

Climate Change and Adaptation in Nigeria: Some Background to Nigeria's Response – Part I

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Abstract. This first part of the larger paper raises fundamental issues about climate change and some aspects of Nigeria's response to it. It describes the global nature of the phenomenon and identifies some of its manifestations in Nigeria. These include the increasing incidences of flood in the various parts of the country and growing severity of drought in the Sudano-Sahelian zone among others. Issues relating to adaptation in the country are presented with an outline of guidelines for possible implementation. In sum, this part of the paper sets the platform for the examination of the phenomenon of climate change using long-term data on rainfall and temperature. It also creates the basis for the assessment of the county's vulnerability to the change and potentials for adaptations to minimize the actual and anticipated impacts particularly in the agriculture sector which are reported in Parts II and III.

Keywords: Nigeria, Forest, Savanna, Sudano-Sahelian climate change, flood, drought, vulnerability, adaptation.

1. Introduction

Climate change is globally a current phenomenon of grave concern. This is fundamentally because climate factors control decisively, the functioning of the environmental system and any change in them as is now widely experienced the various parts of the world, decisively affect virtually every other component of the environment including human activities. Increased temperature regimes may cause plants to die, limiting biomass development, while among other things, heavy storms can devastate socio-economic infrastructures as is now frequently reported around the globe. Of course the human use on the environment has important effects which are magnifying the impacts of climate change and variabilities. Much of the aggravation in flood impacts that puts Nigeria as one of the most vulnerable countries in Africa is without doubt traceable to blocked channels or outright absence of drainage channels in built up areas among others.

Climate change refers to a momentous departure of climatic behaviours from a familiar or established pattern and implies a statistically significant change in measurements of either the mean state or variability of the climate for a place or region. The Intergovernmental Panel on Climate Change [1] refers to it as statistically significant variations that persist for an extended period, usually up to three decades or longer [2]. As usual in climatological analyses, greater emphasis is on the dominant climatic parameters which in the humid tropics are rainfall and temperature. It is important to differentiate climate change from climatic variability. The latter refers to departures of weather behaviour from annual patterns with aggregate impacts that do not amount to a permanent shift in climatic regimes in an area.

Two things need be noted with respect to climate variability. First, it can have negative impacts on activities that are wholly climate-dependent such as rain-fed agriculture. It may cause delay in planting dates and or poor harvests due to major variations in rainfall incidences and volume. It can thus lead to large destabilization in crop production with spiral effects on local and regional socio-economic activities. Also, a

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year of extreme wetness or dryness in a tropical environment like Nigeria may not necessarily be a part of some change in climate. It may simply reflect a short-term perturbation in the climatic system. The establishment of a variability pattern as a norm would however, on the long run, become an element of climate change. The time-dependency of climate phenomena implies that their manifestations which could mean complete change have either historic or futuristic attributes. In history, it is possible to talk of old climatic regimes. For example, a number of archaeological facts suggest that the Sahara desert most probably had wet climates in the past [e.g. 3, 4]. The Ice Age [e.g. 5] is also frequently referred to as a colder historical period. The futuristic aspects of climate studies relate to projecting future patterns and trends. Such projections often depend on climate-engendering factors like sea surface temperatures and atmospheric circulations [6] observed over decades. An eventual change in climate may be positive or otherwise. For example, if a dry location becomes wet, it would provide enhanced opportunities for rain-fed agriculture and increase in local biomass. A drier climate could cause biodiversity losses including problems of water deficits for socio-economic activities. Thus knowledge of possible future behaviours of climate helps in developing suitable preparedness plan.

1.1. The reality of global climate change

With such massive evidences and analyses as contained in Stern [7] and IPCC [1] among others, the controversies associated with climate change have now been largely laid to rest. There are clear indications that virtually every part of the world is in or entering a new climate regime with serious implications for socio-economic sustainability. In Nigeria, the evidences include but not limited to increasing frequencies of floods, high temperatures and frequent dry spells [8, 9, 10].

International response to climate change through the United Nations Framework Convention on Climate Change (UNFCCC) has increased over the last couple of years. For instance, the IPCC under the auspices of the Convention has provided deep insight into the science of climate change and actions required for effective response. Of course, there are dissenting views about climate change. While those who hold opposing views do not refute global warming, they opine that this phenomenon is not simply anthropogenic. According to them, there had been changes in climate in the past when human populations and their activities were by no means near recent levels. It has been argued that the greenhouse effect is most probably caused by well-established factors such as palaeo-climatic and volcanic activities and that it is difficult to explain the changing environmental conditions of this time as simply human-induced [11]. In general however, everyone seems to agree that the depletion of the earth's biophysical resources has reached a worrying level and that global actions are required to ensure that the earth remains livable.

The objective of this paper is to provide some background on climate change phenomenon in Nigeria and how Nigeria is and could be responding to it. The specific objectives of this paper are:

- i. Evaluate some key aspects of climate trends in Nigeria;
- ii. Attempt an assessment of the country's vulnerability to climate change and
- iii. Identify possible adaptation strategies that the country can adopt.

Figure 1 shows the map of Nigeria and the major ecological zones: Forest, Savanna and Sudano-Sahelian.

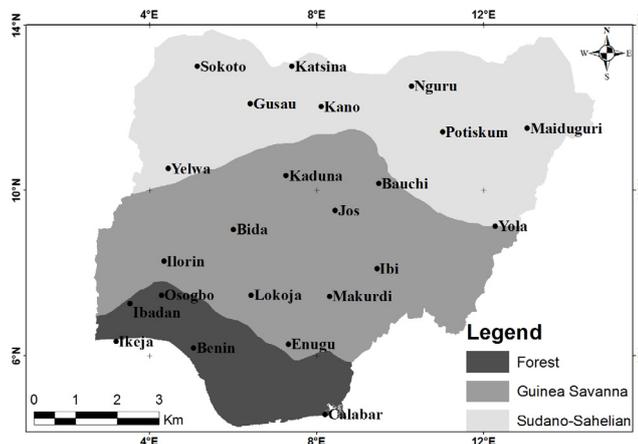


Fig. 1: Map of Nigeria, showing the major ecological zones.

2. Adaptation to climate change

Since the early 1990s, the global communities have come together under the auspices of UNFCCC to address issues associated with climate change. Nigeria has been visible in the various negotiations on actions to reduce the manifest as well as anticipated impacts of climate. Under the UNFCCC, it is generally agreed that developing countries such as Nigeria should focus on adaptation to make them able to cope with the “new” climatic regimes, particularly their extremes. They are nonetheless encouraged to focus on “greening” their economies i.e. to pursue environmentally as well as economically sustainable development. The understanding is that developing countries have produced only a small fraction of the greenhouse gases (GHG) that has changed the chemistry of the atmosphere; and that their development should not be constrained by global change. Also developing countries because of their poor economies, have weak adaptive capacity making them highly vulnerable to climate change impacts.

Adaptation is globally imperative. Even if the various interventions bring about significant reductions in the emission of GHG into the atmosphere, the lag in the climate system implies that the GHG that is resident in the atmosphere will continue to affect the climate systems for several decades to come [12]. All the same, even if developed nations undertake the deep emissions cuts recommended by IPCC i.e. reducing emissions to 95% of 1990 levels by 2050 via mitigation, the desired levels of global emissions and atmospheric GHG concentrations cannot be attained without large developing countries contributing to mitigation actions in the medium and long term. The depths of the potential challenges that climate change may bring are far from being fully understood. For example, it was never imagined that the thawing of polar ice could progress at such high rates that have been observed (www.guardian.co.uk/environment/2009/feb/18/arctic-ice-m...www.guardian.co.uk/environment/2009/feb/18/arctic-ice-melt). It is thus crucial and urgent that every region, country and community begins to build more resilience to conditions that may be harsher than what is presently manifesting.

Burton [13] has summarized six main reasons why adaptation to climate change is imperative:

- Climate change cannot be totally avoided.
- Anticipatory and precautionary adaptations are more effective and less costly than forced/emergency adaptation or retrofitting.
- Climate Change may be more rapid and more severe than current estimates suggest.
- Immediate benefits can be gained from better adaptation to climate variability and extreme events.
- Immediate benefits also can be gained by removing maladaptive policies and practices.
- Climate Change brings opportunities as well as threats.

2.1. Guides for building Adaptation to climate change

Adaptation is basically about development as the *adaptive capacity* of a country is related to its level of socio-economic development [1]. The more developed a country is particularly with respect to economy and political stability, the more resilient it is and the stronger its adaptive capacity. Following from this, it is only appropriate that adaptations be pursued as socio-economic development issues. The following are thus useful suggestions to make adaptation effective:

- Adaptation actions should be incorporated into local and or national development plans.
- Adaptation is a community-based issue.
- Adaptation strategies should be sufficiently flexible to take care of possible further changes in climatic behaviours which may necessitate quick review of plans.
- A clear understanding of local vulnerabilities to climate change and critical thresholds is crucial for appropriate adaptation actions.
- It is important that climate scenarios are understood and appropriate models to identify key climate change risks adopted.
- Adaptation should focus on no regrets, low regrets, and or win-win measures
- Adaptation plan should be reviewed from time to time.

The presentations of the Climate scenarios based on the analyses of long time climatic data are provided in Part II. Part III contains the vulnerability assessment and a proposal for adaptation action for the country.