Climate Change and Insecurity in Northern Nigeria

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ABSTRACT
Climate change is a global source of insecurity. This is because there is virtually no country across the word that is not affected by the devastating effects of climate change. It is even speculated that by 2050 there would not be any glacier in the world. This presents a gloomy picture for human lives and suggests a need to examine the specific impact of climate so as to make provision for adaptation and mitigation. This paper examines climate change as a source of insecurity in Northern Nigeria. The paper posits that climate change has brought about livelihood insecurity, food insecurity, health insecurity, agricultural insecurity as well as competition for resources and migration among others. The paper recommends the creation of awareness and the creation of adaptation policies and measures by leadership and followership respectively.

Keywords: Climate change, Insecurity, conflict, Migration, Northern Nigeria

INTRODUCTION
Climate change has in recent times become a global source of insecurity. This is because there is virtually no country across the word that is not affected by the devastating effects of climate change. It is even speculated that by 2050 there would not be any glacier in the world (Nelson, West and Finan 2009; Adger 2005; Leary, 2008)). This presents a gloomy picture for human life in terms of survival and suggests a need to critically research into this to be able to arrive at adaptive measures as well as measures to reduce the devastating effects of climate change. Previously the climate change discourse focused more on the physical or natural environment but recent research shows increased focused on the social dimensions of climate as a result of the sweeping changes it has brought to human existence across the world.

Ever since the industrial revolution which took place over 200 years ago, human activities have added very large quantities of gases into the earth’s atmosphere (Barnett and Adger 2005; Adger 2001). This has resulted in the warming of the atmosphere over time. Specifically, there has been rising fossil fuel burning as well as land use changes and these have been emitting quantities of greenhouse gases such as carbon dioxide, methane and nitrogen dioxide into the atmosphere (Hulme 2001). A rise in emission of these gases has resulted in the amount of heat from the sun withheld in the earth’s atmosphere and increase in this heat over time has led to the greenhouse effect resulting in climate change (Barnett and Adger, 2005). Climate change generally has led to changes in cloud cover and precipitation over land, the melting of the ice caps and reduced snow cover, increase in ocean and acidity due to sea water absorbing heat and carbon dioxide from the atmosphere.

Over the last century atmospheric concentration of carbon dioxide has increased from a pre-industrial value of 278 parts per million to 379 parts per million in 2005 showing that an increasing rate of warming has taken place over the last 25 years(IPCC, 2007 and African Union 2007). Also the IPPC (2007 and 2013) projection for the 21st century shows that global warming will continue and even accelerate. This will happen even if greenhouse emissions reduce.
Carbon dioxide is responsible for the greater amount of the warming. And over the years the amount of carbon dioxide being released into the atmosphere has been increasing steadily. According to the United States Environmental Protection Agency (2016), carbon dioxide accounted for 82% of human caused emission in the United States of America in 2015. Carbon dioxide is released mainly from the incomplete combustion of fossil fuels – coal oil and gas – used for electricity production, transportation and industrial processes. These activities account for more than 60% of the carbon dioxide released into the atmosphere (Heyd and Brooks 2006, Brauch 2009). The other gases that enhance climate change such as methane, nitrous oxide, black carbon and various fluorinated are emitted in smaller quantities than carbon dioxide but trap more heat in the atmosphere that carbon dioxide does (Brown and Funk 2008, African Union 2007). The emission of these gases leads to increase the warming of the earth surface. According to IPCC (2007, 2014), the earth has warmed at a rate of 0.13°C per decade since 1957, almost twice as fast its rate of warming during the previous century.

Climate change has had far reaching consequences across the world. There have been changes in the global water cycle and changes in the total annual precipitation. Some parts in the world experience drought while others experience increased annual rainfall. There is also the declining of glaciers across the globe are decreasing in area, volume and mass. The warming of the atmosphere has also led to the warming of water hence ocean warming leads to sea level because of the increased volume of water. According to IPCC (2013), the extent of climate change and effects on individuals and regions will vary over time and with the ability different societal and environmental systems to mitigate or adapt to change. All across the world, there is the melting of ice especially at the earth’s poles. This includes mountain glaciers, ice sheets covering West Antarctica and Greenland and in Arctic sea ice. The melting of ice has contributed to sea level rise. Global sea levels are rising 0.13 inches (3.2 millimeters) a year (African Union 2007, Döös 1994). This rise is becoming faster in recent times. The rising temperature has implication for plants and animals. Rising temperature has affected wide life and their habitats. Some have disappeared while others are migrated to cooler areas. Rainfall and snow has increased across the globe, while some regions are experiencing more severe drought, increasing risk of wild fire and water shortages, others are experiencing flood. Pests such as mosquitoes, ticks, and jelly fish as well as crop pests are thriving in other areas over the world. There has been flooding hurricanes, drought, epidemics that are all attributable to climate change.

The threat of climate change is real as ocean temperatures over the years have increased causing expansion of the areas in addition to melt water from the land-based ice resulting in rise in sea level. All these have increased the volume of water across the world and this has implications for life and existence (Bindoff, Willebrand, Artale, Cazenave, Gregory, Gulev and Shum, 2007 and; Brauch 2002). Climate change has resulted in the intensity of extreme events such as tropical cyclone, hurricanes and typhoons, floods and drought (O’Brien, O’keefe, Meena, Rose and Wilson 2008). These events in turn have consequences on the environment, individuals, survival and sustainability of life. This is because of its effect on water resources, agriculture and food security, human health, ecosystems and coastal areas (Collier, Conway & Venables, 2008; Malic & Smit, 2012; Attaner & Masseti, 2015).

Though climate change is a global issue, its impact and vulnerability to it vary across continents of the world. According to the United Nation Framework Convention on Climate Change (UNFCC, 2008) Africa is highly vulnerable to the impact of climate change. The African continent is one of the continents that will be most affected by climate change but contributes the least to it. The United Nations (UN) estimates that nine out of every ten disasters are climate change related (Holmes 2002). Garcia (2008) also argues that climate change has the capacity to disrupt states capacity to generate wealth, to decrease Gross National Product (GDP) and affect human and ultimately national security in Africa. Africa’s vulnerability is both a function of the continents climatic system and the system’s interaction with socio-economic challenges like...
endemic poverty, poor governance, limited access to capital, and global markets, ecosystem degradation, complex disasters and conflicts, urbanization – which may undermine the continents ability to adapt to climate change (Boko et al 2007). Furthermore, Garcia (2008) posits that African’s warm climate and exposure to inconsistent rains with poor soils as well as African economies are dependent on sectors that are susceptible to climatic fluctuation such as fisheries, forestry, and tourism make the continent more vulnerable to the effects of climate change in addition to Africa’s socio-economic sectors which are characterized by lack of good governance, persistent and wide spread poverty, poor economic and social infrastructure, conflicts and limited human institutions and financial capacities. This suggests a need to examine the specific impacts and vulnerabilities.

The Nigerian state is one of the African countries that is said to be very vulnerable to climate change (Huq and Ayers 2007). This is because agriculture which is the most important sector of the economy, employing more than 70 % of the population is rain fed making it vulnerable to weather and by extension climate change (ERM/DFID 2009; NBS 2012). Odjugo (2012) in his study found an increase in temperature and decrease in the amount and duration of rainfall. His finding is also corroborated by Uyigue and Agho(2007) and Odekunle and Adejuwon (2007). It is also believed that Northern Nigeria is likely to have more negative effects of climate change than Southern Nigeria (Oyakale 2009, Odjugo 2010)

The extent of climate change has the capacity to create a sense of insecurity in all spheres and sectors of life. As such this paper examines the various ‘insecurities’ caused by climate change. It is the argument of this paper that no matter how general social issues are, individuals and groups have specific realities have to be examined so as to arrive at an understanding of the impact. This paper examined the climate change situation in Northern Nigeria as well as the insecurity implications it has for individuals and groups within the area.

**Conceptual and Theoretical Issues**

Climate change has been defined variously by scholars. IPCC (2007) defines it as a change in the state of climate that can be identified by changes in the variability of its properties and persists for an extended period typically decades or longer. Climate change could occur as a result of natural variability or as a result of human activity. Either way there is usually a change in the earth’s energy balance. According to UNFCCC (2011) climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. It also be defined as a statistical description of weather and of related condition of oceans land surfaces and ice shed. It refers to the alteration in the pattern of climate over a long period of time due to a combination of natural and human induced caused (Australian Academy of Science, 2015). It is a change in the pattern of weather and related changes in Oceans, land surfaces and ice sheets occurring over time scales of decades or longer. Weather is the state of the atmosphere, humidity, wind, rainfall over hours to weak weather is influenced by the oceans, land surfaces and ice sheets. These together with the atmosphere form the climate system. In essence climate is the statistical description of the climate system. It refers to a change in the statistical properties of the climate system that persists for several decades or 35 years at least. Climate change may be caused by natural processes such as sun’s radiation, volcanoes or internal variability in the climate system or due to human influences such as burning of fossil fuels.

According to IPCC (2001, 2007), global average land and sea temperature has increased by over 0.6°C since mid-19th century. Patterns of precipitation have also changed. Arid and semi-arid regions are becoming drier while other wet areas are becoming wetter. According to IPCC, if no specific actions are taken to reduce greenhouse emissions, global temperatures will increase to between 1.4 and 5.8°C from 1990-2000. According to the Australian Academy of Science (2007), the following have been observed as changes in the climate system:
Mountain glaciers have been shrinking and contributing to global sea level rise since about 1850 (melting accelerated significantly in the 1990s).

The green land and West Antarctica ice sheets have lost both ice since 1990. There is increased discharge of ice into the ocean, and also increased surface melting in green land.

The amount of water vapour in the atmosphere has increased since the 1980s.

The surface of the ocean in rainy parts of the world is becoming less salty which is consistent with fresh water dilution from increased rainfall.

Increasing number of plants and animals, on land and in the oceans are undergoing shifts in their distribution and life cycles that are consistent with observed temperature changes.

Insecurity has also been defined variously by scholars. According to Achumba, Ighomereho and Akpor-Robaro (2013) insecurity is an absence of protection or safety. To them, insecurity entails peril, death trap, ambiguity, dearth of fortification and lack of security. Insecurity could be a state of being prone or vulnerable to danger or threat of danger. The state of anxiety as a result of inadequate security measures can also be regarded as insecurity. Beland (2005), defines insecurity as a state of fear or anxiety stemming from a concrete or alleged lack of production. It is a lack of or inadequacy of freedom from danger. This definition reflects physical insecurity and it is directly linked to other tourist security including, economic, social psychological, etc. Insecurity can be seen as the state of being subject to all forms of dangers of both natural and human activities towards society or individuals. Udoh (2015) sees insecurity as the state of being subject to danger and injury. It is the anxiety that one experience when one feels vulnerable, insecurity and lack of confidence.

Insecurity can be explained using various theories such as Functionalism, Marxism and Elite theory. This paper adopts the functionalist perspective because of its value in explaining climate change as insecurity in Northern Nigeria. The functionalist perspective is a body of theory that adopts an organismic analogy in the explanation of societal issues. Functionalism sees society as a system with interdependent parts. Working towards society is seen as a structure with differentiated interdependent parts. These different parts work together to maintain equilibrium. This perspective has scholars such as August Comte (1998-1857), Herbert Spencer (1820-1903), Robert Merton (1920-2003) and Talcott Parsons (1902-1979). Talcott Parson further elaborated on the discourse of the parts making up the whole through his famous AGIL scheme. Parsons believes that there are four functional prerequisites in societies to enhance survival. These he described as:

1. Adaptation:
2. Goal attainment: a system must define its goals.
3. Integration: manage the relationship between other functional prerequisite.
4. Latency: Renewal of the system.

Functionalist also argues that a society is always in a state of equilibrium and a disruption in any part of the system can trigger change and adjustment within the whole until a new equilibrium is achieved. Climate change can bring about change in the physical and social environment. Climate change in itself is brought about through man-made and natural activities. Climate change brings about changes in the social and physical environment of man causing insecurity. Climate change affects health, livelihood, food security, water security and environmental security in general. This insecurity is a threat to the survival of the social system and can affect the equilibrium balance of society. As such adaptive measures at policy and individual level can enable individuals cope and achieve a new level of equilibrium. Insecurity can also result from the failure of institutions to play their roles. The inability of social institutions to function properly brings about a dysfunction in society and as such adaptation is needed to bring society to a new level of equilibrium.
Climate Change Situation in Northern Nigeria

Northern Nigeria is situated between Longitudes 3° and 15° East and Latitudes 9° and 14° North. Northern Nigeria is used to describe all states that are located in the Northern part of Nigeria. The states located in Northern Nigeria include, Kebbi, Zamfara, Katsina, Kano, Sokoto, Jigawa, Yobe, Borno, Gombe, Bauchi, Kwara, Plateau, Adamawa, Niger, Nasarawa, Taraba, Kogi and Benue as well as FCT. The climate of this area is characterised by alternate wet and dry seas with maximum air temperature in the areas is North of Latitude 9° occurring in March/April and minimum temperature recorded in December/January North of Latitude 9°N. Northern Nigeria experiences early late rainfall and early cessation. This area is dominated by Savanna vegetation types; Guinea, Sudan and Sahel Savanna. The diversity of the trees and grasses decrease North wards responding to climate condition. Agriculture is the most dominant economic activity in the region. This area of Nigeria has experienced climate change leading to insecurity of lives and livelihoods.

Climate change has led to increasing desertification in Northern Nigeria. According to Mohamed (2009), the Sahara desert now covers about 35 percent of land mass and is advancing at an estimated 0.6km per annum while deforestation is taking place at 3.5 percent per annum. According to him, the desert belt which was previously around Kebbi, Kano and Maiduguri has moved to New Bossa, Kaduna and Jos. The Savannah now interfaces between desert and forest along Oyo, Osun, Kogi and Benue States. This has implication for both plant and animal life. Furthermore, the Nigerian Meteorological Agency in their analyses of rainfall data from 1911-2000 in three 30 years interval, show that many places are recording late onset of rain and early cessation of rain, shortened length of the rainy season and reduced amount of rainfall. The number of rain days has dropped by 53% in the North Eastern part of Nigeria (Odjugo, 2012; 2005). The decline in rainfall between 1901 and 2005 has generally declined and has become worse since the early 1970s (Mohamed, 2009; Fasona and Omojola 2005).

Temperature according to Odjugo (2010); Tambo and Abdoulaye (2013) have been on the rise since 1901 and has continued to rise till date. He projects a temperature of 4.5°C by year 2000 if the trend of global warming continues unabated. All these have led to excessive heat, increasing water stress, air pollution and suppressed immune system. Northern Nigeria is also presently experiencing reduction of arable land, reduction of land in the coastal plain, desert encroachment as well as sand dunes. These have deprived farmers of their agricultural farmlands and grazing range land. Lesser rains have started slowing down growing season thereby causing crop failure and food shortage (Ayuba, Maryah and Gwary, 2007; Odjugo, & Isi, 2003). Climate change has led to a shift in crops cultivated in Northern Nigeria in 1970s preferred crops were guinea corn groundnut and maize, today millet, maize and beans are the staple crops in this region. According to Chen, C-T-A (2008) and Odjugo and Isi (2003), climate change has led to a reduction of livelihood options areas such as Borno, Sokoto, Jigawa, Zamfara, Kebbi, Yobe, Kaduna, Kano, Bauchi and Adamawa are prone to desertification. Climate change has led to water scarcity and other latent effects of waterborne diseases such as cholera, typhoid fever, guinea worm infection and river blindness. According to Odjugo (2009), many rivers in Nigeria especially in the Northern part are in danger of disappearing. The climate change situation in Nigeria has implication for the security of individuals and groups within Northern Nigeria.

Climate Change and Livelihood Insecurity

Northern Nigeria is an agrarian region. Agriculture is the main source of livelihood. Smallholder farmers are in abundance in this region. The increased desertification and deforestation of Northern Nigeria has reduced the amount of land available for farming. The desert belt has shifted forward from the Kebbi towards the Kogi axis and this had led to the reduction of land available for farming and other agricultural activities. Desertification, land degradation has created livelihood security. The implication is that smallholder farmers have to migrate to more fertile areas thereby resulting in conflict between the migrants and the host community.
Over the past 40 years rainfall in Northern Nigeria has fallen by 40% (Brown, Hamil & Mcleman, 2007). Besides the decrease in rainfall many parts of Northern Nigeria experience later rainfall and less rain days. This has implication for agricultural productivity. Late rains mean delay in planting and short rain means the land does not have enough water to enhance proper growth of crops. These two in combination with the high temperature in Northern Nigeria result in poor yield. This has ripple effect as the crops are priced poorly resulting in loss for the farmer, also the quality of crop affects nutrition and can also result in food insecurity. Though some fadama programmes have been introduced over the years in parts of Northern Nigeria. The sustainability of the programme is still a challenge because of the decrease in the quantity of water available as a result of low rainfall and high temperature. Climate change has also affected the livelihood of pastoralists who are majorly domiciled in Northern Nigeria. Drought and deforestation in Northern Nigeria has led to loss of livestock and consequent migration of pastoralist to areas where the temperature is conducive for the survival of livestock as well as where there is available pasture for the cows. This trend has led to violent conflict in many parts of central and Nigeria between pastoralists and farmers. Many villages in parts of Plateau, Benue and southern Kaduna have been sacked and presently occupied by the pastoralists and their cows.

Climate Change and Food Security Issues
Food security can be defined as a situation where people have physical, social and economic access to sufficient, safe and nutritive foods that meet their dietary needs and preferences for an active and healthy life (Food and Agricultural Organisation 2018). It has four dimensions of availability, accessibility, utilisation and stability. Climate change has implications for food security in Northern Nigeria. Climate change has brought about increased frequency and severity of extreme events such as floods and droughts in Northern Nigeria and these have led to fluctuation in crop yields and food supplies. This is also in addition to high temperature all these have resulted in variations in the length of the growing season and in turn affected productivity, crop quality as well as prices. The reduction of the length of the growing season has forced areas of marginal agriculture out of production. Small scale farmers who are responsible for the largest portion of agricultural production are affected the most. When crop yield is of low quality it has implication for food utilisation. The decrease in production has also resulted in higher prices for food crops and related issues of availability and affordability. The poor yield of food crops can lead to malnutrition and infectious diseases. In recent times, in many parts of Northern Nigeria, tubers like yam and cassava if not processed immediately can be lost. These get rotten if not processed or consumed immediately. Reduction of production reduces availability of food. Climate change also increases the risk of food borne diseases. The rising temperature in the Northern part of Nigeria has implication for the survival of livestock, poor quality of livestock results in poor annual protein that is available for consumption. Also rising temperature affects the quality of fish produced. This has implication for health and the livelihood of fish farmers.

Climate Change and Health Security
Increasing temperature, reduction in rainfall and flooding in parts of Northern Nigeria have implication for health. Firstly, the rising temperature has caused excessive heat and the prevalence of illnesses like meningitis. Rising temperature also results in water scarcity. Water is a very important resource worldwide. Water scarcity has implication for health of people in Northern Nigeria. Water scarcity beyond the lack of water for the normal functioning of the body (drinking) other hygiene related issues can emerge. Water borne diseases such as diarrhea, cholera will surface. Over the years in Northern Nigeria, these diseases have led to the death of young and old. Other inflammatory and respiratory diseases (cough and asthma) are also results of the weather variations occasioned by climate change. Water scarcity can also result in physical exhaustion, stress and conflict as people have to trek long distances to access water. Lack of
water for domestic use at home and for the processing of agricultural products can result in hygiene related health challenges. Flooding on the other hand has resulted in depression as a result of loss of lives and properties to flood. Within the last ten years, there have been incidences of flooding in North Central Nigeria that have left people homeless, jobless. Internal displacement camps had to be opened for the victims. This also has impact on the mental, physical and social health of the victims. Many IDP victims do not feed well, are disconnected from their roots, kit and kin and this has implications for their health and survival.

**Climate Change and Conflict**

Climate change has resulted in the reduction of natural resources for livelihood and survival. The reduction in arable land as a result of desertification has brought about competition for resources. While some are trying to protect their land from encroachment from non-natives, others are migrating to areas they feel are more fertile for agriculture. In many parts of Northern Nigeria, there is migration and conflict over land resources. Besides the land related conflict, herders and farmers conflict has been prevalent in this area. Pastoralists have been moving herds in large numbers from the far North to the central area of the North. Though this movement has been in existence over time, it was purely seasonal and the number of herders and herds were fewer. But in recent times these movement have been more frequent as such the herders even want permanent residency in many parts of North Central Nigeria. This trend has resulted in the loss of lives and property. Again, the phenomenon of IDP still exists. For instance, Benue State has well over five IDP camps created as a result of herdsmen/farmers conflict. Climate change and its attendant consequences have resulted in conflict thereby reconfiguring social relations from that of mutual social existence to that of mutual suspicion.

**Climate Change and Forced Migration**

Changes in temperature, issues of drought, deforestation have implications for migration. The loss of livelihood as a result of climate change has increased migration within Northern Nigeria. There is increased migration from the areas close to the desert to the central areas. The result of this is overstretched of social amenities, competition over land and water resources. Also, violent conflict between herders and farmers has resulted in migration. Some settlements in the Plateau area are purportedly no more in existence as a result of migration due to farmers/herders conflict. Also those in flood prone areas have lost livelihood, family members and have had to migrate to safer places. The forced migration has caused a disconnection from their ancestral lands with its attendant psychological, emotional, mental and spiritual implications as well as inability to settle in new areas where they have migrated to competition for resources is also a result of forced migration.

On the whole, climate change has ripple effect, that is, the effect on one aspect of social life affects others. Some other latent effects of climate change include erosion which has affected housing and road transportation. Also climate change has led to more resources being deployed to the ecological fund. Many times, this is an avenue for those who are not victims of the climate change to enrich themselves at the expense of others. The climate change situation in Northern Nigeria is a new form of insecurity that needs urgent measures to tackle.

**CONCLUSION/RECOMMENDATION**

Climate change has become part of the existence of individuals and groups in Northern Nigeria. In view of the devastating effect, it is important for mitigation and adaptation measures to be devised. It is important for more research on the impact of climate change in aspects of social life. Government, research agencies and education institutions should invest and conduct climate change related research and dissemination activities. There should be sensitisation to help individuals adapt to climate change. Beyond this, shift in farm management practices like adoption of technological innovation, altering of fertilizer content to maintain crop quality
consistent with changing climatic condition, altering timing or location of crop activities, improvement of pest and disease and weed management practices through the use of pest and pathogen management. Improved species of crops that are more resistant to diseases should be planted. Seasonal climate forecasting models should also be used to reduce production risk. Government should invest in the development of capacity with regards to climate change. Meteorological infrastructure should be invested in, so as to enhance monitoring of climate change impacts, formulate policies that will protect natural resources including forests. There is also need for people especially farmers and pastoralist to respond to the inevitable changes in the environment caused by climate change. There is need for them to change farming practices, and find new livelihood as the case requires. This is only possible when proper information is given to them in a language they can understand. People at the rural or local level should be involved in the planning and execution of programmes and projects that are aimed at minimizing the effect of climate. On human and socio-economic development, government should also encourage the use of low cost solar energy cookers instead of wood burning devices which cause deforestation. In conclusion, it is important to note that some of the insecurity issues caused by climate change are inevitable but while addressing the issue of climate change government should also address other development challenges such as poverty, governance, conflict, unemployment, health provision. Addressing these issues will help to reduce the insecurity caused by climate change. Climate change is not experienced in isolation from other factors. It will only exacerbate them so it is important to address them so that the insecurity issues posed by climate change will be reduced to a minimal level.

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