to cultivate more land each year	4.16*	4.24*	4.03*	4.14*	7
Rising temperature has resulted in decline in crop yields in the last 20 years	3.96*	4.16*	4.03*	4.05*	8
High temperature has led to decrease in soil fertility in the last 20 years	3.97*	4.11*	3.87*	3.99*	9
The yearly rains are not enough to support crop production in the last 20 years	3.78*	4.17*	3.88*	3.94*	10
Death of livestock is increasing because of increase occurrence of desertification/drough	3.62*	3.96*	3.64*	3.74*	11
AVERAGE MEAN SCORE	4.12*	4.23*	4.26*		

**Significant mean of the empirical nexus between climate change and farmer - herder conflict in Plateau State of North Central Nigeria*

Summary of Findings

This study, Establishing the empirical nexus between climate change and farmer-herder conflict in Plateau State of north central Nigeria, 1999 – 2019, used both primary and secondary data through combination of qualitative and quantitative methods of data collection. The results obtained revealed that:

1. Climate change induced farmer - herder conflicts in Plateau State of north central Nigeria is "becoming a recurrent decimal". This is because agriculture in Nigeria is generally dependent on rainfall and the uncertainty in rainfall pattern and the increased rate of desertification in the last 20 years made farming activities (both planting and harvesting) and migration of herders to graze their live stock irregular.
2. Furthermore, in establishing the relationship between climate change and farmer – herder conflict, findings also revealed that just as weather related factors have pushed farmers to cultivate more land each year, so also has drought driven herdsmen to wander outside their traditional grazing routes thereby bringing them into fierce competition over scarce resources such as water and grazing land.
3. Findings also revealed trends and challenges of climate change induced conflicts between farmers and herders in the past 20 years vis – a - vis having a significant impact on the lives of the people. This impact was evident in various dimensions: killing of people, destruction of properties, turning the youths into army of destroyers and discouraging the culture of investment in the area and also threatening the evolution, growth and consolidation of credible civic culture in Plateau State of north central Nigeria
4. The study also revealed that although there have not been much efforts from the government in managing the emerging climate change induced farmer-herder conflicts in Plateau State of north central zone, the suggestions from the findings, measures that can be taken in order to reduce the role of climate change in generating conflicts include government intervening through developmental programmes, funding of research towards stemming the tide of conflict, organizing of enlightenment programmes on climate change, making budgetary provision for tackling desertification and also the creation of grazing corridors or ranches rather than creating grazing reserves or areas.

Conclusion

The phenomenon of herder-harmer conflict in Plateau State of north central Nigeria typifies what is known as resource conflict in contemporary development literature. This thrives in an atmosphere of ecological scarcity and competition, as well as livelihood crisis. The problem has been accentuated by the global trend of climate change which has led to the shrinking of ecological space and resources, leading to intense pressure on, and competition for, the available resources.

The spiraling migration of pastoralists from the far North towards Plateau State of north central part of Nigeria has resulted in a sort of dialectical relations between the Fulani herdsmen and the sedentary native farmers. As this study has observed, this situation has been complicated by the rising incidence of livelihood insecurity among the farming and herding communities as a result of the dwindling ecological fortunes of the region. This scenario has led to desperate, violent struggles for access to and control of scarce ecological space and resources, a situation that has engendered dire humanitarian and socio-economic, consequences. The fierce and often virulent nature of these struggles have found expression in a vicious circle of violence and mutual vendetta.

The outcome of this study implicated rainfall and dry season, desertification and drought as well as pastoral migration as factors that account for the spiral farmer-herder conflicts in the region. This corroborates the dominant scholarly standpoint on the subject matter, as we have seen in the foregoing.

Recommendations

The following recommendations are made to serve as panacea to the challenge of climate change induced farmer-herder conflicts in Plateau State of north central Nigeria:

1. There should be an effective regulation of grazing and farming activities in the country through efficient land-use laws/legislations and administration. Creation of grazing corridors and ranches rather than creating grazing reserves in order to solve the issue of herders encroachment on farmlands and vice versa;
2. Mitigation of desertification and drought in the far North by the government, communities and individuals in order to forestall mass movement of pastoralists towards the north-central zone;
3. Sensitization of stakeholders – farmers and herdsmen alike – on the need for mutual co-existence and peace. This would help to forestall needless provocations and opportunistic violence;
4. Climate change adaptation projects and programmes in tackling farmer-herder conflicts in Plateau State of north centralNigeria should follow a bottom-up participatory approach that encourages the highest level of local participation. The benefits of this approach can be seen in two-fold: (i) this provides valuable insight into how communities interact and share ideas, and (ii) it allows the intended beneficiaries to develop the skills and practices necessary to forge their own path and sustain the projects or programmes.

Limitations of the study

The primary limitation of the study is related to the condition of the study areas in terms of general security because of the recurrence of conflicts. There was tension and general suspicion of people's motives which limited our movement, contact with some people and the duration in terms of staying late into the night hours.

But despite this limitation, adequate measures were taken and this limitation was taken care of leading to the successful conducted of the study.

Contribution to knowledge

1. The study has empirically established the correlation between climate change and farmer-herder conflicts in Plateau State of North Central zone of Nigeria.
2. Climate change is implicated in the numerous violent conflicts that have erupted between sedentary farmers and herders over land and water resources which are becoming increasingly scarce.
3. It has also been established that climate change induced migration from the Sahel region (some extreme northern part of Nigeria and some West African countries) has grown the volume of herders seeking for grazing land and water points for their herds. This is against the resolve of sedentary farmers to protect and defend their means of livelihood.

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