Climate Change – Induced Extreme Weather Events and Threats to Nigeria's National Security

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Abstract
Climate change is a reality and extreme climate events such as floods, heat waves, droughts and storms are now occurring more frequently and with greater intensities. These extreme weather events are also prevailing with hazards that threaten national security. National security by this paper has nothing to do with weapons, open or cold war or terrorism but has a lot to do with food security, personal security, economic security, community security, political security and environmental security. Storms, floods, ocean surge kill and injure people, damage property, infrastructure, public utilities, farmlands, and these threaten food, personal, community, economic environmental securities which aggregate to national security of Nigeria. Also storms, ocean surge and floods especially at the coastal zone of Nigeria endanger lives, property and critical infrastructure such as oil and gas, ports facilities and displacement of settlements in some of the coastal cities of Nigeria including Lagos, Warri, Yenagoa, Port Harcourt, Bonny and Calabar. This study has reviewed some of the critical sectors of Nigeria's economy such as agriculture, housing and settlement, water resources, health, coastal infrastructure, and the outcome is that climate change and associated extreme weather events constitute serious threat to Nigeria's national security and we need to start building necessary resilience to protect Nigeria and her economy from the adverse impacts of climate change.

1.0 Introduction

Climate Change is real. The science of climate change has established its evidence, impacts and likely impacts with little doubts and uncertainties.

One area in which climate change has manifested very clearly is in the intensification of different extreme weather events across the world. Weather events that have been exacerbated in recent years by climate change include floods, drought, storms and heatwaves.

According to the World Bank Group (WBG, 2016) climate change is a threat and weather extremes already affect millions of people, putting food and water security at risk and threatening agricultural supply chains and many coastal cities.

Doubters of climate change have trouble dismissing its evidence of last year in the United States alone as nearly 1000 tornadoes have ripped across the heartlands killing more than 500people and inflicting $9billion (US) in damage. The Midwest suffered the wettest April in 116years, forcing the Mississippi to flood thousands of square miles, and drought plagued Texas which suffered the driest month in a century. Worldwide, the litany of weather extremes has reached biblical proportions. The 2010 heat wave in Russia killed about 15,000people, floods in Australia and Pakistan killed about 2000 and drought in China devastated millions of acres of farmland (Begley, 2011).

Eze (2010) reporting on 2006 address by Defence Secretary of Britain said that the Secretary warned that global climate change and dwindling natural resources are combining

to increase the likelihood of violent conflict over land, water and energy. Climate change will make scarce resources – clean water, viable agricultural land even scarcer and this will make the emergence of violent conflict more, rather than less. Speaking on climate change and its impacts, Jarraud (2008) has singled out climate change as one of the most serious problems facing humanity and global sustainable development and noted that the impacts of climate change are expected to concern water availability, health, food security, socio-economic activities, natural resources and physical infrastructure, as well as the environment.

Report by the British Risk Consultancy, Maplecroft has ranked Nigeria sixth among the countries that are vulnerable to effects of climate change and Nigeria according to the report is vulnerable because of her long coastline that can have sea level impact, desertification, erosion and flooding disasters and land degradation with its variety of ecosystems that range from mangroves and rainforest in the south to Savanna in the north (Azu, 2003).

This paper is out to show that climate change and associated extreme weather events portent serious danger to the people of Nigeria especially in the areas of life, property, food, water, health and social infrastructural security. The insecurity posed by climate change means that Nigeria must rise up to this challenge by building climate resilient country by adopting efficient mitigation and adaptation measures.

2.0 Climate Change as a Security Issue

The reason why climate change is a security issue is that security has gone beyond just wars, conflicts and terrorism and likes but now includes total security of life, property, ecosystems and the general environment and livelihood of people.

According to Pogosom (2013) national security is the ability of nations to promote the pursuit and realization of the fundamental needs and to protect citizens from all forms of threats which may be economic, social, environmental, political, military or epidemiological in nature. Many undiscerning minds may not be able to link climate change to security because of the long held traditional believes that security is all about conflicts, wars, blockades, armaments, combat and non-combat, terrorism within or across states.

But more modern thinking about security means safety for people from both violent and non-violent threats (Oche, 2010) Oche, (2010) has gone on to identify seven main dimensions of human security and these include economic security, food security, health security, personal security, community security, political security and environmental security.

The truth is that climate change will profoundly and directly impact on five of the identified human security, and these are food, health, personal, community and environmental securities and indirectly on the other two. For example, floods and extreme temperatures can lead to crop failures, hunger and malnutrition, extreme heats can lead to heat waves that lead to deaths and high morbidity, floods and storms such as hurricanes and typhoons kill people and both can affect personal, community security; floods, heat waves, storms, are serious threats to any human environment or ecosystems that support human existence. And people displaced by floods, hurricanes, cyclonic storms and heat waves suffer serious economic losses and may likely be unstable politically.

3.0 Extreme Weather Events and Threats to Life and Property

Floods, storms and ocean surge are some of the extreme weather events that have been predicted to be exacerbated by global warming and climate change. For example, IPCC (2007 and Oladipo, 2008) clearly predicted that the frequency and intensity of heavy precipitation events such as floods and storms would be on the increase in some parts of Nigeria. Evidence on the ground shows that these heavy precipitation events especially flooding have actually increased both in intensity and frequency. Associated loss of lives and property has also

increased in Nigeria.

In Nigeria, to show that flooding is becoming a serious environmental and security issue, an annual flood early warning is issued by Nigerian Meteorological Agency (NIMET) in their yearly Seasonal Rainfall Prediction (SRP) and by other relevant agencies such as the Nigerian Hydrological Services Agency, the Federal Emergency Management Agency (FEMA) and their state counterparts, State Emergency Management Agency (SEMA). Despite all the early warnings by the relevant agencies in Nigeria, the country has been witnessing devastating floods in recent years.

But perhaps, the worst of such annual floods in Nigeria was the 2012 floods that affected 27 of the 36 states in Nigeria 14 of them, Bayelsa, Delta, Imo, Anambra, Edo, Kwara, Kogi, Benue, Plateau, Niger, Taraba, Kebbi, Rivers and Jigawa very severely, killing 353 persons, injuring over 18200 people, destroyed over 618,000 houses, farmlands, graze lands, bridges, power infrastructure were damaged or submerged (Nigeria Climate Review, 2012). Property loss of 2012 floods ran into billions of Naira.

Apart from floods, high temperatures are increasingly being recorded in cities across northern and central states of Nigeria (Table 1). And high temperatures have some serious implications for heat waves, discomfort and conditions that exacerbate celebro-spinal meningitis in Nigeria. Many deaths attributed to celebrospinal meningitis were recorded in northern and central sates of Nigeria in 2017.

Table 1: High daily temperatures recorded for cities of northern and central areas of Nigeria in 2012.

Source: Nigerian Meteorological Agency (NIMET) Review (2012).

5.0 Extreme Weather Events and Agriculture and Food Security

S/N	Station	Value (°C)	Period	Frequency (Days)
1	Maiduguri	44.7	February – May	53
2	Nguru	43.6	March – May	57
3	Sokoto	43.6	February – May	51
4	Yelwa	43.5	February – May	41
5	Potiskum	42.4	March – May	48
6	Gusau	42.2	February – May	30
7	Kano	42.1	March – May	38
8	Yola	42.1	February – May	60
9	Katsina	42.0	April – May	34
10	Ibi	41.2	March	10
11	Bauchi	41.0	March – May	29
12	Combe	41.0	April	9
13	Lafia	40.8	March	16
14	Minna	40.8	March	7
15	Makurdi	40.3	March	4
16	Bida	40.0	March	10

Agriculture is a human activity that is concerned with the production of crops, livestock and raw materials for various industrial and medicinal uses. But agriculture virtually everywhere requires a lot from weather and climate. According to World Climate News (2008) the main determinant of agricultural production is the seasonal variation of factors such as temperature, precipitation and sunshine. Droughts, floods, frosts and heat waves stress crops and livestock.

In Nigeria, agriculture is essentially rain-fed and irrigation application is extreme of low scale in Nigeria. This explains while rainfall is the chief determinant of agricultural activities in Nigeria. The beginning of farming season in different parts of Nigerian is

strongly tied to rainfall regimes that seasonally vary across Nigeria, but generally decrease from the coast to the Sahel region of northern Nigeria. The importance of rainfall to agricultural activities in Nigeria probably prompted the Nigerian Meteorological Agency (NIMET) to be issuing Annual Seasonal Predication (SRP) to enable farmers and other users of weather and climate information to have access to reliable data, data whose validity and dependability are not in any doubt. For example, the 2016 predictions for temperature showed forecast accuracy of between 67 to 84 percent and for rainfall, the accuracy ranged from 87 to 93 percent (Seasonal Rainfall Prediction (SRP) 2017). For 2017 planting season, the SRP (2017) predicted that dates of growing season in Nigeria will run between 25th February over the coastal states to 16th June in the far north and that cessation dates for 2017 rains are predicted to start from around 4th October in extreme north and 25th December in the coastal states. Empirical studies by NIMET have shown that weather and climate patterns have changed across Nigeria. Both rainfall and temperature patterns between 1941 to 1970 and 1971 to 2000 have changed. NIMET (2008) and NASPACCN (2011) have noted that between 1941 and 1970, only small areas of the country in the northeast, northwest and southeast experienced late onset of rains, but between 1971 and 2000 late onset of rains had spread to most parts except a narrow band in the middle of the country. Also only a small area of the country in the southwest recorded early cessation of rains between 1941 and 1970, but between 1971 to 2000, early cessation of rains had covered much of the country and temperature records between 1941 to 2000 show also temperature increase in most parts of the country and this has some implications for the rate of evapo-transpiration which determines the amount of moisture available to crops. In the Sudano-Sahelian zone of Nigeria, Dogara (2008) reported that there were droughts in 1903/1905, 1913/1915, 1923/1924, 1942/1944, 1954/1956, 1972/1973, 1982. One strong evidence of serious drought and high evaporation rate in Sudano-Sahelian region of Nigeria is the shrinking of the Lake Chad in the last 40 years. Statelite imagery in 2006 showed that the lake which is a major water source for agriculture – cropping, fishing and livestock not only for Nigeria but for other countries such as Chad, Niger and Cameroon is fast drying up and has shrunk to less than one-third of its size in 1963 (Human Development Report, 2006 and Ajadike, 2015). This study has shown that there is increased evidence of extreme weather events in the form of abnormal rainfall patterns, increasing temperatures, increasing frequency and long lasting droughts plus increasing frequency and devastating floods. All these put a lot of stress on agricultural and food security of Nigeria to the extent that Nigeria spends billions of foreign currency on food importation annually. There is strong evidence that Nigeria's food insecurity is manifested by millions of Nigerians that are daily hungry and malnourished because of not having access to sufficient or balanced food.

6.0 Water Resources and Security Threats

According to the (IPCC, 2007) by 2020, between 75 and 250 million people are projected to be exposed to increased water stress due to climate change. National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN, 2011) stated that climate change will affect the nature, characteristics of the fresh water resources on which Nigerians depend.

Climate Change affects rainfall patterns in Nigeria. There is strong evidence that rainfall will increase in some parts of Nigeria but decrease in other parts. Some extreme weather events such as floods, storms and droughts are already showing levels of intensification.

In Nigeria, devastating floods occur on yearly basis and when they happen, they contaminate fresh water with human wastes, animal wastes, industrial effluents, municipal wastes and mining wastes. These wastes are easily washed into fresh water sources such as

rivers, streams and lakes.

Increasing storms especially at the coastal areas of Nigeria lead to ocean surge, this allows sea water to rush on shore to pollute inland fresh water sources.

In the Sudano-Sahelien zone of Nigeria, drought is occurring more frequently and also long lasting. Scanty or no rainfall all lead to serious water stress not just for humans but for animals and agriculture. With serious drought, ground water aquifers fail to recharge. The same fate holds for rivers and streams and the two are the main sources of water supply systems to Nigerians.

Climate change impact on water resources for Nigeria is particularly challenging because the various sectors of Nigeria are dependent on natural sources such as rainfall, rivers, streams, wetlands and this paper is arguing that these natural supply sources are very vulnerable to prevailing climate change.

The truth is that climate change will further diminish access to safe water and sanitation given that only about 57.48% of Nigerians has access to safe water and 43.25% have access to safe sanitation and only about 28% of Nigerians are serviced by pipe borne water and boreholes (Nigerian Millennium Report, 2010, Ajadike, 2016).

7.0 Climate Change Impacts and Human Health

Good human health goes beyond absence of diseases but encompasses emotional, mental and general wellbeing and happiness. But true human health which everyone desires is now affected by climate change. Climate change affects health directly or indirectly through their negative impacts on some of the determinants of health such as clean air, potable water, sufficient and nutritious food and decent housing.

Direct impacts of climate come in the form of heat waves especially when daily temperature readings go beyond $38^{O}C$. Heat waves can instantly kill many people and lead to hospitalization of many others.

Table 1 shows that daily temperature readings of above $40^{O}C$ are not uncommon especially in the northern and central zones of Nigeria.

Thunder storms which are also becoming more frequent and more intensified can strike buildings leading to human deaths and loss of property. Increasing rainfall can precipitate floods and floods kill people by drowning or it can trigger landslides that can bury people leading to deaths and injuries. Indirectly, floods can create serious health hazards by polluting water sources and introducing water borne diseases such as cholera, diarrheal, typhoid fever and malaria. Mosquitoes that cause malaria and dengue fevers thrive best in polluted stagnant waters. From health records, malaria kills millions annually in tropical countries of the world and increasing temperatures as a result of global warming and climate change are making health scientists to think that malaria may extend to temperate regions of the world where the disease was unknown in the past.

Floods, droughts, storms and cyclonic activities can devastate farmlands and livestock and hence create serious food insecurity and not having access to adequate and nutritious food lead to low human immunity to all kinds of diseases.

The relationship between weather and climate is not new. Hippocrates, one of the fathers of medicine wrote about 2500 years ago about the regional differences in climate and their relationship to the state of health. Folklore is rich in belief about the effect of the seasons on and weather fluctuations on physical and mental health. Fevers vary seasonally, so do mood and various psychological disorders; aches and pains in the joints flare up in winter and heat waves can debilitate and kill (World Climate News, 1999).

8.0 Ocean Surge, Extreme Storms and Coastal Infrastructure and Settlements in Nigeria.

The impact of sea level rise on Nigerian coast is well documented by the Vulnerability Assessment Case Study by Awosika and Folorunsho (2010). Earlier study by Nicholls and Leatherman (1995) estimated that sea level rise of just one meter could endanger 18398 to 18803 square Km^2 of land and up to 3.2 million Nigerians along the Atlantic coastline would be at risk. Virtually all the Nigerian beaches including Bar Beach, Alpha, Kuramo are currently witnessing frequent ocean surge. For example on August 21, 2012 Kuramo was struck by a surge and this claimed at least eight lives (Tell, 2012).

The Nigerian coastal zone which extends from Lagos to Calabar and is about 800 kilometers is infrastructural rich. It houses the oil and gas infrastructure of Nigeria and maritime facilities of the country. Lagos, Warri, Port Harcourt, Yenagoa, Bonny and Calabar are very important cities. Lagos is the largest commercial city in Nigeria. It is also the chief port of Nigeria and the capital city of Lagos State, Port Harcourt, Calabar and Yenagoa also are capital cities of their respective States. The truth is that Nigerian coastline is very infrastructural rich and it is densely populated with millions of settlers. These coastal cities are commercial hubs of Nigeria and are increasingly exposed to risk as a result of storms and ocean surge and this portends serious danger to millions of Nigerians and their supporting infrastructure.

9.0 Discussions, Recommendations and Conclusion

Climate change with increasing frequency and intensity of extreme weather events present serious threats to national security. This paper has argued that national security in this respect should be expanded beyond open wars, terrorism and political instability. In fact, Gore (2008) has captured an expanded national security when he admonished that old concept of global security with its focus almost solely on armies, ideologies and geopolitics has to be enlarged to include security threats by the global environmental crisis which could render all our other progress meaningless… already the increase in severe droughts, severe floods and stronger storms is having a harsh impact. A looming water crisis reflects both the sharp growth in demand and disruption of the natural storage system of fresh water.

Climate change does not only present serious water insecurity, it is also fingered in other national security threats such as agriculture and food, infrastructural, life, health, economic and community security. For example, extreme weather events such as floods, storms, droughts reduce agricultural activities in various ways. Floods wash away crops, kill livestock and droughts deny crops of needed moisture for growth, and many livestock die because of lack of water and pasture and these put a lot of pressure on food prices and food availability when crops fail and livestock die.

Severe floods, storms and ocean surge constitute serious threat to humans, property and infrastructural security because these hazards kill people, lead to injuries, some are displaced as happened in 2012 super floods when thousands of Nigerians were affected. The Nigerian coastline is infrastructural rich as it hosts the oil and gas infrastructure and maritime facilities. It is densely populated with cities such as Lagos, Warri, Yenagoa, Port Harcourt, Bonny and Calabar, some of the cities are capital cities of their states and Bonny is the location of Nigeria's multi-billion Naira Nigeria Liquefied National Gas Company (NLNG). This paper shows the vulnerability of Nigeria's coastline to rising storms, floods, ocean surge and coastal erosion and is calling for concerted actions to protect the people of Nigeria from impacts of extreme weather events which no doubt are being exacerbated by climate change. All these portend grave threat to national security. First, there is need to raise awareness about climate change and related hazards to enable the relevant agencies such as NIMET, Nigerian Hydrological Services Agency (NIHSA), FEMA, SEMA to work in synergy

towards protecting the people of Nigeria, by building dykes and groins to ward off surging ocean and canals for evacuating flowing water to minimize floods. Early warning systems for floods and surging oceans should be intensified and publicized to enable vulnerable populations to be evacuated before disasters strike. Buffer dams should be built across the Rivers Niger and Benue to help stem flood waters from reaching Nigeria from other countries such as Cameroon.

Rising temperatures capable of causing heatwaves especially in northern and central zones should be contained by new housing designs that emphasize cooling and the use of mechanical cooling devices and planting of trees to create shades around buildings.

Irrigation schemes should be increased to reduce droughts especially in the Sudano-Sehelien zone of Nigeria where drought years are on the increase.

The conclusion is that climate change is a serious threat to Nigeria's national security and the best defence is to plan towards building a country that is very responsive to both climate change mitigation and adaptation.

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