

# A Review of Climate Change: Its Impacts and Governance for Enhancing Nigeria's Environmental Resources

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## Abstract

*This paper examines peoples' perception about governance of impacts of climate change on Nigeria's environmental resources. The effects of man's activities and those of natural phenomena on issue of climate change impacts as they relates to peoples' perception, governance of climate change are presented and discussed. In addition, policy implementation as the process of putting a plan into practice by carrying out planned activities, climate change as one of the greatest challenges currently facing human and the environment, atmospheric gases/effects, evidence of global warming and climate change in Nigeria, as well as, impacts of climate change on Nigeria's environmental resources were reviewed. It was pointed out that Nigerian government has not set up a specific ministry for climate change, but rather assigned responsibility for climate change to the ministries of environments at the Federal and States levels, thereby effectively side lining the climate change issue and heightening the tensions between economic development and environmental protection. It was recommended among others that, immediate effective measures are needed to be taken in solving the problems of increasing temperatures and changes in rainfall regimes in Nigeria.*

**Key Words:** Climate Change, Impacts, Governance, Enhancement and Resources.

## Introduction

Global warming refers to an increase in average global temperatures. Natural events and human activities are believed to be contributing to an increase in average global temperatures. This is caused primarily by increases in greenhouse gases such as carbon dioxide (CO<sub>2</sub>). Recently, and especially over the past three or four decades, the issue of global climate change due to the greenhouse effects, including global warming and sea level rise have been a subject of scientific discussions and public debate (Olufemi & Samson, 2012). Furthermore, the authors indicated that climate change is as a result of interrelationship between Man and Environment as well as the connection between environment and conflict in developed and developing countries all over the world. Alarm bells are ringing with lakes drying up and a reduction in river flow in the arid and semi-arid regions. The result is fewer water supplies for use in agriculture, hydro power generation and other users. The main suspect for all this havoc is Climate Change. Africa as pointed out by Olaniyi *et al.*, (2014) will be worst hit by the effects of Climate Change and that Nigeria being part of it is experiencing adverse climate conditions with negative impacts on the welfare of millions of people.

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When scientists talk about global climate change, they are talking about the global climate and a pattern of change that is happening over the years. One of the most important trends that scientists look at is the average temperature of the earth, which has been increasing for many years. This is called global warming. Rising global temperatures lead to such stronger hurricanes, melting glaciers, and the loss of wildlife habitats. That was because the earth's air, water, and land are all related to one another through the climate system. This means a change in one place can lead to other changes somewhere else. For example, when air temperatures rise, the oceans absorb more heat from the atmosphere and become warmer, which in turn can cause stronger storms.

### **Peoples' Perception**

Perception deals with the human senses that generate signals from the environment through sight, hearing, touch, smell and taste. Vision and audition are the best understood. Simply put, perception is the process by which we interpret the world around us, forming a mental representation of the environment (Healey, 2017). Environmental perception is however, understood as the relationship human beings have with the environment (Buenrostro *et al.*, 2014). This relationship determines the attitudes of the people in favour of or against the environment. Human environment interaction refers to the relationship between human social systems and the rest of the environment. It is a term that is used to define the dynamics between these two entities, and it can also be used to predict the future of this interaction. It is important for policy makers to understand human environment interaction, as it affects the future of the human race. For instance, if the interaction is to the detriment of the ecosystem, it means that man may not have a place to call home in the near future. It is important to try and modify this interaction to such a degree that both human life and the environment are preserved. Man and the Environment were created to interact with each other on balance basis. Whilst a fair decent shelter, food supplements including economic resources were created by the natural environment, man on the other hand is supposed to care and protect the environment from destruction (Fekadu, 2014).

### **Governance of Climate Change and Policy Implementation**

Institutionalization of climate change issues in domestic government agencies would effectively create "champions" for mitigation and adaptation within governments of developing countries. This engagement is a crucial step, which would build a constituency for action and help give domestic and foreign businesses and NGOs reliable points of contact to engage governments on climate change (Drexhage, 2008). The author further pointed out that the key implication is that coherent climate policy as it relates to developing countries must become much more closely aligned with and, indeed, one aspect of a sustainable development pathway committed to poverty alleviation (Drexhage, 2008). National government too has its share of challenges and opportunities.

Policy implementation is the process of putting a plan into practice by carrying out planned activities, including compliance and enforcement activities or ensuring such activities are carried out in accordance with the guidelines for identification of regions and agencies/institutions for implementation (Egonmwan, 2000; Agamuthu, *et al.*, 2011; Environmental Management Bureau of the Philippines (EMBP), 2014). The state plan therefore, shall take: the identification of the responsibilities of state and sub-state (regional, local and interstate) authorities in the development and implementation of the state plan; the means of distribution of federal funds to the authorities responsible for development and implementation of the state plan; and the means for coordinating sub-state planning and implementation (Agamuthu, *et al.*, 2011).

Policy implementation reflects a complex change process where government decisions are transformed into programs, procedures, regulations, or practices aimed at social betterment (DeGroff & Cargo, 2009). The authors further said implementation has long been recognized as a distinct stage in the policy process, unique for representing the transformation of a policy idea or expectation to action aimed at remedying social problems. Public policy implementation as described by Egonmwan (2000) is a major problem confronting the Developing Countries. In relativity, the successful implementation of public policy is difficult in Developed Countries; it is more difficult in the Developing Countries and it may be most difficult in reform oriented governments in the Developing Countries such as Africa. Considering the work of Schubeler (1996) within the scope of public policy implementation, one might be willing to know who are the actors and development partners in public policy implementation and how the strategic objectives and issues should be addressed in a state setting. The perceived difficulty in having a successful public policy implementation strengthen the need for studying the governance of climate change as it relates to Nigerian environmental resources.

### **Climate Change**

Climate change is one of the greatest challenges currently facing human and the environment (Harbinson *et al.*, 2006). Further to that, evidences showed that many biological systems are being affected by climate change through increasing temperatures and changes in rainfall regimes. Many projections indicated worsening of impacts if effective measures are not taken immediately to solve the problem. As a result, there has been a significant international attention over the last few decades to control the situation. Many adaptation and mitigation measures have been proposed (Lorenzoni *et al.*, 2007). The authors further said these measures will be effective if they are based on the perceptions of all groups in the society. Thus, it is essential to assemble the opinions of the public especially rural communities in formulating effective climate change policies since public perceptions will likely influence the success of strategies to solve the problem (Wood *et al.*, 2012). Due to their dependence on rain-fed agriculture and lack of institutional and financial capacities, such communities are more vulnerable to climate change (Kotir, 2011).

Climate change occur when the average long - term weather patterns of a region are altered for an extended period of time, typically decades or longer. Examples include shifts in wind patterns, the average temperature or the amount of precipitation. These changes can affect one region, many regions or the whole planet (Allison, 2010). Climate changes are caused by changes in the total amount of energy that is kept within the Earth's atmosphere. This change in energy is then spread out around the globe mainly by ocean currents as well as wind and weather patterns to affect the climates of different regions (Royal Society, 2010).

More than 100 years ago, people around the world started burning large amounts of coal, oil, and natural gas to power their homes, factories, and vehicles. Today, most of the world relies on these fossil fuels for their energy needs. Burning fossil fuels releases carbon dioxide, a heat-trapping gas, into the atmosphere, which is the main reason why the climate is changing. Heat-trapping gases are also called greenhouse gases. They exist naturally in the atmosphere, where they help keep the Earth warm enough for plants and animals to live. But people are adding extra greenhouse gases to the atmosphere. These extra gases are causing the Earth to get warmer, setting up around the world - on land, in the oceans, and in the atmosphere. These changes further affect people, plants and animals in many ways.

Today's climate change is different from past climate change in several important ways: None of the natural causes of climate change, including variations in the sun's energy and the Earth's orbit, can fully explain the climate changes we are seeing today. Global warming and the climate change seen today are being caused by the increase of carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions by humans. Human activities like the burning of fossil fuels and industrial production increase greenhouse gas levels. This traps more heat in the atmosphere, which drives global warming and climate change (UNESCO/UNEP, 2011). Whilst CO<sub>2</sub> and other greenhouse gases are naturally present in the atmosphere, emissions from human activities have greatly amplified the natural greenhouse effect. CO<sub>2</sub> concentrations in the earth's atmosphere have increased significantly since the beginning of the industrial revolution, and most especially in the past 50 years (World Bank, 2010). Additionally, human activities have caused the Earth's average temperature to increase by more than 0.75°C over the last 100 years. Scientists have tracked not only the changes in the temperature of the air and oceans, but other indicators such as the melting of the polar ice caps and the increase of world-wide sea levels (World Bank, 2010).

### **Greenhouse Gases/Effects**

Atmospheric gases tend to absorb the infrared radiation from the Sun as it is reflected back towards space, thus trapping the heat in the atmosphere. The major greenhouse gases include both naturally occurring species, like water vapor (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and several anthropogenic designed gases, like chlorofluorocarbons (CFC's), per-fluorocarbons (PFC's) and sulfur hexafluoride (SF<sub>6</sub>). Their relative ability to trap heat can be measured in terms of their Global Warming Potential (GWP), the ratio of global warming both direct and indirect from one unit mass of a greenhouse gas to that of one unit mass of carbon dioxide over a period of time.

The "greenhouse effect" denotes the trapping of heat radiation within the atmosphere by certain trace gases contained in air, mainly water vapor, carbon dioxide and methane. Earth must radiate heat into space to balance the energy received from the Sun. The greenhouse effect makes it impossible to achieve the balance by re-radiation from the surface of Earth, thus forcing a warming of the ground and the lower atmosphere. The term "greenhouse effect" is used in connection with the emission of greenhouse gases associated with human activities, including industrial compounds (chlorofluorocarbons or CFC's). This is more correctly referred to as the "excess greenhouse effect" or "additional greenhouse effect," unless the meaning is clear from the context.

### **Evidence of Global Warming and Climate Change in Nigeria**

Developing countries like Nigeria are least prepared for the impact of global warming. Global warming is real and evidence abounds in the country. Although the country has been lucky not to have experienced major climate-change-induced natural disasters, the effect of climate change is evidenced by rise in sea level and erosion along the nation's coastline. For instance, Nigerian coastline spanning the years 1900-2002 has been observed by Orupabo (2008) to estimate shoreline dynamics from conservatively 1.7m per annum to a net sediment loss of 7.3m<sup>2</sup> per annum. The weather pattern is no longer distinct in the country, we have witnessed very hot weather conditions and high precipitations leading to flooding which ruined crops in parts of the country creating food scarcity, the latest being Jigawa State. Gully erosion has sacked many communities especially in Edo and Anambra States. Due to heavy rainfall experienced in 2013, gullies have caused about 3.15 and 2.10 kg m year<sup>-1</sup> of soil losses in Jigawa State (Mansur, 2014)

As a result of persistent drought, the Lake Chad has almost dried up, while there had been persistent desert encroachment in the north (Atilola, 2012). Also, the dearth of statistical data and non-collection of environmental data in a systematic manner make it difficult to estimate in concrete terms the overall effect of climate change on: agriculture and food supply, flooding and erosion, health risks diseases spread, water resources, wildlife, level of CO<sub>2</sub> emission and trends in temperature increase, and their effects on the social and economic systems of the country. A comprehensive audit of the environment is needed to quantify the effects of global warming and the level of degradation and loss of biodiversity, so that we can start to put in place some mechanism for responding to these challenges. To this effect, Bellard *et al.*, (2012) estimated biodiversity loss by 2100 to about 12.6% in plants, 9.4% in invertebrates and 17.7% in vertebrates

### **Impacts of Climate Change on Nigeria's Environmental Resources**

Nigeria's climate is likely to see growing shifts in temperature, rainfall, storms, and sea levels throughout the twenty-first century. Poor adaptive responses to these shifts could help fuel violent conflicts in some areas of the country (Sayne, 2011). In Nigeria environmental conflict is mostly climate induced most especially through exploitation of mineral resources and its indirect effects (Oyefusi, 2008). Most of these conflicts come about over the ownership of land. Further to that, Nigeria has not been spared the agony of recurring violent conflicts associated with the management of her oil resource in the South-South geo-political zone of the country. Among the major sources of conflict in most of the Northern states in Nigeria could be ecological degradation induced by climate change. For instance, natural resource scarcity was observed by Odoh & Chigozie (2012) as the immediate cause of Fulani herdsman-farmer conflict while climate change constitutes the remote cause. This is because drought, feed and water shortages caused partly by desertification and drought have sent nomadic pastoralists, wandering outside their normal grazing routes.

Furthermore, our growing vulnerability to climate change may be a threat to human development and survival. Socially, politically and economically, these might leads to competition for scarce resources, which enhances and creates socio-environmental conflicts (Olufemi & Samson, 2012). Similarly in the south west and south east political zone of the country, environmental conflicts arise mostly over the direct use of land, water, wild life and forestry resources which are caused by physical scarcity when local demand exceeds supply. Climate effects could contribute to violent conflict in a number of ways, including, long-term environmental deterioration which may lead to scarcity (especially declining access to water or to land and the returns on use of land), increasing competition over those resources (Olufemi & Samson, 2012). It is therefore appropriate to observe that there is no part of Nigeria that is not prone to environmental conflict. For the purpose of clarity in understanding governance of climate change impacts, social conflict are considered in representing a universal form of interaction in which groups are naturally in conflict as their purposes and interest/goals overlap, encroach on each other and often tend to be competitive.

There is a direct relationship between conflicts and Nigeria's economic growth to the extent that the competitive achievement oriented nature of modern society makes social conflict part and parcel of the dynamics of society (Iyoboyi, 2014). The author further pointed out that, the consequence for the Nigerian people is a geographical pincer threat from desertification in the north and coastal erosion in the south. Through a combination of overgrazing abuse of woodland for fuel and increasingly unreliable rainfall, the Sahara is

advancing at an estimated rate of 600 meters per annum. Over 55 million people in 10 northern states were affected. The situation across the northern Nigeria especially Jos and Kaduna is linked/blame on climate change, resulting in conflicts that have led to death of hundreds of people in Jos and Kaduna. It is instructive to note that most of these conflicts are not religions. Ethnicity and Religion are just triggers because they are major sources of identity for most Nigerians. The key issue is the fight for economic and political control between the indigenes and settlers and the tussle began (Odoh&Chigozie, 2012).

By contrast, rising sea levels threaten Nigeria's coastal regions. The Niger Delta may be the source of oil wealth but its low-lying terrain crisscrossed with waterways makes it extremely vulnerable to flooding and salinization. The protective mangroves of these coastlines have been largely lost to human intervention; half of the 15 million population of the city of Lagos lives less than six feet above sea level, especially, Victoria Island is in the front line, along mushrooming slum settlements (Olufemi & Samson, 2012).

As pointed out by Olaniyi, *et al.*, (2014), droughts are getting worse in the arid zones and climate uncertainty is growing. Additionally, climate change is an unprecedented and threat to food security. Arid and semi-arid areas in northern Nigeria are becoming drier, while the southern part of the country are getting wetter. Global warming means that many dry areas are going to get drier and wet areas are going to get wetter. They are going to be caught between the devil of drought and the deep blue seas of floods. However, "great tragedy" and Nigeria used to be number one gas flaring nation in the world until recently when it was overtaken by Russia, thus, it has been playing an important role because millions of tons of greenhouse gases, especially carbon dioxide and methane are released into the atmosphere; a problem was caused by economic activity of the rich, industrial countries. Unless climate change was tackled, all the "best efforts" to help this great country could come to nothing. One of the biggest threats is growing climate unpredictability, which makes subsistence farming difficult. But a better planning to reduce the risk from disasters, together with developing agricultural practices that can withstand changing climates, have been shown to work and could help mitigate the impact if used more widely

In Nigeria for example, hot climate and little rain are experienced in the extreme northern States, According to some estimates, fully two- third of Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Sokoto, and Yobe could turn to desert or semi-desert in the 21<sup>st</sup> Century, where desertification is fast encroaching on arable lands and agriculture is highly dependent on irrigation (Sayne, 2011). The author further established that one of the most significant climatic variations in the north eastern region of Nigeria since the late 1960s has been the persistent decline in rainfall. Further to that, this has reduced agricultural productivity in this region and that increased temperature as a result of climate change is a favourable condition for pests such as grasshoppers that destroy or reduce crop yield to thrive and multiply.

Climate change affects agriculture in a number of ways. Extreme weather events such as thunderstorms, heavy winds, and floods devastate farmlands and can lead to crop failure. Pests and crop diseases migrate in response to climate variations (e.g. the tsetse fly has extended- its range northward) and will potentially pose a threat to livestock farming in the drier northern areas). Changes in climatic and atmospheric composition will also negatively affect Bio-diversity and likely help to diminish Nigeria's forests. The upper limits of the tropical rainforest are already receding. Given the sensitive nature of the forest ecosystems, forest resources have become highly vulnerable to even slight changes in climate systems. There is a direct influence of global warming on precipitation to the extent that increased

heating leads to greater evaporation and thus surface drying, thereby increasing the intensity and duration of droughts (Oyefusi, 2008; Iyoboyi, 2014). Changes in temperature, precipitation and water cycle dynamics, therefore, can lead to remarkable forest-cover loss.

Climate change is also affecting Nigeria's energy sector profoundly. Conflict over the use of water resources among different economic sector has adversely affected the hydropower plants in Kanji, Jebba and Shiroro which are the key to the security of electricity supply in the country and represent about one-third of the country's total installed electricity generating capacity (Olufemi & Samson, 2012). Additionally, these plants have produced significantly lower energy leading to epileptic power supply as a result of excessive drought that leads to increase in evapotranspiration affecting water volume and the capacity of the power plants to produce optimally. Incessant power outage increases the cost of doing business and hampers the pace of industrialization in the country. Industries that are dependent on climate sensitive resources or conditions e.g. agro businesses, construction, infrastructure, transportation, pollution control are potentially vulnerable to changes in the climate. Conflicts may also demand greater participation in decisions that affect the population directly. Climate change is equally a major problem caused by the increase of human activities leading to several direct and indirect impacts on health. Disasters have a direct impact on local infrastructure and indirectly produce social conflicts affecting the access to basic needs of food, housing and health. These climatic changes will have wide-ranging harmful effects including increase in heat-related mortality, dehydration, and spread of infectious diseases, malnutrition, and damage to public health infrastructure. It is anticipated that the impacts of climate change will lead to an increase in unemployment rates. There are no public policies to prevent climate change impacts on the labour sector. There could be some changes in this sector due to three main factors; Internal and external migration flows will trigger the need for groups of people to adapt both to a new territory and to new labour conditions. Also, as consequences of damaged infrastructure due to recurrence of natural disasters, it is estimated that there will be a period of mass unemployment in those sectors that rely on this infrastructure, until it has been rebuilt.

### **Implications and Way Forward**

From the foregoing, it might be understood that least preparation for the impacts of global warming, despite its reality and evidence in Nigeria may further result to unprecedented climate change impacts, thence, poor enhancement of Nigeria's environmental resources. Poor adaptive responses to climatic shifts in temperature, rainfall, storms, and sea levels can fuel violent conflict in many parts of the country. On the other hand, environmental conflicts were mostly considered to be climate induced in Nigeria, most especially through exploitation of mineral resources and its indirect effects. Therefore, the country's growing vulnerability to climate change may be another threat for consideration, specifically on human development and survival. This might be due to Social, political and economic competition for scarce resources, which enhances and creates socio-environmental conflicts.

Nigerian governments need to adequately prepare for the impact of climate change. This way, devastating effects in the dry and wet areas are going to be enhanced, hence assured environmental resources resourcefulness. Immediate effective measures are needed to be taken in solving the problems of increasing temperatures and changes in rainfall regimes in Nigeria. In this manner, many biological systems affected by climate change will be protected. Specific ministry for climate change is recommended to be set up by the Nigerian government. This in essence will relieve the climate change unit in the Federal Ministry of Environment of the responsibility for climate change under the umbrella of environmental

protection. At the long run, the Federal government will effectively take the general progress of the climate change issue and reduce the tensions between economic development and environmental protection.

Mitigating climate change and ecological degradation is strongly needed to be in place in Nigeria to effectively reduce environmental resources conflicts concerning direct use of land, water, wild-life and forestry resources in the northern and southern parts of the Federation. Extreme weather events such as thunderstorms, heavy winds, and floods are to be mitigated by the governments and public, to prevent their effects on agriculture in Nigeria. By so doing devastated farmlands and crop failure are going to be enhanced. Further to that, Nigeria's energy sector will equally be protected and improved security of electricity supply in the country will be assured.

### **Conclusion**

Nigerian government has not set up a specific ministry for climate change, but rather has assigned responsibility to climate change unit in the Federal Ministry of Environment under the umbrella of environmental protection. By doing so, the national government has effectively side lined the climate change issue and has heightened the tensions between economic development and environmental protection. Developing countries like Nigeria were least prepared over the impact of global warming, the implication of which is that many dry areas are going to get drier and wet areas are going to get wetter.

Many biological systems were affected by climate change in Nigeria, through increasing temperatures and changes in rainfall regimes, which worsened the impacts as effective measures were not taken immediately to solve the problem. Whilst the major source of conflict in most of the northern states in Nigeria was ecological degradation induced by climate change, environmental conflicts in the south west and south east political zone of the country arise mostly over the direct use of land, water, wild life and forestry resources. Extreme weather events such as thunderstorms, heavy winds, and floods equally affect agriculture in Nigeria by devastating farmlands and leading to crop failure. Furthermore, Nigeria's energy sector is profoundly affected by the climate change, mainly over the use of water resources among different economic sector, which is a key to the security of electricity supply in the country.

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