

Vulnerability and Adaptation to Climate Change: Key Strategies for Nigeria

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ABSTRACT

Nigeria's major ecological zone have been reportedly altered by changes in climate over the last century. Biodiversity such as terrestrials, marines, freshwaters and other ecosystems including forests and agricultures have been tremendously impacted. These impacts have caused increase in desert encroachment, diseases occurrence, floods, erosion and a rising heat waves in the county. Several literatures have also reported the displacement of millions of Nigerians as a result of rise in sea levels and droughts in some parts of the country due to changes in climate. More also, the growing fluctuations in temperature, rainfall, among others are likely to have adverse impacts on the country's economy since agriculture employs over 70% of its population. Hence, if these climate challenges are not effectively address, it could deplete or shorten the already limited natural resources in the country. It is against this background that this article reviews the current impacts of climate change in Nigeria. It also indicates the group of Nigerians who are highly vulnerable to the climate change impacts. It also explains the major areas and sectors which will experience the most impact of changes in climate in Nigeria. It further highlights the challenges to climate adaptation in Nigeria. It ends by highlighting necessary adaptation strategies and calls the Nigerian government, international organization, civil societies and private sectors in the country to work together in scaling up these adaptation strategies in the country.

Highlights

- Climate resilience and poverty reduction projects should be a focal point for Nigerian government to minimise the vulnerability of its citizen to climate changes.
- Young climate leaders in the country should be mobilised, trained and equipped to promote effective grassroots climate adaptation strategies.

Keywords: Climate change, Vulnerability, Adaptation, Nigeria

Climate change is one of the most discussed issues in the world today. Over the last decade, it has been regarded by researchers, environmentalists and policy makers as a threat unprecedented in human history. Climate change was regarded as potentially more catastrophic than any other threats facing humanity (Tolba, 1991). Also, the dynamics of climate change are exquisitely complex and imperfectly understood. Climate change is a slow and gradual change in the average climate conditions over a long period which might be difficult to predict and accurately experienced personally (Weber, 2010). Climate as a global resource is vulnerable

to the tragedy of all people since regions, nations and continents benefit in the short-run from high greenhouse gas (GHG) emissions, while the burdens are borne by all.

However, the costs and benefits from changes in climate are not equally distributed between the developed and developing countries (UNFPA, 2012). Supporting this claim, World Bank (2013) reports also indicates that climate change is felt disproportionately to the tropics and among the developing nations. Intergovernmental Panel on Climate Change (IPCC, 2007) attributes the

vulnerabilities of developing countries to climate change impacts due to high levels of poverty, heavy dependence on agriculture, poor education, lack of climate data, inadequate human resources, low GDP and government irresponsiveness to climate issues. Several literatures have reported the impacts of climate change in Nigeria. Nigeria is home to more than 180 million people, making it the most populous country in Africa. Over the past four decades, climate-related disasters have been frequently witnessed in the country (BNRCC, 2011). The country is vulnerable to extreme climate events such as floods, droughts, desertification and diseases. Several researchers have recorded a drastic decrease in annual rainfall over the last 50 years. Also, the country's average temperature is projected to rise and the sea level is projected to rise by 1.0 m (BNRCC, 2011).

The vulnerability of Nigeria to impacts of climate change calls for an urgent need to respond to potential changes in climate in the country. While attempts have been made by many researchers to explore various dimensions of climate change in sub-Saharan Africa, there are few comprehensive reviews focusing on Nigeria. Hence, this paper highlights the impacts of changes in climate in Nigeria focusing on agriculture, health and economy. It also shows the vulnerability groups to climate change impacts in Nigeria. It ends by indicating responsive adaptation strategies to minimize climate challenges in the country.

Data and Method

The data collected for this research is based on existing literatures. Related journals and articles were analysed thoroughly and conclusions drawn. Information was collected from Nigerian Metrological Agency (NIMET), National Adaptation Strategy and Plan of Actions on Climate change for Nigeria (NASPA-CCN), Intergovernmental Panel on Climate Change (IPCC), Nigeria's Federal Ministry of Environment, USAID Climate Change Adaptation in Western Africa, United Nations Framework Convention on Climate Change (UNFCCC) and World Bank reports

Observed Climate Changes in Nigeria

Nigeria is expected to experience a drastic shift in

temperature, rainfall, extreme events and sea levels as a result of climate change. The followings are demonstrated changes in Nigeria's climate:

Rainfall: Several researchers have studied the pattern and distribution of rainfall in all and some parts of the country. Between 1911 to 1980, Adefolalu (1986) studied the rainfall trend in twenty-eight meteorological stations in the country. His work was extended by Bello (1998) as he compared the seasonal distribution of rainfall between 1930 to 1961 and 1962 to 1993. A report by Ati *et al.* (2009) from a study of over 9 meteorological stations in northern Nigeria between 1953 and 2002 shows a progressive increase in rainfall trend. Oguntunde *et al.* (2011) using the Global Gridded Climatology of Climate Research Unit Times series (CRU TS.2.1) data from 1901 to 2002 reported a 50-350mm decreased in annual rainfall in sixty-four percent of Nigeria's size. On this part, the Nigeria Meteorological Agency (NIMET, 2008), shows a decreased in annual rainfall by 2-8mm between 1941 to 2000.

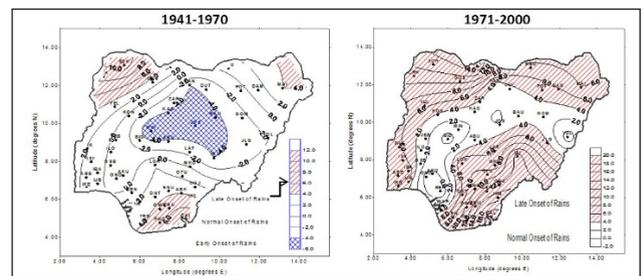


Fig. 1: Trend of Onset of Rainy Season in Nigeria (NIMET, 2008)

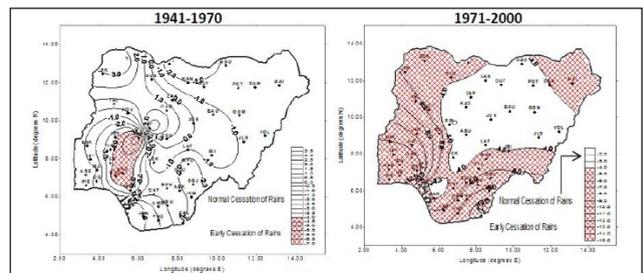


Fig. 2: Trend of Cessation of Rainy Season in Nigeria (NIMET, 2008)

Temperature: Temperature variations play an essential role in climate change. In Nigeria, the temperature patterns have shown an increasing trend since 1901 (Kpodioyaga *et al.* 2010). This increasing trend continued till late 1960s and after which a sharp rise in air temperature began in 1970s. Between 1901 and 2005, the average air temperature

in Nigeria was 26.6 degree. It was noted for a period 105 years that Nigeria experienced 1.1 degree rise in air temperature (Kpodiogaga *et al.* 2010). Compared to the global mean temperature at the beginning of 1860, this increment in air temperature was way too much (Spore 2008; IPCC, 2007). More also, all these situations however suggested a warmer climate for Nigeria in future. Furthermore, it has been projected that Nigeria may experience 0.04-degree temperature rise every year from now and additionally 0.08 degree after 2050.

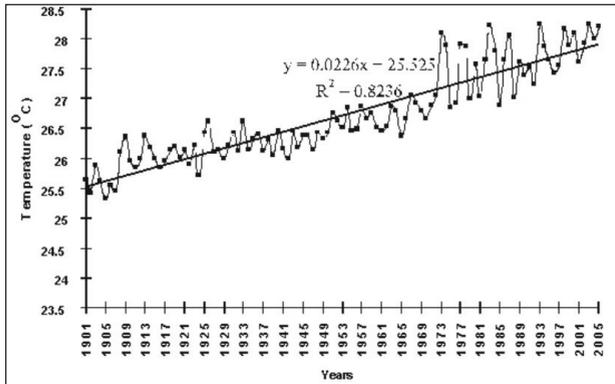


Fig. 3: Nigeria: Air Temperature Distribution Between 1901 to 2005 (Kpodiogaga *et al.* 2010)

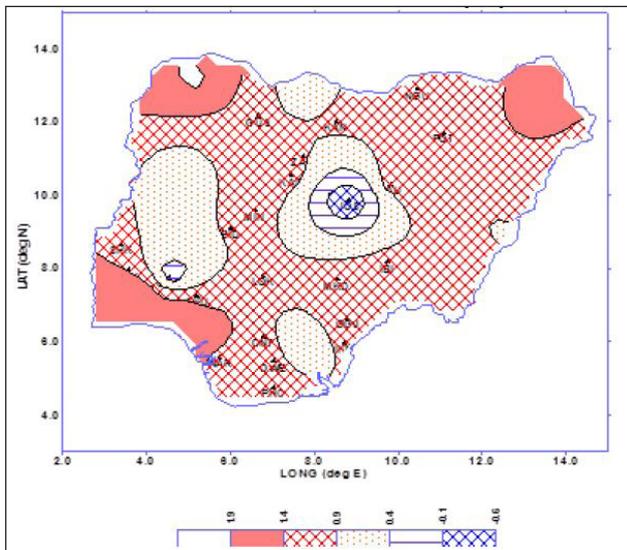


Fig. 4: Average Mean Temperature increase from 1941 to 2000 in Nigeria (NIMET, 2008)

Major Impacts of Climate Change in Nigeria

Agriculture: The vulnerability of agricultural sector to climate change is one of the key interests of this study. Agriculture being the major source of livelihood for the majority of rural communities and

over 60% of the Nigeria’s population (Mayong *et al.* 2005). Agriculture has a multiplying effect on any country’s economic and development (Ogen 2007). Agriculture in Nigeria is mainly rain-dependent which means any change in climate is bound to impact this sector. This impact can be noticed in varieties of ways such as stunted plant growth, soil water unavailability, increased pests and diseases, erosion and rise in sea level (Adejuwon 2004).



Fig. 5: Nigeria: Floods in Villages Due to Rise in Sea Levels (IRIN, 2017)

The impact of climate change in agriculture also includes livestock farming. In Nigeria, changes in climate have both direct and indirect impacts on livestock production. A major climate-related problem in Nigeria is farmer-herder conflict. Over the last 10 years, an estimate of over 10,000 Nigerians has been killed due communal and resource violence (Human Rights Watch, 2007). A mixture of climate-related issues such as drought and desertification have been responsible for the death of several hundred Nigerian in farmer-herder conflict since 1999 (Sayne 2011).



Fig. 6: Nigeria: Cattle Grazing on Farm Crops (Guardian 2018)

Health: Climate change impacts human health both directly and indirectly. The health impacts of climate change occur gradually over a long period of time. In Nigeria, climate change may increase the distribution and prevalence of diseases, mental illness, malnutrition and even death. Some of these health impacts are already being experienced among both the poor and rich populations in Nigeria. In 2030, diarrhoeal deaths in children under 15 years old is predicted to be about 9.8% of the diarrhoeal deaths as a result of climate change in Nigeria (WHO, 2015).

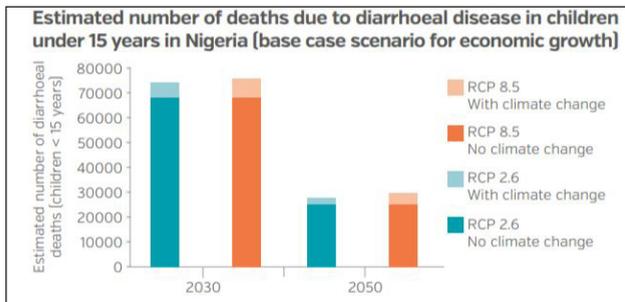


Fig. 7: Projected Number of Death Due to Diarrhoeal disease in children below 15 years in Nigeria (WHO, 2015)

Also, by 2070, over 400 million people in Nigeria is projected be at risk of malaria due to climate change (WHO, 2015). It is important to know that some of the world’s infections are highly sensitive to temperature, rainfall and humidity. These climate and weather events however in many ways influence their life-cycles. Also, when a largely depending natural resources such as land, water and food is affected by climate change, the health of millions that depend on these resources are affected as well. Hence, the anticipated rise in sea levels, droughts, food shortages are likely to increase the vulnerability of the poor to disease risks.

Economy: Several existing articles have shown that climate change impacts economic growth of any country. A study of 136 countries for the period of 1950 to 2003 suggested the negative impacts of climate change on economic growth (Dell *et al.* 2012). Their study provided three evident parameters. First, that increase in temperatures will reduce economic output in developing countries. Second, that increase in temperatures will not only impact economic output but reduce the economic growth of any poor country. Third, that temperature rise will have a range of adverse effects such as reducing agricultural productivity, industrial output and

causing political instability. Also, using cointegration analysis, Ali (2012) observed that changes in rainfall patterns and distributions have a long term drag-effect on economic growth in Ethiopia. Using econometric analysis on Nigeria from 1980-2005, Ayinde *et al.* (2011) observed that temperature and rainfall changes have generated a series of negative impacts on agricultural productivity in the country thus effecting economic growth.

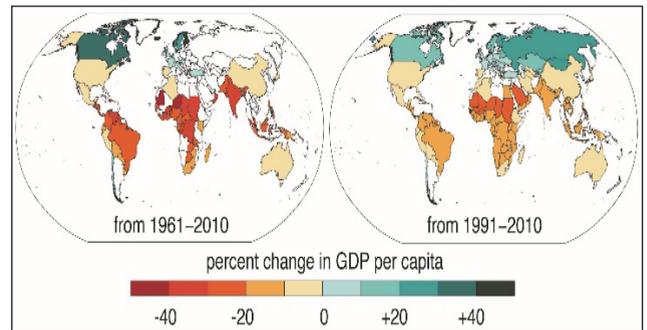


Fig. 8: The Economic Impact of Global Warming During the 1961-2010 and 1991-2010 (Diffenbaugh *et al.* 2017)

The above figure shows the regional consequences of climate change on GDP across the globe. This shows that damages caused and to be caused by climate change will be felt globally. However, climate scientist, Diffenbaugh (2017) emphasized that damages on GDP will make poor countries poorer. Also, a study has estimated that about 43 million additional people in Africa are liable to make poorer by 2030 due to climate change.

Key Adaption Strategies to Climate Change in Nigeria

There are two ways of dealing with climate change. First, mitigation and the other is adaptation. For developing countries like Nigeria that contribute insignificantly to the causes of climate change but vulnerable to its impacts, adaptation strategies should be the country’s concern. Adaptation is therefore a process of reducing the impacts of climate change. There are several ways of minimizing current and expected consequences of climate change. However, the extent to these ways depend on how vulnerable a country is to climate and weather changes. The adaptation strategy necessary for Nigeria includes:

1. Government of Nigeria and International Organizations such as WHO, USAID should focus adaptation efforts in parts of the



- country where vulnerability is high and also safety and resilience is greatly needed.
2. Government of Nigeria should intensify efforts in climate change and vulnerability assessment in order to develop both the long and short adaptation strategies in strengthening responsive capacities, minimise risks and encourage effective adaptation in the country.
 3. The federal, state and local governments in Nigeria should on long term national and local poverty reduction strategies to foster local sustainable development and poverty eradication.
 4. The Federal Government of Nigeria should focus on strengthening existing capacities and involving civil societies and private sectors for a robust disaster management and scaling up necessary adaptation through effective capacity building and grassroots mobilization.
 5. The Government of Nigeria should develop a funding mechanism to support local actions on climate change adaptation to achieve the developmental of goals of building more resilience and protected communities in the country.
 6. The Government of Nigeria should focus on creating enabling environment for climate advocacy and capacity development.
 7. The Federal Ministry of Agriculture should focus on developing weather resistant crops and improved farming techniques to reduce the vulnerability of the farming communities in the country.
 8. The Federal Ministry of Environment should focus on increasing afforestation and reforestation programs across all levels in the country.
 9. Federal Ministry of Power, Works and Housing should focus on finding alternative energy sources to the meet energy crunch in the country.
 10. In coastal regions, disaster reduction and management measures especially against flooding should be prioritized.

11. Also, in drought prone areas in Nigeria, improving efficiency in irrigation farming should be the government's priority.
12. Government should focus on the diversification of the country's economy and improve access to insurance such as health insurance for the most vulnerable.

CONCLUSION

Although there are a lot of limitations to adaptation in Nigeria just like any developing country, it is also important to highlight that there are some existing adaptation projects in the field of health care, agriculture, coastal and ecosystem management in the country. These projects need to be rapidly scaled up to the demand of the country's growing population. Also, it is no doubt that Nigeria is highly vulnerable to impacts of climate change and therefore needs to take serious steps in building resilience communities. In order to deal with the negative impacts of climate change, Nigeria needs both regional and international collaboration and support to develop necessary actions and policy. This is urgently needed for the country's economy and the livelihood of its people.

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