REVIEWING THE LINKS BETWEEN CLIMATE CHANGE AND RESOURCE CONFLICT

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ABSTRACT

Knowledge of the relationship between climate change and resource conflict is paramount in resolving resource conflict between farmers and herdsmen in Nigeria. However, there is yet no general agreement on how climate change causes or influences resource conflict. Thus, a review of existing literature that link climate change and resource conflict was conducted for identification of the missing link. These were achieved through the review of literature published in the era of the recent global climate change from late 90s to date. Selections of papers were based on the topic and date of publication. Result showed that there is general agreement that climate change influence resource conflicts. Some of the authors agreed that climate change cannot cause resource conflict in isolation but through influences on other factors that affect resource availability, accessibility and utility. These factors are also influenced by policies and socio-cultural system. Thus, resource conflict may be a secondary or tertiary effect of climate change. Climate change solution is scares in literature that linked climate change and resource conflict. Thus, future studies should be focused on climate change solution to resource conflict.

KEYWORDS Climate change, Resource conflict, Literature review, Famers

1. INTRODUCTION

Climate change is one of the most important worldwide issues addressed among scientists and researchers; and one of the consequences of climate change is conflict resulting from alteration of rainfall patterns and increased temperature. A number of studies have demonstrated an empirical relationship between higher ambient temperatures and sub-state violence, which have been extrapolated to make predictions about the security implications of climate change (Hsiang et al., 2013; Alexander and Andrew, 2015). The Intergovernmental Panel on Climate Change (IPCC, 2007), views climate change as statistically significant variation in either mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Similarly, the United States Environmental Protection Agency (USEPA, 2020) defined climate change as any long-term significant change in the expected average weather of any place over an appropriate period of time. In other words climate change depicts abnormal variations in the expected climate of a region. Climate change has become a global issue in recent times manifesting in variations of different climate parameters including cloud cover, precipitation, temperature ranges, sea levels and vapour pressure (Ministry of Environment of the Federal Republic of Nigeria (MoEFRN, 2003).

Haider (2019) affirmed that climate change exists in Nigeria, in his words “Nigeria’s climate has been changing, evident in: increases in temperature; variable rainfall; rise in sea level and flooding; drought and desertification; land degradation; more frequent extreme weather events; affected fresh water resources and loss of biodiversity”. Haider (2019) stated that the reports of Elisha et al., (2017), Ebele and Emodi, (2016) and Olaniyi (2013) are proves that Nigeria is currently experiencing climate change. United State Geological Survey (USGS, 2020) noted that climate change is resulted many factors. These factors are both natural and anthropogenic but mainly the later. Studies on

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climate change in Nigeria especially those that emphasize the effects are robust and in agreement that climate change threatens Nigerian’s desire of achieving socio-economic development and peace (Nzeadibe et al., 2011; Olaniyi, 2013; Haider, 2019).

Resource conflicts are disagreements and disputes over access to, and control and use of, natural resources (FAO, 2000). These conflicts often emerge because people have different uses for resources such as forests, water, pastures and land, or want to manage them in different ways. Disagreements also arise when these interests and needs are incompatible, or when the priorities of some user groups are not considered in policies, programmes and projects. Such conflicts of interest are an inevitable feature of all societies (Swedish International Development Cooperation Agency SIDA, 2018).

The theory of eco violence developed by Homer-Dixon (1999) is an emerging theoretical construct that seeks to elucidate the relationship between environmental factors and violent conflicts. The theory holds thus: a decrease in the quality and quantity of renewable resources, population growth, and 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 or be expelled to new lands. Migrating groups often trigger ethnic conflicts when they move to new areas, while decreases in wealth can cause deprivation conflicts (Adoye, 2017). Implicit in the eco-violence theory is the assumption that competition over scarce ecological resources engenders violent conflict. This trend has been aggravated in contemporary times owing to the impacts of climate change, which has exacerbated ecological scarcity across the world (Blench, 2004; Onuoha, 2007).

In effect, ecological scarcity raises the competitive stakes and the premium that the various societal groups may place on available ecological resources. This condition tends to precipitate violent conflicts. Applied to the present review, the theory of eco-violence offers insights into the links between climate change and resource conflict in Nigeria. It suggests that resource conflicts have been driven by the desperation of the affected groups to protect and advance their livelihood interests in the context of an ever shrinking ecological space, characterized by resource-scarcity, a livelihood crisis, population explosion, and resource competition which are propelled by climate change (Okoli and Atelhe, 2014).

Climate change and resource conflict are among the contemporary challenges in Africa particularly Nigeria. There is growing recognition of the possible links between climate change and resource conflicts between farmers and herdsmen in Nigeria (Abubakar, 2012; Abugu and Onuba, 2015; Abugu et al., 2020). However, the links between climate change and resource Nigeria is not clearly articulated due to differing views among researchers. There seems to be a debate on how climate change influences resource conflict between farmers and herdsmen in Nigeria. Thus, this review was conducted to contribute to the debate on the known links between climate change and resource conflict and identify the missing links for further studies.

2. MATERIALS AND METHODS

Desk study of over two hundred (200) research articles out of six hundred (600) documents related to the topic were sorted for review. Qualification of article for review was based on contextual and temporal scope of the study. On the basis of context, article must be on climate change, resource conflict, climate change and resource conflict, climate parameter and conflict, temperature and conflict/crime. On the other hand, preferences were given to studies in Nigeria and articles published in 2007 and upwards. This is because 2007 was when the fourth IPCC assessment report declared that climate change is an issue to be taken seriously. However, articles must not be published before late 19th century as scientists generally regard the later part of the 19th century as the point at which human activity started influencing the climate (Picock, 2016). The findings from existing literature were summarized and direction for further study was suggested.

3. RESULTS AND DISCUSSION

From a historical point of view, certain scholars refer to the fact that resource conflicts resulting from cattle grazing have existed for as long as the practice of agriculture (Blench 2010; Abbass, 2012). However, the dimension and scope of farmers/herdsmen conflict is worrisome (Aliyu, et al., 2018). The primary cause of these conflicts in Nigeria has been linked to southward migration of herders which has been largely attributed to climate change and the recent insecurity in the Northeast (International Crisis Group, 2017). Disagreements over the use of essential resources such as farmland, grazing areas and water between herders and local farmers are said to be the major igniting cause of the battles (Adebayo and Olaniyi, 2008; Ofuoku and Isife, 2009; Abubakar, 2012).

Koubi, (2019) described two schools of thought on the link between climate change and resource conflict as follows. Firstly, those who claim that climate affects the likelihood of conflict via direct physiological and/or psychological factors and resource scarcity. The second group postulates that climate indirectly leads to conflict by reducing economic output and agricultural incomes, raising food prices, and increasing migration flows. On the basis of physiological and/or psychological factors, scholars have argued that, temperature, especially warmer temperatures, elevate levels of discomfort and aggressiveness thereby increase hostility and violence (Anderson and Bushman, 2002). Climate change also affects the likelihood of intragroup violence via the scarcity of renewable resources such as freshwater, arable land, forests, and fisheries (Koubi, 2019).

At the national level, for instance, less rainfall or high temperatures could lead to conflict among consumers of water, for instance farmers and herders, as well as, urban unrest, insurrections, and other forms of civil violence, especially in the developing world. Some scholars suggest that scarcity, especially around shared resources such as transboundary water resources, can also lead to interstate conflict (Salehyan and Gleditsch, 2006).
Other factors such as poor governance, corruption, institutional instability, religious intolerance, ethnic interest and other location-specific and structural conditions have also been identified as important factors in the relationship between resource scarcity and conflict (Barnett and Adger 2007; Raleigh and Kniveton, 2012). Cederman et al. (2013) were of the opinion that grievances due to climate-induced adverse economic conditions could lead to low-level conflict, such as protests when food prices rise, as well as, to civil conflicts when a certain (ethnic) group is particularly affected by such conditions and is excluded.

Literature recognizes the centrality of resource scarcity and competition between different occupational and ethno-cultural groups. Shetrima and Tar (2008) have offered an excellent review of the different theoretical perspectives of conflicts between herders and farmers. The review shows convergence on the centrality of resource scarcity and environmental decline. Similarly, Yunana et al. (2017) pointed specifically that the impact of climate change in the Lake Chad region reflects the general picture, noting that it has taken a heavy toll on the livelihoods of over 8 million pastoralists and fishermen around Lake Chad. Azare et al. (2020) explained that the combined effect of dam development, desert encroachment, and deforestation has caused a series of conflicts and violence, induced by resource scarcity and growing social and economic misery.

Concepts that link climate change and resource conflict are on the increase following speculations and recent researches on the relationship between climate change and migration/conflict. In the words of Maslin (2018), “the media has even started using terms such as “climate refugees” and “environmental migrants” to describe people fleeing their homes from these climate-driven conflicts”. However, it not yet clear that climate causes or influence armed conflicts. Literature have linked climate variables like temperature, rainfall, wind, relative humidity with conflict occurrence (Notaras, 2009; Burke, et al., 2009). Burke et al. (2009) found that “there is a relationship between past internal conflict in sub-Saharan Africa and variations in temperature (but not precipitation) and that there are “substantial increases in conflict during warmer years”. According to (Notaras, 2009), “a 1% increase in temperature leads to a 4.5% increase in civil war in the same year and a 0.9% increase in the following year”.

CLIMATE CHANGE, ALTERED LANDSCAPES AND RESOURCE CONFLICTS

On the basis of possible causes, climate change has been linked to farmers/herdsmen conflicts on the presumption that climate change has slowly changed the landscape of Northern Nigeria leading to increasing drought and desertification which invariably forces herdsmen to migrate southward (Dioha and Emodi, 2018; Elisha et al., 2017). Moreover, studies have also shown that the Southern part of Nigeria is prone to flooding and erosion (Abugkhese et al., 2014; Enete, 2014; Azubuike and Nnubia 2015; Akukwe et al., 2018; Adeniji, 2018). For instance, Enete (2014) showed that “the durations and intensities of rainfall have increased, producing large runoffs and flooding in Enugu State, Nigeria.

This scenario made the Middle Belt of North Central Nigeria the safest zone for both farmers and herdsmen. This also comes with its own consequence such as resource conflict between the local farmers and herdsmen. The herdsmen are searching for a safe place in the Middle Belt States in Nigeria (Abugu et al., 2020). The farmers around this region who focus on shifting cultivation and rotation of land for foraging reasons and good output of farm inputs see the invasion of following grounds and other farmlands by the herder’s cattle as direct incursion on their livelihood (Abass, 2012; Akevi, 2014; Durojaiye, 2014).

Scholars (Folami 2009; Odeku and Isife 2009; Adekunle and Adisa 2015; Brench 2010; Odoh and Chigozie 2012; Solagberu 2012; Audu 2013, 2014; Bello 2013; McGregor 2014; Fabiyi and Onunuga, 2016), had identified climate changes as the root cause of farmers-herdmen conflicts over resource use in Nigeria. It was observed by Gefu and Kolawole (nd) that, while some conflicts arise between same resource group such as between one farming community and another, others occur between different user groups such as between herdsmen and farmers or between foresters and farmers. Adisa (2012) has observed that the farmers-herdsmen conflict has remained the most preponderant resource-use conflict in Nigeria.

CLIMATE CHANGE AND HUMAN ARMED CONFLICT

The link between climate change and conflict is well documented in the literature but there is no general agreement among these reports (Burke et al., 2009; Sutton et al., 2010; Gleditsch, 2012). Burke et al. (2009) stated that “hotter annual temperatures have led to increased civil war incidence in sub-Saharan African states”. The sub-Saharan African area has been the primary geographic focus, given policy concerns over the region’s vulnerability due to populations and “heavy dependence on rainfed agriculture” (Gleditsch, 2012). The assumption by Burke et al., (2010) that increased temperature can lead to increase violence has been challenged by critique (Sutton et al., 2010). In response to criticisms, Burke et al. (2009) revised their model and generated additional results confirming that variation in the incidence of large wars in sub-Saharan Africa in the 1980s and 1990s is in part explained by temperature change (Burke et al., 2010). The updated finding does not hold for the 2003 to 2008 period, which the authors argued may be the result of economic development, improvements in domestic governance, or international peacekeeping efforts. Sutton et al. (2010) suggested that such relationship should be subjected to measurement, dataset selection, and statistical analysis strategies (Buhag, 2010). From this theoretical perspective, subsequent studies have sought to predict the consequences of climate change on violence levels by extrapolating from historical temperature and rainfall trends (Gleditsch, 2012; Hendrix and Salehyan, 2012; Theisen, 2012). According to Hsiang et al. (2011) temperature-induced variation in agricultural yield can alter migration patterns, with potential effects on substate violence. Research has shown “significant effect of climate-driven changes in crop yields on the rate of migration from Mexico to the United States” (Feng et al., 2013). Excessive heat can reduce the supply of crops, which in most circumstances
raises the price of food. In turn, higher food prices have been shown to lead to social instability, including incidents of group violence (Belllemare, 2012). Much of the doubt about the relationship between climate change and conflict results from the inherent complexities of war and peace (Maslin, 2018). With so many political, social, economic and environmental factors playing a role in either preventing or stimulating conflict, applying quantitative analysis and then trying to predict the chance of future conflict is problematic. There is no doubt that impoverishment and human insecurity may arise as a result of climate change, if preventive measures are not undertaken. However, there is missing evidence that global warming directly increases conflict (Notaras 2009).

CHANGING TEMPERATURES AND CONFLICTS

A good number of empirical studies have also demonstrated the relationship between higher ambient temperatures and conflicts (Theisen, 2012; Hendrix and Salehyan, 2012; Hsiang et al., 2013; Bollfrass and Shaver, 2015). However, most of the literature rests on the untested assumption that the mechanism behind the temperature-conflict link is that disruption of agricultural production provokes local violence. Using a subnational-level dataset, Bollfrass and Shaver (2015) demonstrated that: the relationship: (1) obtains globally, (2) exists at the sub-state level provinces that experience positive temperature deviations witness increased conflict; and (3) occurs even in regions without significant agricultural production. It has been stated that diminished local farm output resulting from elevated temperatures is unlikely to account for the entire increase in substrate violence (Burke et al., 2010). The empirical relationship between higher temperatures and increased substrate violence has been demonstrated in many settings. A recent meta-analysis of 60 prior studies finds substantial effects of temperature increases on the likelihood of interpersonal and intergroup conflict (Alexander and Andrew, 2015). Similar associations with changes in precipitation patterns have also been identified. The most thorough scholarly exchange to date has centered on the report of Burke et al. (2009) "that hotter annual temperatures have led to increased civil war incidence in sub-Saharan African states”.

CLIMATE CHANGE AND ECONOMIC CONDITIONS

Most previous studies have theorized that the effect of climate on conflict operates through local economic conditions (Anderson and Anderson, 2014). The first step in this chain of causation is that higher temperatures depress agricultural output. Within Africa, this effect is well established: temperature can affect agricultural yields through increases in crop evapotranspiration and through accelerated crop development. These in turn can reduce African staple crop yields by 10%–30% per degree centigrade of warming (Burke et al., 2010). Moreover, empirical psychological research has established the tendency of individuals to behave more violently at higher temperatures, leaving “little doubt or controversy about the existence of a heat-violence relation in real-world data” (Alexander and Andrew, 2015). Relying on the records collected by law enforcement agencies, several robust analyses have found that much variation in violent offenses can be explained by temperature change (Dodge and Lentzner, 1980). In post-conflict environments where peace is tenuous, temperature induced aggression may be sufficient to trigger escalatory violence, leading to renewed fighting. The argument that climate change contributes to the problems of insecurity and banditry in Nigeria is on the increase. SIDA (2018) emphasized that climate change increases the risk of conflicts through increase in poverty, hunger and forced migration. Other factors include rapid population growth, weak economy, violation of human rights, and failure of political systems or extreme political instability. In line with the report of SIDA (2018), Notaras (2009) has cautioned that "climate change is likely to impact freshwater availability adversely even if annual global precipitation remains the same, because of changes in precipitation pattern causing drought and flood. Flood and drought both will cause freshwater stress that would adversely affect health, sanitation, agriculture, industry and commerce, making livelihoods unsustainable. This would lead to water-induced migration in some parts of the world. Large scale migration on a sustained basis would put pressure on other resources of host regions. Scarcity of resources would normally lead to conflict and this would be further aggravated if migrants and people of host regions get polarized on ethnic, linguistic, religious or some other identities in their fight for resources. Abugu and Onuba (2015) carried out a study titled, ‘climate change and pastoral conflicts in the Middle Belt and South-East Nigeria: implications on human resources of the regions’. The study examined the relationship between climate change and pastoral conflicts as well as their effects on human resources of both the Middle Belt and South Eastern Nigeria. Deprivation, Frustration and Aggression theory was employed to anchor the study. At the end, the study revealed that pastoralists migrate due largely to extreme and unfavorable weather conditions occasioned by climate change. In similar point, Ofuoku and Isife (2009) noted that the advancement of farming through irrigation and the increased decimation of pasture across the savannah also extended the scope of conflicts, through transhumance, to the coastal zones, which were more ecologically viable. A study by International Organization for Migration (IOM) and United Nations University and Institute for Environment and Human Security (UNU-EHS) in 2009 broadly classified the causes of land resource conflicts under six headings: disagreements over historical claims, changes in climatic conditions, consequences of changes in the nature of power balance; elite manipulation, youth reactions to vulnerability and exclusion and alterations in boundary structures. The Intergovernmental Panel on Climate Change (IPCC, 2007) stated that “warming of the climate system is unequivocal” and that climate change could become a major contributing factor to conflicts by exacerbating the scarcity of important natural resources, such as freshwater, and by triggering mass population dislocations (migration) due to extreme weather events, such as droughts and desertification, as well as rising sea levels (Koubi, 2019). Similarly, a US governmental
report elevated environmental issues to the forefront of the security agenda by identifying climate change as “potentially the greatest challenge to global stability and security, and therefore to national security” (CNA Corp. 2007).

According to International Organization for Migration (IOM) and United Nations University Institute for Environment and Human Security (UNU-EHS) report in 2009, changes in climatic conditions have become a factor in conflict considerations when unanticipated environmental changes emerge to alter existing land tenure arrangements between local communities. According to Ile et al. (2018) drought and conflict coexist mostly in countries or regions with the following features: already suffer from adverse climatic changes, highly dependent on agriculture for income and food generation, have few capabilities to cope with climatic changes, and have preexisting tensions and conflict.

CLIMATE CHANGE AND CONFLICTS OVER LAND USE
Despite this notable link between climate change and conflict, few studies have statistically linked climate change with conflict (Burke, et al., 2009; Gleditsch, 2012; Hendrix and Salehyan, 2012; Theisen, 2012; Alexander and Andrew, 2015; Anderson, 2017; Abugu et al., 2020). These literature rest on the untested assumption that the mechanism behind the temperature-conflict link is that disruption of agricultural production provokes local violence.

In Nigeria, the growth of agro-pastoralism, the expansion of farming on pastures, the invasion of farmlands by cattle, assault on non-Fulani women by herdsmen, blockage of stock routes and water points, freshwater scarcity, burning of range lands, cattle theft, inadequate animal health care and disease control, overgrazing on fallow lands, defecation on streams and roads by cattle, ethnic stereotyping, and the breakdown of conflict intervention mechanisms, these are usually identified by scholars as the root causes of farmers/herders conflicts (Folami, 2009; Ofooku and Isife 2009; Adekunle and Adisa 2010; Blench 2010; Odohand Gleditsch, 2012; Solagberu 2012; Audu 2013, 2014; Bello 2015; Shehu 2018). Okoli and Atelhe (2014) conducted a study on political ecology study of herder/farmer conflicts in Nasarawa State, Nigeria. They posited that the phenomenon of herder/farmer conflict in Nasarawa State typifies what is known as resource conflict in contemporary development literature. Eje et al. (2017) argued that farmers-herder’s conflicts in Riyom local government area of Plateau State Nigeria are caused by a combination of factors such as crop damage by cattle, land encroachment, encroachment on grazing reserves, lack of access to water point and pollution of water points, killing of stray cattle, cattle rustling, indiscriminate bush burning and disregard to rules and regulations.

CLIMATE CHANGE RESOURCE CONFLICTS AND SOCIAL CONSEQUENCES
The effects of resource conflict between farmers and herdsmen is well studied and include loss of lives, displacement of indigenous settlers, food insecurity, hardships and disruption of properties/livelihood sources, famine/mass starvation, reductions in farmland, loss of herds and so on. So many aspects of farmers/herdsmen conflicts such as the nature, causes, frequencies, effects and resolution mechanism have been well elaborated (Agberegbeda, 2013). Musa et al. (2014) evaluated resource use conflict between herdsmen and farmers in Benue state of Nigeria by adopting a descriptive survey design. Result revealed that the conflicting parties always end up losing their lives and properties, experience a decrease in productivity and get displaced.

International Crises Group (2017) found that tens of thousands of Nigerians also have been displaced. Women and girls were particularly affected: they experienced poverty and lack of access to resources, and their husbands were killed in the violence in the Fulani-farmer conflict. Gürsoy (2020) stated that violent conflicts between herdsmen and farmers in Nigeria have escalated in recent years, which threaten people’s lives and the country’s stability. The conflicts between herdsmen and farmers have resulted in a humanitarian crisis (Ningxin, 2018).

Salihu (2019) cautioned that in environments that are already unstable, protracted farmer/herder violence has the potential to aggravate preexisting tensions. Similarly, Bagu and Smith (2017) warned that if the violence is not properly dealt with, farmer/herder conflicts have the potential to undermine community relationships, destabilizing the country and the state. Additionally, Shehu (2018) opined that farmers-herdsmen conflict often leads to mistrust among people who live together for so many years because some northern Christian minorities and southern politicians have labeled the conflict as a deliberate attempt by the Northern Muslim leaders to impose Islamic shariah or as a jihad movement to the mostly Christian dominated states of north central and southern states.
Ajuwon (2004) reported farmer–herdsmen conflict in Imo State, Southeastern Nigeria. The author noted that between 1996 and 2003, nineteen (19) people died and forty-two (42) injured in the rising incident of farmers–herdsmen conflict and the violence that often accompanies such conflicts should be regarded as being of national concern. According to Aluko (2017), the conflict between herdsmen and farmers in the north central of Nigeria has displaced more than 100,000 people in Benue and Nasarawa states. It has left them without any other feasible option than squatting with relatives or relocating to temporary displaced persons’ camps.

Studies (Human rights watch, 2010; Agbegbedia, 2013) have shown that resolving resource conflicts requires a wide range of skills. These include an understanding of precedent, local history and the political economy, including the contested role of the state, and the ability to build trust, be creative and manage complex processes. Knowledge of natural resources and resource governance is also essential. However, International Crisis Group (2017) opined that farmers and herdsmen’s conflict have not received adequate attention by both State and Federal Governments. Consequently, violent conflicts escalated in recent years and are spreading southward, threatening the Nigeria’s security and stability.

Sailihu (2019) assessed the effectiveness of government strategies in resolving farmers-herdsmen conflict in Adamawa State. Results indicated that the government is up and doing with effort to tackle the problem of farmers-herdsmen conflict in Adamawa State by introducing such measures as security and legal actions, creation of grazing reserves, development programmes, cattle colonies, national livestock transformation plan, organized dialogue and negotiations, and comprehensive livestock development plan. However, the author concluded that these measures did not yield the desired outcome. Chikaire et al., (2018) recommended involvement of traditional rulers, town unions, herder unions, farmers associations, religious organizations and law enforcement agents in reconciliatory roles to ensure peaceful co-existence between farmers and herdsmen.

4. CONCLUSION
There is general agreement that climate change influences resource conflicts. However, there is disagreement on the nature of the influence and majority see resource conflict as a secondary effect of climate change. To psychologists, frustration/aggression theory best describe the link between climate change and resource conflict. Psychologists claim that rise in temperature upset people and provoke conflict. Sociologists point at societal structure and deprivation and uses deprivation/ structural conflict theory in the explanation of climate change and resource conflict link. Geographers consider the interconnection between the environment and man in discussing climate change and resource conflict. Thus, eco-violence theory is usually applied in their holistic approach to link climate change and resource conflict.

Though, climate change is a well accepted factor of resource conflict between farmers and herdsmen; the decision in the present study is that climate change has a relationship with resource conflict through influence on other factors that affect resource availability, accessibility and utility. These include land use, population distribution and economy. These factors are also influenced by policies and socio-cultural system. Thus, resource conflict may be a secondary or tertiary effect of climate change.

Climate change solution is the focus of recent literature that links climate change and resource conflict (Buhaug, 2015; Schleussner, 2016; Dapilah et al., 2019; Koubi, 2019; Schilling, 2020; Mach and Kraan, 2021). However, such studies are relatively inadequate. This suggests that future studies should be focused on climate change solution as a response to resource conflict. Since climate change relate to resource conflict through influence on other factors that affect resource, addressing climate change involves restructuring land use, adopting environmental friendly economy and so on. Therefore, good policies on land use, population distribution and economy will abate the effects of climate change on societal cohesion and minimize resource conflict between farmers and herdsmen.

REFERENCES
Abass I. M., 2012. No Retreat, No Surrender: Conflict for Survival between the Fulani Pastoralists and Farmers in Northern Nigeria. European Scientific Journal 8(1):331–346.

Abubakar A. Z., 2012. Effects of urbanization on land use/land cover changes in Birnin Kebbi, Kebbi State, Nigeria. M.Sc Dissertation submitted to School of Post Graduate Studies, Ahmadu Bello University, Zaria, For The Award of Master of Science Degree in Remote Sensing and Geographic Information System, Department of Geography.

Abugu N. A., Odele M, Ogah T. A and Yero A. B., 2020. Analysis of Climate Variables and Resource Conflict in Benue State, Nigeria. WJIR 9 (5).

Abugu S. O., Onuba C. O., 2015. Climate change and pastoral conflicts in the middle belt and south-east Nigeria: Implication on human resource of the regions. Global Journal of Human Resource Management 3(5): 44–51.

Adebayo O. O. and Olaniyi, O. A., 2008. Factors Associated with Pastoral and Crop Farmers Conflict in Derived Savannah Zone of Oyo State, Nigeria. Journal of Human Ecology 23(1).

Adekunle A.O., Adisa S. R., 2010. An empirical phenomenological psychological study of famer-herdsman conflicts in Northern Nigeria. Journal of Alternative Perspectives in the Social Sciences 2 (1): 1-27.

Adeniji O. A., 2018. Climate Change and Environmental Impacts of Flood in Nigeria. Journal of Environment and Earth Science 8 (8): 10-16.

Adeoye N. O., 2017. Land Use Conflict between Farmers and Herdsmen in parts of Kano, Yobe
and Borno States of Nigeria: Nomads Viewpoint. Ghana Journal of Geography 9(1):127–151.

Adisa R. S., 2012. Land Use Conflicts between Farmers and Herdsman: Implications for Agricultural and Rural Development in Nigeria. Rural Development—Contemporary Issues and Practices (Ed) Shanghai, In–Tech. 1–23.

Agbegbedia A. O., 2013. An assessment of the methods of managing conflict between pastoralists and farmers in Benue State, Nigeria. A thesis submitted to the institute of African studies in partial fulfillment of the requirements for the award of the degree of doctor of philosophy (PhD) in peace and conflict studies, institute of African studies, university of Ibadan, Ibadan, Nigeria.

Agbonkhese O. E., Agbonkhese E. A., Joe-Abaya J. Ocholi M. Adekunle A., 2014. Flood Menace in Nigeria: Impacts, Remedial and Management Strategies.” Civil and Environmental Research 6 (4): 32–40.

Ajuwon S. S., 2004. Analyzing and managing potential conflict: Case study — Fadama project in Nigeria. International Journal of Development and Sustainability 2(1).

Akevi J., 2014. Addressing the scourge of Fulani Herdsmen in Benue State. Eagle Reporters Journal 11(2917):12.

Akuwue T., Krhoda G., Oluko-Odino A., 2018. Principal Component Analysis of the Effects of Flooding on Food Security in Agrarian Communities of South Eastern Nigeria. International Journal of Hydrogen Energy 2 (2): 205–212.

Alexander B., Andrew S., 2015. The Effects of Temperature on Political Violence: Global Evidence at the Subnational Level. PLoS One,10 (5).

Aluko I. O., 2017. Urban violence dimension in Nigeria: farmers and herdsmen onslaught. AGATHOS 8(1):187-206.

Aliyu M. K., Ikedinma H. A., Akinwande A. E., 2018. Assessment of the Effect of Farmers-Herdsmen Conflicts on National Integration in Nigeria. International Journal of Humanities and Social Sciences, 8 (10):118—128.

Anderson C. A., Anderson D. C., 2014. Ambient temperature and violent crime: Tests of the linear and curvilinear hypotheses. Journal of personality and social psychology 46(1).

Anderson C. A., 2017. Temperature and aggression: effects on quarterly, yearly, and city rates of violent and nonviolent crime. Journal of personality and social psychology 52(6).

Anderson C. A., Bushman B. J., 2002. Human aggression. Annu. Rev. Psychol. 53:27–15.

Audu S., 2013. Conflicts among Farmers and Pastoralists in Northern Nigeria Induced by Fresh water Scarcity. Developing Country Studies 3 (12): 25–32.

Audu S., 2014. Freshwater Scarcity: A Threat to Peaceful Co-Existence between Farmers and Pastoralists in Northern Nigeria. Nigeria. African Security Review 24(1): 55–62.

Azare, I. M., Abdullahi M. S., Adebayo, A. A., Dantata, I. J., Duala, T., 2020. Deforestation, Desert Encroachment, Climate Change and Agricultural Production in the Sudano-Sahelian Region of Nigeria. Appl. Sci. Environ. Manage. Vol. 24 (1) 127-132.

Azubuike O. C., Nnubia U. E., 2015. “Challenges of Food Insecurity Due to Climate Change (Flood Disaster) in the South Eastern Region of Nigeria: Need for Home Economics Extension Workers.” World Scientific News 15 (2): 40–48.

Bagu B. M., Smith A., 2017. Political succession: a model of coups, revolution, purges, and everyday. International Journal of Academic Pedagogical Research (IJAPR).

Barnett J and Adger W. N., 2007. Climate change, human security and violent conflict. Political Geogr. 26:639–55.

Bellemare M. F., 2012. Rising food prices, food price volatility, and social unrest. In: APSA 2012 Annual Meeting Paper: 1–66.

Bello A., 2013. Herdsmen and Farmers Conflicts in North-Eastern Nigeria: Causes, Repercussions and Resolutions. Academic Journal of Interdisciplinary Studies 2(5):129-139.

Blench R., 2004. The Transformation of Conflict between Pastoralists and Cultivators in Nigeria.

Blench R., 2010. Conflict between Pastoralists and Cultivators in Nigeria: Review paper prepared for DFID, Nigeria.

Bollfrass A and Shaver A., 2015. The effects of temperature on political violence: global evidence at the subnational level. PLOS ONE 10:e0123505

Buhaug H., 2010. Climate not to blame for African civil wars. Proceedings of the National Academy of Sciences 107: 16477–16482.

Buhaug H., 2015. Climate-conflict research: some reflections on the way forward. WIREs Clim. Change 6:269-275.
Burke M. B., Miguel E, Satyanath S, Dykema J. A., Lobell D. B., 2009. Warming increases the risk of civil war in Africa. Proceedings of the National Academy of Sciences 106: 20670–20674.

Burke M. B., Miguel E, Satyanath S, Dykema J. A., Lobell D. B., 2010. Climate robustly linked to African civil war. Proceedings of the National Academy of Sciences 107.

Cederman L. E., Gleditsch K. S., Buhaug H., 2013 "Inequality, Grievances, and Civil War". Cambridge, UK: Cambridge Univ. Press.

Campion B. B., Acheampong E., 2014. The Chieftaincy Institution in Ghana: Causes and Arbitrators of Conflicts in Industrial Jatropha Investments. Sustainability 6:6332-6350.

Chikaire J. U., Ajaero J. O., Ibe M. N., Orushe J. O. and Onogu B., 2018.Status of Institutional Arrangements for Managing Resource Use Conflicts among Crop Farmers and Pastoralists in Imo State, Nigeria. Agricultural Research and Technology: Open Access Journal 9(1).

Chikezie C, Ibekwe U. C., Ohajianya D. O., Orebiyi J. S., Henri-Ukoh A, Ukoha I. I., Osuji M. N., Anthony G., 2016. Climate change and perceived climate hazards: A trend analysis in Southeast Nigeria. International Journal of Weather, Climate Change and Conservation Research 2(1): 1-10.

CNA Corp 2007. “National security and the threat of climate change”. Rep. CNA Corp.

Collins, R., 2015. “Conflict Sociology”. New York: Academic Press.

Coser L. A., 2014 “The Functions of Social Conflict”. Free Press.

Chukwuma O. A. and Ateli A. G., 2014. Nomads against natives: A political ecology of herder/ farmer conflicts in Nasarawa State, Nigeria. American International Journal of Contemporary Research 4(2): 76–88.

Dapilah F, Nielsen JØ, Friis C., 2019. The role of social networks in building adaptive capacity and resilience to climate change: a case study from northern Ghana. Clim. Dev.10(2):231.

Dioha M. O., Emodi N. V., 2018. Energy-climate dilemma in Nigeria: Options for the future. IAEE Energy Forum.

Dodge R. W., Lentzner H. R., 2020. Crime and seasonality. US Department of Justice, Bureau of Justice Statistics.

Durojaiye R., 2014. Challenge of Fulani Herdsmen. Editorial, Daily Independence, July 8.

Ebele N. E., Emodi N. V., 2016. Climate change and its impact in Nigerian economy. Journal of Scientific Research & Reports, 10(6), 1-13.

Eje T. I. Angai I. A., Abdulahi Y. B., 2017. Pattern and Impact of Conflicts between Farmers and Herders in Riyom L.G.A. of Plateau State, Nigeria. The International Journal of Humanities and Social Sciences 5(10):256–271.

Elisha, I., 2017. Evidence of climate change and adaptation strategies among grain farmers in Sokoto State, Nigeria. IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT), 11(3), 1-7.

Enete I. C., 2014. Impacts of climate change on agricultural production in Enugu State, Nigeria. Journal of Earth Science and Climatic Change 5(9), 234.

Fabiyi M, Otunuga A., 2016. Why The Fulani Herdsmen and Farmers Fight: How Climate Change and The Boko Haram Crisis Created The Crisis and Six (6) Evidence-Based Policy Recommendations For Its Resolution.

FAO, 2000. “Feeding Asian Cities”. Proceedings of the regional seminar organized by: The Regional Network of Local Authorities for the Management of Human Settlements (CityNet) and the Association of Food Marketing Agencies in Asia and the Pacific (AFMA), with the technical support of the Food and Agriculture Organization of the United Nations (FAO) Bangkok, Thailand November 27-30.

F A O., 2 010. Conflict and Natural Resource Management.

Feng S, Krueger A. B., Oppenheimer M., 2013. Linkages among climate change, crop yields and Mexico–US cross-border migration. Proceedings of the National Academy of Sciences 107.

Folami, O., 2009. Climate Change and Inter-Ethnic Conflict Between Fulani Herdsmen and Host Communities in Nigeria. Being a Paper Presented at Conference on Climate Change and Security Organized by the Norwegian Academic of Sciences and Letters on the Occasion of 250 years Anniversary in Trondiern, Norway.

Gefu J. O., Kolaowale A (nd). Conflict in common property resource use: experiences from an irrigation project. Paper prepared for the 9th Biennial Conference of the International Association for the study of Common Property.

Gleditsch N. P., 2012. Whither the weather? Climate change and conflict. Journal of Peace Research 49: 3–9.
Goke S., 2018. The genesis of farmers-herders clashes in Nigeria. Journal of Social Sciences, 4 (2): 34-48.

Greiner C, Michael B, Terrence J. M., 2013. Notes on Land-based Conflicts in Kenya’s Arid Areas. Afrika Spectrum: Deutsche Zeitschrift für Gegenwartszzeitgenössische Afrikaforschung 46(3).

Gürsoy G., 2020."Farmers Herders Conflict in Nigeria”. Peace and Conflict Studies MA 2019 Summer Semester Marburg, Germany.

Haider H., 2019. “Climate change in Nigeria: Impacts and responses”. K4D Helpdesk Report 675. Brighton, UK: Institute of Development Studies.

Hendrix C. S., Salehyan I., 2012. Climate change, rainfall, and social conflict in Africa. Journal of Peace Research 49: 35–50.

Hsiang S. M., Burke M, Miguel E., 2013. Quantifying the influence of climate on human conflict. Science 341: 123-336.

Homer–Dixon T. F., 1999. “Environment, Society and Violence”. Princeton: Princeton University Press.

Human Rights Watch (12 December 2013). "Leave Everything to God": Accountability for Inter-Communal Violence in Plateau and Kaduna States, Nigeria: 49–81.

Ide T, Adams C, Barnett J, Detges A., 2018. Sampling bias in climate-conflict research. Nat. Clim. Change 8:200–3

Intergovernmental Panel on Climate Change (IPCC, 2007. Climate Change 2007: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.

International Crisis Group 2017. Herders against Farmers: Nigeria’s expanding Deadly Conflict. Report 252/Africa, 19 September.

International Organization for Migration (IOM), United Nations University Institute for Environment and Human Security (UNU-EHS) 2009. Migration, Environment and Climate Change: Assessing the Evidence. Published by International Organization for Migration17 route des Morillons1211 Geneva 19Switzerland.

Koubi V., 2019. Climate Change and Conflict. Annual Review of Political Science. The Annual Review of Political Science.

Mach K. J. and Kraan C. M., 2021. Science-policy dimensions of research on climate change and conflict. J. Peace Res. 58(1):168-176.

Maslin M., 2018. Climate change is not a key cause of conflict, finds new study. The Conversation Africa, Inc. Retrieved online at theconversation.com › climate-change-is-not-a-key-cau.

McGregor A., 2014. Alleged Connection between Boko Haram and Nigeria’s Fulani Herdsmen Could Spark a Nigerian Civil War. Terrorism Monitor 12, (10): 8-10.

Ministry of Environment of the Federal Republic of Nigeria MOEFRN, 2003 Nigeria’s first National communication under the United Nations framework convention on Climate change. Abuja, Nigeria.5 -10.

Musa S. D., Shadu T, Igbawua, M. I., 2016. Resource use conflict between farmers and Fulani herdsmen in Guma Local Government Area of Benue state, Nigeria. Journal of Defense Studies and Resource Management 4 (1), 1-6.

Ningxin Li., 2018. Nigeria’s Fulani herdsmen-farmers conflict and peace building. Global Journal of Agricultural Research 6(5):1-15.

Notaras M., 2009. Does Climate Change Cause Conflict? Our World United Nations University. Available online at Our World ourworld.unu.edu › does-climate-change-cause-conflict.

Nzeadibe T. C., 2011. Climate change awareness and adaptation in the Niger Delta Region of Nigeria. African Technology Policy Studies Network. Working paper, no. 57. Nairobi: Published by the African Technology Policy Studies Network.

Odoh S, Chigozie C., 2012. Climate Change and Conflict in Nigeria: A Theoretical and Empirical examination of the Worsening Incidence of Conflict between Fulani Herdsmen and Farmers in Northern Nigeria. Arabian Journal of Business and Management Review. 2, (1): 110-124.

Ofluoku, A and Isife, B., 2009. Causes, effects and resolution of farmer-nomadic cattle herdsmen's conflict in Delta State, Nigeria. International Journal of Sociology and Anthropology, 1, 47-54.

Okoli, A. C and Atelhe G., 2014. Nomads against natives: A political ecology of herders/farmers conflicts in Nasarawa State, Nigeria. American International Journal of Contemporary Research, 4 (2): 76 -88.

Olaniyi O. A., 2013. Review of climate change and its effect on Nigeria ecosystem. International Journal of African and Asian Studies, 1, 57.

Onuoha, F. C., 2007. The state and water conflict in Africa: A focus on the Lake Chad, 1960 – 2007. M.Sc. Thesis submitted to Department of Political Science, University of Nigeria, Nsukka.
Picock R., 2016. Scientists clarify starting point for human-caused climate change. Wikimedia Global Temperature.

Raleigh C and Kniveton D., 2012. Come rain or shine: An analysis of conflict and climate variability in East Africa. Journal of Peace Research 49: 51–64.

Salehyan I, Gleditsch K. S., 2006. Refugees and the spread of civil war. International Organization 60: 335.

Salihu M., 2019. The Effectiveness of Government Strategies in Resolving Farmers-Herdsmen Conflict in Adamawa State. International Journal of Research and Innovation in Social Science (IJRISS), 3(8).

Schleussner C. F., Donges J. F., Donner RV, Schellnhuber H. J., 2016. Armed-conflict risks enhanced by climate-related disasters in ethnically fractionalized countries. PNAS 113: 9216–21.

Schillling J, Hertig E, Tramblay Y, Scheffran J., 2020. Climate change vulnerability, water resources and social implications in North Africa. Reg. Environ. Change 20:15.

Shehu A., 2018. The Causes and Consequences of Fulani Pastoralist-Farmers Conflict in Nigeria. International Journal of Innovation and Research in Educational Sciences, 5 (3): 357-361.

Shetima A. G., Tar A. U., 2008. Farmer pastoralist conflict in West Africa exploring the causes and consequences. Information, Society and Justice, 1(2): 163 – 184.

Solagberu R., 2012. Land Use Conflict between Farmers and Herdsmen –Implications for Agricultural and Rural Development in Nigeria. In Solagberu, R (ed) Rural Development: Contemporary Issues and Practices. Rijeka/Shanghai: In Tech.: 99 -118.

Sutton A. E., Dohn J, Loyd K, Tredennick A, Bucini G., 2010. Does warming increase the risk of civil war in Africa? Proceedings of the National Academy of Sciences 107.

Swedish International Development Cooperation Agency SIDA, 2018. The relationship between climate change and violent conflict. Green tool box/peace and security tool box: working paper.

Theisen O. M., 2012. Climate clashes? weather variability, land pressure, and organize violence in Kenya, 1989–2004. Journal of Peace Research 49: 81–96.

United States Environmental Protection Agency USEPA, 2020. Climate Change Indicators: Weather and Climate. Published by United States government.

United State Geological Survey USGS, 2020. Why is climate change happening and what are the causes? Published US department of Interior.

Yunana D. A., Shittu A. A., Ayuba S, Bassah E. J., Joshua W. K., 2017. Climate change and lake water resources in Sub-Saharan Africa: case study of lake Chad and lake Victoria. Nigerian Journal of Technology 36(2):648-654.