

The Impacts of Flooding on Socio-Economic Development and Agriculture in Northern Nigeria: A Case Study of 2012 Flooding in Yola and Numan Areas of Adamawa State Nigeria.

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ABSTRACT: Flood is not only a local environmental problem but also a challenge that is faced globally. It is a phenomenon that has caused severe loss of lives and properties in different settlements both in developed and developing countries. In Nigeria, flooding is experienced annually in both urban and rural areas. Northern part of Nigeria is one of the areas faced with the menace of annual flood despite the dry climatic conditions of the area which is characterized by severe droughts. This research assesses the causes and effects of flood disaster on agriculture and socio-economic activities in Northern Nigeria. The study areas were Yola and Numan in Adamawa state. Both urban and rural areas affected were analysed and a cross section analysis shows that laws and policies on flood control and land use were implemented in the state. These areas were the ones affected the most and were placed on a 'category A' list of relief materials and shelter during the flood. The trend of flooding events indicated that climate change may be one of the major causes of floods in these areas. However, further study showed that the communities and properties washed away were situated by the flood plains and were at risk of inundation during the rainy seasons. It also discusses the effects the socio-economic and environmental well-being of the victims affected and also the huge impact on agriculture and food security especially in northern Nigeria since the major livelihood there is farming and pastoralism. Several issues together complicate and make the impact worse but the basic solution is a sustainable foundation of laws and policies that should be strictly adhered to, this goes without saying that for the laws to be accepted by individuals, the government has to play her part in providing the basic and necessary amenities like homes builds safely away from the plains.

KEY WORDS: Agriculture, Climate Change, Flooding, and Socio-Economic Development.

1.0 INTRODUCTION

Climate change and its impact have evolved so rapidly from a future evasion to a frightening reality. Climate change is believed to be a long time change in the atmospheric temperature and weather distribution in general. However, over the last twenty to thirty years the impacts of climate change through global warming has been drastic and poses great concern and imperatively the need seek sustainable measures to tackle the situation (WHO, 2012). Global warming is the most common form of climate change affecting mankind at different levels resulting in depletion of natural resources, drought and flooding (Arnell and Reynard, 1996). The impact of climate change is felt in both developed and developing countries but the impact is felt the most in developing countries due to lack of adequate infrastructures to respond to it (IPPC, 2007). The focus of this research will be on flooding in the north eastern state of Adamawa which has been an ongoing event for decades and automatically affects the social, economic and environmental well-being of the affected regions and country at large.

Flooding is when a dry area overflows with water and is not able to absorb it into the ground. The hazard of flooding is an annual phenomenon that has displaced millions every year worldwide and claimed lives and properties (Bronstert 2003). According to Bariweni et al., 2012 and Etuonovbe 2011, Nigeria experiences floods every year especially flash floods and dam

related floods during the raining season. However, each disaster seems to get worse leaving a larger impact than the previous. In 2012, the intensity with which the floods came left the affected areas in a tragic state. The flood displaced over 2.1 million Nigerians leaving them homeless. Hundreds of lives were lost and properties including hundreds of thousand hectares of farm lands washed away (NEMA 2012). The northern regions of the country were affected the most especially states which the major rivers pass through and communities by the riparian were completely submerged. According to Bunu 1999, Northern Nigeria is characterized by very dry and very hot climate, especially in the north eastern and north western states. Drought and desertification therefore has always been the main focus of climate change challenges and environmental degradation issues. The general temperature of northern Nigeria remains constantly high during the day especially in dry seasons reaching a maximum of about 40 degrees Celsius on very hot days. A few areas in the north like the Jos and Biu plateau experience a relatively different climate from the generalized dry and hot climate. Temperatures on the plateau can be cold and a temperature difference of less than 10 degrees most times due to the high altitude (NNT, 2009). Drought no doubt is a concern but flooding has also become a major issue. However, within the last 3 decades flooding has become a perennial event in Nigeria. The reoccurrence of flooding is becoming more tragic

due to the loss of lives, property and agriculture. It's gotten worse due to change in rainfall pattern attributed to climate change. Climate change is a worldwide trend and should be treated with urgency as many regions are getting to a stage that is considered unfit for human survival due to land degradation. This has resulted in conflicts over extreme depletion of natural resources, increase in population and poverty causing severe risk to political, economic, and social stability (Schwartz and Randall, 2003). Way before crude oil was discovered in commercial quantity in Nigeria, agriculture was the major trade and source of livelihood and economic growth. Agriculture is still rich in the country's growth and plays a vital role in economic growth so it has to be protected (Bello et al., 2012).

2.0 CLIMATE CHANGE IN NIGERIA

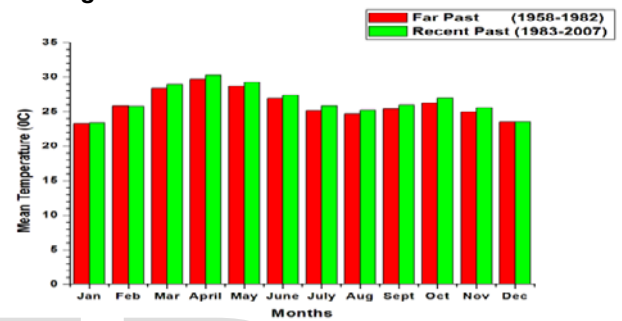
Climate change is defined as a change of climate which is attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (WHO 2011 and WHO 2012). In the study, 'Combating Climate Change in Nigeria', Medugu 2009, noted that from the 4th IPCC research and report conducted in 2007, it was revealed that Africa will be affected the most by the effects of climate change not due to emitting the highest amount of greenhouse gases but because of insufficient amenities to tackle the effects. Medugu 2009 further stated that, Nigeria being a part of Africa is already being affected negatively by the climate changes and is affecting millions of people, socially, economically and environmentally. Crop production in Africa is likely to decrease by 50% by 2050 (Bello et al., 2012) due to climate change, especially since the agriculture system in Africa is predominantly dependent on rainfall which is constantly changing in pattern (Jones and Thornton 2003). Nigeria is vulnerable to the impacts of climate change largely because of the approximately 70% of Nigerians that are engaged in agricultural trades, almost 90% of agricultural practices depend solidly on rainfall for farm yield (Adejuwon 2005). The impact of climate change is very visible in most communities in Nigeria, from the Sahel in the north to the rainforest and coastal zone in the south. The high population coupled with high poverty levels and rapid economic growth, are making huge demands on Nigeria's natural resources (BNRCC, 2011).

Over the centuries, Nigeria's climate has obviously changed as observed through weather patterns leading to extreme events such as drought and flooding (Bello *et.al* 2012). In 2011, the Building Nigeria's Response to Climate Change (BNRCC) Project team drafted an adaptation strategy document called National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPAN-CCN). In addition to this, NIMET estimated the predicted temperature and rainfall for the future in Nigeria using the climate trends over the years. The following results for temperature and rainfall were predicted;

Temperature: the general prediction is increase in temperatures. An increase in temperature of 0.04 degree Celsius is depicted

till 2046-2065 with an increase to 0.08 degree Celsius after 2050. Again the hottest regions will be the north eastern region with a temperature rise of 4.5 degrees by 2081-2100.

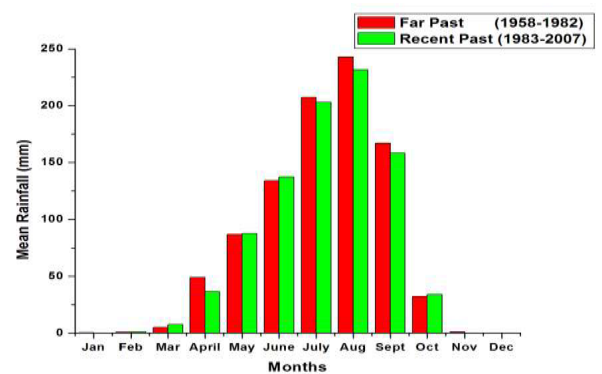
Figure 1: Annual Variation in the Temperature over Northern Nigeria



SOURCE: NASPAN-CCN 2011

Rainfall: the rainfall trends showed a variation across the country with more rainfall in the south and drier climate in the northeast. In the southern regions, the average increase of rainfall will be observed at 15cm annually during the period of 2046-2065 while an average decrease of 7.5cm annually will be observed in the north (NASPAN-CCN 2011).

Figure 2: Annual Variation in the Rainfall over Northern Nigeria



SOURCE: NASPAN-CCN 2011

2.1 AGRICULTURE IN NORTHERN NIGERIA

In spite of the growing importance of oil, Nigeria's economy has remained an agrarian economy, with agriculture still accounting for significant shares in Gross Domestic Product (GDP) and total exports, and also providing employment to a majority of the country's population (Adejuwon 2005). About 70% of the nation's 162,470,737 population relies on agricultural production as a major trade. The yield from agriculture accounted for 41% of Nigeria's GDP in 1999 (Farauta et al., 2012). In the 1950's and 1960's, agriculture accounted for about 70% of Nigeria's GDP (Ibrahim et al., 2010), it however dropped to 40% in the 1970's with a steady spiral to about 2% less in the 1990's. Sadly, even with a bulk of the country's population involved in agriculture, Nigeria is a net importer of food from countries around the world like Asia, running into billions of naira annually (Dimelu et.al, 2011). Notwithstanding the amount of food imported, agriculture is the main source of food for the nation's consumption which is predominantly a dependent on the annual rainfall hence making the agricultural produce vulnerable to the impacts of climate change due to changes in weather patterns (NFNC, 2003). Similarly, cattle and poultry predominantly bred in northern Nigeria are also equally vulnerable. It's important to note that about 90% of the food produced for the country is from the rural areas whose poverty level is severe, about 80% with women playing a major role. The percentage of women involved in agricultural practices is 72% and males are 44% (IFAD, 2011). According to Farauta et al., 2011, a significant portion of the agricultural sector in Nigeria involves cattle herding, fishing, poultry, and lumbering. There was a record of 12.2million pigs, 700,000 donkeys, 250,000 horses, and 18,000 camels in 1987. These animals are predominantly bred in northern Nigeria, and owned mostly by rural dwellers. The decline of agricultural produce has been due to environmental degradation and water pollution as a result of climate change. Today, the figures may have changed but the nation depends on the northern regions for animal rearing, especially cattle for dairy products.

2.2 IMPACT OF CLIMATE CHANGE ON AGRICULTURE

The major climate change threat in Northern Nigeria has been desert encroachment which has led to severe drought (FME, 2004) which has brought about a quick depletion of resources such as surface water, flora and fauna in the region (Obioha, 2009). This condition puts further stress on the people in the regions affected. Another negative effect is the exploitation of the already depleting resources by deforestation which results in the formation of sand dunes/Aeolian deposits in the Northern axis of Nigeria (Bello *et.al* 2012). Conversely, flooding is a major concern for those living along the coastal regions and this is destroying farmlands, altering the ecosystem and this spreads diseases due to contamination of water. These climate/environmental situations have forced some farmers to seek other means of livelihood which will in turn result in reduced yield from agriculture (Odjugo 2010). However, flash floods occur annually in the north, the frequency and damage especially in recent times has become alarming (Bariweni et al.,

2012). Climate change is likely to increase the frequency and severity of floods, droughts and other events such as desert encroachment and drastic changes in rainfall patterns and temperature. This will inevitably alter the agricultural yield in crops and livestock (Nzeh et al., 2012) which will lead to socio-economic problems like migration and unemployment (NFNC, 2003). Studies reveal that agriculture is the most vulnerable to the effects of climate change (Ibrahim et al., 2010) especially in developing countries where the bulk of the population is invested in agricultural practices and also mostly in rural areas (Apata *et al.* 2010). In the above context, it can be safe to say that Nigeria is at the forefront of risks of climate change since 70% of its 167,000,000 citizens depend solidly on agriculture as a major source of livelihood (Adesina, 2011). Also, since a significant portion of Nigerian agriculture involves fishing, poultry and cattle rearing, Northern regions will be hugely affected since the country's meat supply and dairy products lie in the northern states (Nuru, 1984).

2.3 FLOODING

Flood hazards occur naturally, but the level of impact, damage and losses are as a result of human activities (Action Aid, 2006). The threat to lives and property by flood is now becoming an annual event in many urban and rural areas in Nigeria (Olanrewaju and Fadiro 2003). Flood occurs when surface water covers land that is normally dry or when water overflows normal confinements. The most widespread of any hazard, floods can arise from abnormally high precipitation, storm surges from tropical storms, dam bursts, and rapid snow melts or even burst water mains. The majorities of floods are harmful to humans (Etuonovbe 2011); however, floods can provide benefits without creating disaster and are necessary to maintain most river ecosystems. Floods replenish soil fertility, provide water for crop irrigation and fisheries and contribute seasonal water supplies to support life in arid lands. Flooding is basically a natural phenomenon, which can be caused or even intensified in most cases by human activities. Flooding has been identified as one of the major factors that prevents Africa's growing population of city dwellers from escaping poverty and stands in the way of United Nations 2020 goal of achieving significant improvement in the lives of urban slum dwellers (Action Aid,2006).This is because many African cities lack the infrastructures to withstand extreme weather conditions. Poor urban planning together with other urban governance challenges contributes to making African urban slum dwellers most at risk (Adelekan 2009). It is the unforeseen circumstance, which causes severe damage to lives and properties.

2.4 AN OVERVIEW OF FLOODING IN NIGERIA

Floods in Nigeria are usually predictable, occurring in the rainy season as sporadic flash floods, especially along the coastal regions, riverbanks, waterways and estuaries. In 2012 however Nigeria experienced severe flooding across the nation destroying properties, farms and displacing millions of people

from their homes (NEMA 2012). The Nigerian Hydrological Services Agency described the 2012 floods as the worst flooding disaster the country had ever experienced and can only be compared in magnitude and scale of destruction with those of 1967/68 (Aderogba 2012). The Agency recorded peak water level of 12.84m and maximum discharge of 31.692 m³/s at the confluence of Rivers Niger and Benue at Lokoja, Kogi State on September 29, 2012, causing devastating destruction of lives and property together with economic loss in Nigeria.

Developing nations such as Nigeria are at great risks to flooding hazards due to urbanization (Ijeoma, 2012) which triggers flooding through the construction of buildings along flood channels, thereby restricting free flow of water. Also as urbanization grows, populations of the cities rises, causing even moderate climate changes in storms, winds and rainfall create high flows in rivers due to hard surfaces and buildings (Action Aid, 2006). Faruata et al 2011 agreed that low levels of education and poorly developed communication and infrastructures especially in the rural communities who are most vulnerable plays a huge role in the level of impacts of climate change. Management/adaptation strategies, especially for flooding, have to be structured in a sustainable way to meets the present need, socially, economically and environmentally while preserving and protecting the future (WHO 2012).

2.5 EFFECTS OF FLOODING IN NORTHERN NIGERIA

'Flooding is one of the major factors that prevents Africa's growing population of city dwellers from escaping poverty, and stands in the way of the UN 2020 goal of achieving 'significant improvement' in the lives of urban slum dwellers' (Action Aid, 2006). These effects can be seen in the following point of view;

2.5.1 Socio economic impacts:

The socio-economic impacts of flooding are felt as soon as floods occur, as it instantly disrupts day to day businesses and activities (Bronstert, 2003). In their study, Bariweni et al., 2012, revealed that the floods of 2012 had a major impact on socio-economic life for days, weeks and even months in some areas. Roads and buildings were submerged and victims were trapped due to blockage of road and damaged bridges. Children couldn't go to school, workers couldn't go to work and traders couldn't open their stores at the markets. These automatically took its toll on the economy as businesses were being affected. The damages and destruction of buildings, bridges, dams, embankments, drains, roads, railways, electricity wires/poles, (Etuonovbe 2011) all amounted to billions of Nigerian Naira due to the extent of property damage and infrastructures (NEMA 2012). Health issues also became higher especially in the north. Cholera due to contaminated water and malaria due to stagnant waters all increased and of course, the most vulnerable are the poor rural areas with women and children affected the most (Agwu and Okhimamhe, 2009). Also, the disruption of electricity and communication lines had its toll on all affected (Bariweni, et al., 2012; Ijeoma 2012). The year 2011, also had devastating effects

on the north eastern states, completely destroying mud houses in the villages and washing away livestock (NASA, 2011). All together, the impact was overwhelming as day to day lifestyles and trades were put on hold. Farmlands, roads, railways, schools, hospitals (including maternity clinics), loss of lives and properties running into several millions of naira were the results of the 2012 floods (Aderogba, 2012). In an official report by the National Emergency Management Agency (NEMA) in 2012, the following figures were revealed in terms of damages 7,705,378 people were affected, 2,157,419 victims were displaced, 5,800 injured, 32 out of the 36 states affected and homes affected were 597,476.

2.5.2 Impact of Flooding on Agriculture:

Close to a billion people around the globe live in abject poverty characterized by serious hunger (Lobell and Burke, 2010) and majority of this number lies within Africa which is heightened by the conflicts, degradation of resources and poor adaptive skills (IPPC, 2007). With Nigeria being the most populous nation on the African continent (Etuonovbe 2011), and 70% of this population living in poverty, any unrest or disasters such as flooding will have a huge impact (Agwu and Okhimamhe, 2009) especially on food security which is vulnerable to extreme events such as flooding (Nzeh, et al. 2012). The annual occurrence of floods in northern Nigeria, especially the magnitude of the most recent one in 2012, will definitely tamper with food security of the nation. Researchers and reports have shown the impacts on agriculture and food security. NEMA 2012 and Aderogba 2012 showed that many farmlands have been washed off by the floods. Afolabi, 2013 reported that in Lafia, Nassarawa state, a \$90 million rice farm cultivated was inundated by the floods. Previous flood disasters also had similar impacts, washing away, farmlands and destroyed livestock, which is an integral part of agriculture in the north (Ibrahim et al., 2010).

2.6 REVIEW OF GOVERNMENT POLICY ON FLOOD CONTROL

The goals of the 1999 National Policy on the Environment is to achieve sustainable development in Nigeria, and in particular to:

- a) Secure a quality environment adequate for good health and well being.
- b) Conserve and use the environment and national resources for the benefit of present and future generation.
- c) Restore, maintain and enhance the ecological process essential for the functioning of the biosphere to preserve biological diversity and the principal of optimum sustainable yield in the use of living natural resource and ecosystem.
- d) Raise public awareness and promote understanding of essential linkages between the environment, resources and development and encourage individual and community participation in environmental improvement efforts; and

- e) Cooperate in good faith with other countries, international organizations and agencies to achieve optimal use of transboundary environmental degradation.

3.0 METHODOLOGY

3.1 STUDY AREA (ADAMAWA STATE)

Adamawa state is also known as the 'land of beauty' because of its beautiful mountainous landscapes. It lies between latitude 7 and 11°N and between longitude 11 and 14°E (Online Nigeria 2003). The topography is characterized by mountains and valleys. The climate of the state like the country in general is characterized by dry and wet seasons. The dry season is usually very hot and humid with exceptions to regions situated on the plateaus which have a relatively low temperature compare to the other regions. The dry season is from November to April while the rainy season varies within the state starting as early as April in some regions and ending as late as October in other regions. Mean annual rainfall in the state ranges from 700mm in the Northwest to 1600mm in the extreme southern part of the state around Ganye and Jada local government area (Online Nigeria 2003). The highest peak of rainfall is between August and September and the length of the rainy season is from 85 to 92 days per annum. Adamawa state is located at the far north eastern region of Nigeria. It is one of the largest states in the country with a land mass of 36,917 square kilometres. On the east it shares a border with Republic of Cameroon. One of the country's major rivers- River Benue flows into Nigeria through Adamawa state from the plateau of northern Cameroon. The estimated population of the state by 2013 is 3,922,781 (NPC 2006), and the major occupation of the people is farming, notable for cash crops such as cotton and groundnut. Other crops grown in the state are maize, millet, rice, yam, cassava, millet, sugarcane, Arabica, and kola nuts (Nwilo et al 2012). Due to the location of the state by the Benue River, it has attracted a lot of agricultural activities and settlements by the flood plains for irrigation, fishing, cattle rearing and also supports the growth of economically important trees such as the bamboo. The state is also prone to the annual floods which occur mainly in the rainy season.

3.2 CONCEPTUAL DESIGN

The aim of this study is to assess the causes and impacts of flooding on agriculture and socio economic growth in the study areas. This is a cross case study analysis based on secondary data alone. The cross case analysis evaluates all case studies used to seek linkages, differences, similarities and hopefully strategic solutions to the causes and impacts of yearly flood events in Nigeria. The literature review describes the events of flooding, linking it to climate change and its effect on agriculture. Emphasis is made on impacts on agriculture and food supply. This is because agriculture is the major source of livelihood for 70% of Nigerians (mostly in the northern states) and agriculture is heavily dependent on rainfall. Therefore it shows how any impact on agriculture affects millions of

northern Nigerians which depend on the income from farm produce to survive. The assessment was done primarily on the people directly affected by the past flooding disasters in northern Nigeria.

3.3 CROSS CASE ANALYSIS TECHNIQUE

This research is a cross-case analysis of two case studies of flood prone regions in northern Nigeria. The selected sites have both been categorized as group A of the four federal government aid groups due to the impact of the 2012 floods. Group A were considered a priority because it had the largest number of victims displaced. The case studies examine the causes of flooding in the area and impact on agriculture, environment and socio economic development. The case studies were selected for several reasons. All experience annual floods leading to loss of lives and properties, the major trade is agriculture (farming, fishing, cattle breeding), they all suffered severe losses and were the worst hit in 2012 floods and all case studies play a vital role in the economic growth of the country and food production. The sites selected also vary as one is a proper urban community and the other a rural community. This is done to see the similarities and differences in the effect of urban floods and rural floods.

4.0 CASE STUDY DISCUSSION

The two areas selected for this study are both from Adamawa state. The first is Yola, which is the capital and administrative centre of the state. While the second is Numan; a local government area with rural areas within. Both Yola and Numan suffer severe losses of lives, homes and farmlands with each flood event and 2012 was no exemption.

4.1.1 YOLA

Yola is the state's capital with a growing population of 395,868 as at 2006 census (NPC 2006). It is a typical urban area bursting with economic development activities, increase in population due to migration to the cities and the seat of Government. The tropical Guinea savannah vegetation is form in the floodplains of the Benue River in Yola creating a large wetland. It is also known as the upper Benue catchment (Nwilo et. al 2012). The region is favourable for farming, fishing, cattle rearing, wildlife and growing economically important trees such as the bamboo. The area is very fertile and richly cultivated with wells and dams dug around to meet the ever increasing population growing around the plains. The agricultural benefits of the area together with being the capital and centre of industrial development in the state have attracted a large settlement along the plains. Yola therefore is considered a flood prone area and has suffered losses of lives and properties annually. A report in 2010 revealed that Yola is among the five(5) districts in the state that had thousands displaced annually with no access to clean drinking water and exposure to water communicable diseases such as cholera (Premium Times 2012 and This Day News Reported by Adesina 2011). The major causes of flooding in Yola over the years have been identified as release of Lagdo dam from the Cameroon border and flash floods due to high

intensity of rainfall coupled with siltation and blocked drainages (Mayomi et al., 2013).

The floods in 2012 in Yola started at night while most people were asleep and didn't have the opportunity to move their properties, resulting in even more loss. However, the government of Cameroon had issued warning to Adamawa state and indigenes of flood prone communities about the opening of the flood gates to release excess water (Mayomi et al., 2013). Yola north and Yola south regions were severely affected as a result of the floods leading to deaths, loss of farmlands and inundation of primary schools (Nwilo et al. 2012). Socio-economic activities had to be put on hold due to the damage of roads, embankments, destruction of markets and crop produce and electricity outage. This disruption led to losses running to millions of Naira (NEMA 2012). The city was flooded and people couldn't go to work due to closure of roads or submerged offices. Temporary shelters were provided in different locations by the state and federal government and relief material donations made by Nigerians and other foreign bodies to aid the 'internally displaced victims' of Yola city (Premium Times 2012).

Figure 3: Submerged homes during the 2012 flooding in Yola



Source: Premium Times 2012

4.1.2 NUMAN

Numan is one of the local government areas affected by the annual floods in Adamawa state. It is considered a flood prone area due to its proximity to the banks of the Benue River. In 2012, it was among the 10 local government areas badly hit by the floods completely submerged by floods washing away several villages and settlements. Numan can be considered a very vital community to the state's economic growth and development considering the large number of the indigenes involvement in agricultural activities such as farming, fishing, cattle rearing and large number of produce made available for exportation outside the state (Khobe et al., 2009). Numan has a population of about 91, 549 (NPC 2006) actively involved in agriculture as a major source of trade. The community lies on the Benue River. Numan is home of the famous and largest sugar company in Nigeria- Savannah Sugar Company Limited, which was incorporated in 1971, although production did not commence until 1981 (Khobe et al., 2009). Khobe et al., 2009 went further to add that in Numan alone, the company cultivates 5,200 hectares of sugarcane currently from the 32,000 hectares of land designated for sugar cane production with a

cane crushing capacity of 4000 metric tons of cane per day. There has been a decline over the years in production and quality of sugar from the company and although, flooding has been identified as one of the issues, there are other issues which include climate change, soil management practices and lack of proper techniques by farmers. The entire local government suffers losses and displacement annually. In 2012 the flood disaster led to loss of lives, destruction of property, displacement of people, and disruption of economic activities by washing away many farmlands and destruction of many of cottage industries such as rice-mills, fisheries, livestock, etc. Mburum Ngbalang road in Numan Local Government Area and some other feeder roads were discovered to have been washed away.

Figure 4: Submerged homes during the 2012 flooding in Numan



Source: Premium Times 2012

4.2 PRINCIPAL FINDINGS AND DISCUSSION

Critically based on data from the literature review and careful cross-case analysis from the two case studies, a number of findings were realized relating to the causes of the recurrent flooding and the resulting loss of lives and properties. Although it may not be possible to generalise based on the two case studies, the similarities and trends may reveal the underlying issues in hope to build a more strategic approach to the annual events of flooding. Like Curtis and Mills 2010, I agree that natural events such as flooding have patterns and trends as they occur which has been triggered by people, cultures and economic development.

The key findings realized from the cross-case analysis are:

- Climate change is the major cause of floods creating increase in intensity of rainfall which leads to the release or bursting of dams.
- Poor management and construction of settlements by the floodplains.
- The need for climate justice to be introduced into any flood control and prevention scheme.

- Law enforcement agencies, flood prevention and control policies and land development policies poorly implemented.
- Agriculture and food security at risk as thousands of hectares of farm lands are being washed away
- Indigenous failure to adhere to warning signs of flooding prior to release of Lagdo dam.

Having assessed the findings and literature review on impact of climate change on livelihood, agriculture and vulnerability, it was clear that climate change is indeed occurring and the changes are happening fast and on a rapid increase both in terms of extreme weather frequency and gradual changes in land degradation in Nigeria. Climate change is a global situation and every nation has to be educated about, controlled and is prepared for. It is caused by both natural and man-made factors. Regardless of the cause, we have seen the impact of climate change over the years which has had an unpleasant effect on nations/communities affected. This is because it interferes with the social, economic and environmental well-being of the people. The major causes of floods over the years and especially in 2012 has been identified as climate change which caused an unpredictable heavy downpour of rains which filled up the reservoirs and rivers. The study shows that although climate change is a factor experienced globally, it is a natural factor but the impact and degree of damage is as a result of man-made interference through exploitation of resources and other forms of socio-economic development.

Settlements and construction of buildings along floodplain is the most common cause of floods in urban areas like Yola and rural areas as Numan from the case studies. Conversely, in the rural communities, due to poverty the buildings are constructed poorly and wash away easily even with simple flash floods. Looking at the goals and principles of the 1999 National policy on environment-Flood and Erosion control, the urban and regional development policy and land use act and also looking at the case studies seeing that most of the victims dwelled by the river plains shows that the UNHABITAT 1995 definition of land use planning hasn't been put to practice. However, in all fairness there is also resistance from settlers even after being warned and being victims. There seems to be some sentimental attachment amongst dwellers as they refuse to migrate claiming it's the land of their ancestors and they can't leave.

The vulnerability and threshold level of the flood disasters is not uniform and some people suffer a great deal more than others which are usually very poor communities with poor adaptation techniques. The literature review shows that like most disasters the poor communities are hit the most and within this group, women, children and the elderly suffer more. These vulnerable groups are those who live in risk areas like the plains, and others are relatively poor they can only afford to live in mud/straw houses which gets washed away when the floods come. The failure of the local and state governments to provide adequate housing and infrastructures for individuals is the cause and bad planning and

implementation of urban development. The policy makers ought to therefore claim responsibility and integrate Climate Justice in the schemes. Climate Justice is a fairly new vision which seeks to bring fairness, equality and environmental justice especially since the most vulnerable of the effects of climate change are those who are least involved in activities that cause it. 'Climate Justice is recognizing that the urgent action needed to prevent climate change must be based on community-led solutions and the well-being of local communities, Indigenous Peoples and the global poor, as well as biodiversity and intact ecosystems. Climate justice is the understanding that we will not be able to stop climate change if we don't change the neo-liberal, corporate-based economy which stops us from achieving sustainable societies. It is the understanding that corporate globalization must be stopped.

One of the interesting findings from the study was that there are several laws, policies, frameworks, adaptation strategies, flood, prevention and control schemes available for both federal and state level yet yearly the country experiences disastrous floods washing away properties worth Millions of US dollars. Premium Times of August 18, 2012, reported that 'not adequately addressing Climate Change will cost Nigeria N1.4 trillion annually'. That is an alarming figure that can be invested in prevention and reduction of the impacts of climate change and flooding to a minimal level. The interesting question is if the nation has all these policies yet face these increasing threats on flooding yearly, what then is the problem? Maybe they don't relate to Nigeria, not of standard quality or that they are just poorly implemented? I go for poorly implemented. I believe that laws and law abiding citizens are the backbone of a standard development growth in any community or nation. Having the laws is however not the problem here but implementing and enforcing them. People feel they can get away with anything because there are no binding laws or punishment for breaking them. Enforcement agencies need not just to have these laws, acts and codes of conducts but also to implement them at every level (federal and local) for the interest of lives and wellbeing of the people and also for sustainable development.

5.0 CONCLUSION

This study shows that there is an increasing trend of climate change which aggravates the occurrence of extreme weather events such as flooding and its impact on livelihood on northern Nigeria, who are predominantly farmers and can put economic growth at stake. The impact on socio-economic activities automatically affects the nation's stability and economic growth. The monumental loss, followed by government's efforts in donations and recovery of losses all slows down economic activities. Inappropriate development of infrastructures by floods plains is obviously an issue especially since its one of the priorities of the flood control policy. The degree of impact shows weak communication and bilateral co-operation between Nigeria and neighbouring countries particularly Cameroon in regards to management of waters.

The findings show weakness in environmental impact assessment, vulnerability maps and negligence. The negligence is not only on the part of authorities alone but also of the people who were warned about the floods but refused to adhere to the warning. An intervention needs to be made to address these issues and mitigate the effects of future floods to secure lives and properties and to sustain our economic growth in a sustainable way.

6.0 RECOMMENDATION

The following recommendations are advised based on the findings, literature review and conclusions made in this study.

1. The Nigerian Government should draw up a more comprehensive flood control/prevention plan, paying particular attention to prone areas and integrated into master plans for all cities, local government and villages.
2. All existing planning laws in each state should be reviewed to meet present day realities and a building code for the state, be provided for enforcement.
3. Climate justice should be adapted at every level so there is equality in policy implementation. Climate Justice is a fairly new vision which seeks to bring fairness, equality and environmental justice especially since the most vulnerable of the effects of climate change are those who are least involved in activities that cause it.
4. Ministries such as Ministry of Works and Housing, Ministry of Environment, Ministry of water resources and the State Ministry of Land Housing and Urban & Rural Development should work together in drawing up plans and strategies and if possible to come up with a single policy for rural development and another for urban development.
5. Public enlightenment should be emphasized on the dangers associated with erecting buildings on flood prone areas and other practices that will affect the environment and create risk to individuals. Climate change lectures should be given to farmers, community members, talks on radio, and primary school will help in enlightening people on the risk and consequently their compliance with policies and future warnings. .
6. Emergency action plans should be put in place for unforeseen future events, even if it seems insignificant. The common sayings 'Prevention is better than cure' and 'Better safe than sorry' can be used as phrases for strategic planning.

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