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THE SCIENCE AND POLITICS OF CLIMATE CHANGE: IMPLICATIONS FOR SOCIO-ECONOMIC DEVELOPMENT IN NIGERIA.

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ABSTRACT.

This paper examined the causes and consequences of climate change worldwide and the process surrounding the insurgence in recent times. Information were obtained through the process of literature review, and past literature indicates that there has been increase in the attention towards solving the problems through adaptation and other mitigation processes. Furthermore, despite the magnitude of its likely impacts on the Third world Countries, until recently it has been viewed largely as an environmental concern, of little relevance to development policy making. Science teaches that climate change arises as a result of anthropogenic emissions of greenhouse gases being manipulated by man activities in his environment. However, there is much of political in the attention, and worldwide outcries relating to its possible effects and the ways out. For those who do not believe in the anthropogenic causes of Climate Change, mitigation measures are unnecessary, rather we should concentrate on adaptation measures. Those who believe on the other hand lay emphasis on mitigation measures while others are less concerned about any serious measures in readiness for its consequences. The implications of this dreadful occurrence on socio-economic development may include among others, a fall in agricultural output and a high reduction of water resources in various parts of the country. A refinement of early warning systems and formalization of adaptation techniques among others are strongly recommended.

Keywords: Adaptation, Climate Change, Global warming, Rural Production, Vulnerability

1.0 INTRODUCTION.

In recent times, human activities have caused, and are continuing to cause, great changes to the composition of the atmosphere. The major concern of both scientific and public communities is the enhanced greenhouse effect caused by anthropogenic activities. The findings of the Intergovernmental Panel on Climate change (IPCC) have shown that Climate change is already having strong impacts on human societies and the natural world, and is expected to do so for decades to come (IPCC,2007; Zakieldean,2009). Much has been written and argued about global climate change since its emergence in the late 1970s.

These range from total rejection to a gradual and reluctant acceptance to various debates and international conferences among others.

Various researches worldwide indicated a lot of changes and inconsistencies on matters relating to changes in the essential elements of climate over the years. For example, the works of IPCC,(1996), Adefolalu (2007),Ayoade,(2008) Nwajuiba (2011) among others focus on climate anomalies and changes over the years in both developed and developing nations. These observations range from climate variability, long term weather variations, rainfall anomalies to shifts in climatic patterns and what other scholars

'climatic accidents'. No matter what language we use, over the years, there has been climate change or variation in the past, in the present age and probably in the nearest future. The pressure mounted by the world's advanced countries (such as the United States of America, the United Kingdom, France and Germany) on climate change has definitely raised the awareness levels in the developing countries like Nigeria. For example, countries like Niger, Mali and Algeria have involved themselves in setting up early warning systems and specific bodies to recommend for their countries comprehensive analysis of, and stakeholder consultation on, policies and institutions to integrate and co-ordinate approaches for finding solutions. These bodies are to work with vulnerable communities at the local levels to work out adaptation strategies and establish early warning centers within their environment. Many countries in the sub Saharan Africa like Nigeria, Ghana, Sierra Leone and Zimbabwe, to mention a few, have also been engaged in climate change activities and negotiations. The countries are parties to both the United Nations Framework Convention on Climate change (UNFCCC) and the Kyoto Protocol. Currently, Sudan is leading the biggest negotiating group, the group of 77 and China, in the climate change negotiations to formulate new commitments in the post-2012 and to enhance the implementation of the convention (Zakieldeen,2009: 7)

Nwajuibu, (2011) indicated that the Nigerian environmental Study Action team (NEST) has been engaged for a quarter of a century with research, advocacy, and actions on the threats and opportunities with respect to the Nigerian environment. In the last five years NEST has been implementing the Canadian International Agency (CIDA) – funded Building Nigeria's Response to Climate Change (BNRCC) project. This is perhaps the most extensive and intensive

project on climate change in Nigeria.

However, a major component of the BNRCC has been to develop a National Adaptation Strategy and Plan of Action for Nigeria, in partnership with the Special Climate Change (SCCU) of the Federal Ministry of Environment.

Climate can be defined as the synthesis of atmospheric characteristics at a given location over a period of at least 30 years (Rosenberg (1992). Climate is more than the average weather conditions over a given area as it includes the variability over the same period. The Climate of a region depends on many factors including the amount of sunlight it receives, its altitude, topography, and how close it is to the ocean, and the climate of a region is never static, it varies around the mean or average state over a given defined period such as a month, season or year. Over a long period of time, climatic variations may be such that a shift or a change in the type of climate prevailing over an area takes place. In such a case, we say there has been a change in climate or a climate change. The common definition of Climate Change as given by IPCC,(2000) is

“A change of climate which is attributed directly and indirectly to human activities that alter the composition of the global atmosphere and which are in addition to natural climate variability observed over comparable time period”

On the other hand, Rosenberg et al, (1992) saw climate change as increasing atmospheric concentration of green house gases resulting from human activities which are capable of warming the earth. This change has led to various responses of both living and non living organisms in the environment. Climate change is ultimately a global issue, and the impact will vary from one region of the world to another and even within a given country. Scientists, historians and geographers have let us known that the climate of our known world

is gradually changing and that it represents one of the greatest environmental, social and economic threats facing the planet Earth. The measure of these changes are seen in global warming, rainfall anomalies, wind changes leading to increased hurricanes, cyclones, heat waves, dust storms, drought and flooding.

With various reports over the years, climate change is increasingly emerging as a serious threat to sustained economic growth. In the last five years for example, two major reports- the 2007 fourth assessment report (AR4) of the IPCC and stern review entered the public domain and simulated professional discussions to be reflected on development strategies and thinking. These two reports provide compelling evidences, analytical explanations of observed trends, and simulation model projectors drawing strong cause and effect linkage between human and socio-economic activities worldwide (Ojoye,2010).

The aim of this study is two folds. First, it is to examine the politics and scientific explanations surrounding the issues of climate and climate change over the years. Secondly it is to examine the components of climate change as affecting Nigeria, with a view to proffer solutions to the emerging climate related problems. The global climate change and its associated risks are serious issues for Nigeria most especially in the Northern parts of the country where precipitation is erratic and desertification is on the increase over the years. The basic questions still remain: what causes climate change? Is Nigeria prone to climate change? If yes, what are the likely effects of climate change/ and how ready are we to combat these effects?

2.0 THE CAUSES OF CLIMATE CHANGE

The problem of human induced climate change first came to the attention of the global

public and international policy makers. The Intergovernmental Panel on Climate Change (IPCC) published its first assessment report in 1990. This drew attention to significant increases in atmospheric greenhouse gas concentrations observed last 150 years.

Science teaches us that global warming and climate change have stayed, and that they arise as a result of variations in the earth orbital characteristics, atmospheric carbon dioxide variations, variation in solar output worldwide. This is a natural cause resulting from steady increase in the amount of energy emitted by the sun, energy intercepted by the earth, the energy absorbed by the atmosphere, volcanic eruptions and variations in solar output.

The other cause of this phenomenon is anthropogenic emissions of greenhouse gases such as Carbon Dioxide and Nitrous Oxide being manipulated by man activities in the environment. Man over the years has spewed gases into the atmosphere and the rate has been on the increase leading to major sources of atmospheric pollution. These are man made climate change resulting from increasing Green House Gas emission [CGH] caused by development factors such as economic growth, technological population and governance. Ayoade (2008) opined that a continual loading of the atmosphere with radio actively traceable gases such as carbon dioxide, methane, nitrous oxide, CFCs and other gases, could change the climatic condition of an area. These emissions arise from various development efforts of man such industrial and agricultural development, manufacturing, bush burning and emission of combustible products into man's environment resulting into various types of pollutions.

Ayoade (2008), however indicated that Carbon dioxide is only one of several greenhouse gases that human activities produce and it is estimated to account

about 55% of anthropogenically induced global warming. It could thus be said that both variations in solar activity affecting solar output and the greenhouse effect of anthropogenically produced gases may contribute to global warming and relative climate change worldwide. Ayoade, 2008:7) further attested that the role of greenhouse gases have often been emphasized at the expense of the role of natural forces due to variations in global solar activity. In most cases, the projected impacts of global warming are mostly not beneficial; attempts are thus being made to devise appropriate response strategies worldwide. These have been in form of mitigation and adaptation measures both of which have political undertones and socio-economic implications.

3.0 VULNERABILITY AND ADAPTATION TO CLIMATE CHANGE

Developing countries like Nigeria are particularly vulnerable to climate change because of the overwhelming dependence of their economies on natural resources, and their low adaptive capacity. Most land in Nigeria especially in the north is quite sensitive to changes in temperature and precipitations. Food security is mainly determined by rainfall, with more than 60% of Nigerians directly depend on climate sensitive resources for their livelihood (Olawepo, 2011).

Vulnerability according to Zakieldean (2009:4) is the potential to be adversely affected by an event or a change and ability to cope with or recover from its impacts. The extent to which climate change may damage or harm a system depends on the system's sensitivity and ability to adapt to new conditions. Physical vulnerability refers to exposure to stress and crises resulting from physical hazards, while social vulnerability refers to the inability of individuals and communities to respond to physical impacts. Vulnerability may also be considered at many

levels, including the individual, national or regional level. Apart from the general views on vulnerability in the Nigerian context, the following vulnerable groups deserve attention. These have been identified by Ayoade (2003:45 ,2008:10), Ojoye,2010:25), and Olawepo (2011:58). They include among others,

- (a) rural poor and local farmers in all locations in the country. This is because they mostly depend on nature for agricultural productivity due to poverty and in ability to access means of production that may reduce the likely effects of extremity of climate variations;
- (b) the people in the Sudano-Sahelian belts of Northern Nigeria. These locations have a range of ecosystems relating farming, water and social livelihoods. Throughout the region, water resources and rainfall variability are dominant. These underlying conditions are exacerbated by various human pressures which are also relating to climatic issues;
- (c) water resources as a sector. Climate change is expected to affect Nigeria's water resources through reduced groundwater recharge brought about by a projected decreased precipitation and/or increased temperatures and evaporation ,especially in the Northern States;
- (d) the rain fed communities of the South are also vulnerable due to a projected increased precipitations along the coast and excessive flooding;
- (e) the public health sector and human resource. More people are likely to be exposed to significantly increased tropical diseases such as malaria, waterborne diseases and heat related risks. The risk of transmission of diseases could increase substantially

in the coming years due to variability of climatic features; and human environment and environmental hazards. There is the likelihood of increased environmental hazards in various locations. The speculations include environmental hazards because their impacts, in conjunction with climate change, are likely to exacerbate people's vulnerability by weakening coping capacities and reducing options for adaptation.

Among the different options being proposed for solving climatic problems is the issue of adaptation to the impending changes. Adaptation is an automatic or planned activity that is proposed to minimize adverse effects of climate change, and which maximizes the accrued advantages. According to Zakiudeen (2009: 4), adaptation is the adjustment in natural or human systems in response to actual or expected climatic change or their effects, to reduce harm or exploit beneficial opportunities. Adaptation involve among others, changing processes, practices or structures, either automatic or planned, by individuals, households, governments and other stakeholders. The capacity to adapt depends largely on access to assets (including natural resources; and human, technological, social, physical and financial capital) and how well these are used (ibid).

The main consensus in various climate change conferences and convention is in the area of adaptation to changes. Burton et al (1998), summarized adaptation strategies into eight alternatives at various levels. These include:

(i) bear losses among the vulnerable communities; bearing losses may occur when the people affected have no capacity to respond in any way, to the impending impacts of

- (ii) climate change, the only option is 'doing nothing'; share losses among a community, especially traditional societies as well as tech societies;
- (iii) modify the threat; modifications may be in low reduction strategies on greenhouse gases as well as flood control order to slow down the effects of climate change;
- (iv) prevent effects A common for adaptation measures involves by communities, corporations, NGOs to prevent the effects of climate change;
- (v) change use; where the threat of climate change makes the continuation of an economic activity extremely risky, it is impossible, an alternative activity could be sought for. For example, substituting a less drought tolerant crop with varieties with less moisture needs or improved seedlings;
- (vi) change location; location of economic activities to a more favourable environment in order to reduce the effects and threats of climate change;
- (vii) indulging in continuous research; this will advance the process of adaptation and researches into new technologies; and,
- (viii) educate, inform and encourage behavioural change; this will enlarge peoples' perception of foresight, and make more people to prepare ahead of impending threats.

In Nigeria, various adaptation strategies have been suggested and are ongoing at various levels and locations. For example

Dabi et al (2005) have identified a number of adaptation options in Nigeria's rural communities especially among the local farmers. These include among others; the use of shallow wells to increase water supply, increased mulching on farms, development of small-scale irrigation initiatives and planting drought resistant crops. Others include, crops and animal diversification, development of alternative local fish ponds and income diversity into nonfarm activities.

4.0 EVIDENCES OF CLIMATE CHANGE

That the climate of the world is changing is not new and that this present change has come to stay. Evidences of these changes therefore cannot be over flogged in a country like Nigeria. For example, the Sahelian Zone of Nigeria is now extending southward into guinea savannah zone leading to increased desertification threat. There is now also misnormal behaviour of the ITD, floods and drought are now common especially in the north, while coastal cities are experiencing increased rates of ocean surges. The truth about climate change worldwide is that no matter what language we use over the years, there have been various changes even within our environment. Ayoade,(2003) supports the view that increases in atmospheric concentrations of Carbon Dioxide and other greenhouse gases and the resultant global warming and projected changes in climate will have impact on natural terrestrial ecosystems in diverse ways. Changes in temperature, precipitation and relative humidity will cause ecological stresses in marginal areas and will affect the dynamics and distribution of plant species, insects and animals (Jeje, 2009). Apart from this, Adefolalu (2007) has shown that there is ample evidence already that climate change is taking place at the local level in Nigeria, especially in the Sudano-Sahelian ecological zone with a substantial

reduction in rainfall distribution over the years.

Global change and its associated risks are serious issues for Nigeria most especially in the Northern states where precipitation is erratic and temperature is usually on the high sides. There is a growing evidence of a shift in climatic patterns. Although governments around the world have embarked on programmes designed to cut greenhouse gas emission that fuel climate change (Ojoye, 2010). Furthermore, observational evidences in various weather stations and locations indicate that changes in the 20th century have already affected a diverse set of physical and biological system. Examples of these changes include the shrinkage of glaciers, coastal storm surges, high temperature, high precipitation and intense wind among others (McCarthy, et al 2001, Ojoye 2010:5)

The work of Nwajiuba (2011:3) showed that there are four climate issues or related issues, which BNRCC has isolated and which are emphasized in the adaptation strategies. These are temperature, rainfall, extreme weather events and rising sea level. The experience in the last decade in Nigeria, which are projected to increase in the coming decades, include rising average temperatures all over Nigeria, but most significantly in the Northeast of Nigeria.

The coastal regions have positive moderating effects of the ocean on the rising temperatures hence this is milder in the coast. In Nigeria's north, especially the Northeast, the rising average daily temperature is more critical and areas around Maiduguri already experience significant increase in the number of days with mean average (minimum and maximum) temperature above 40 degrees Celsius. This is projected to increase with adverse consequences for human livelihoods as well as crops and livestock production. Around some of Nigeria's most important food producing areas of the Savannah

including Nasarawa, Benue and Taraba, Plateau, Gombe, and Niger states, but also Borno State among others, rising temperatures could be a disincentive to labour productivity, as we know that the main source of far energy is the human labour. The low level of mechanization and huge rural out-migration will hamper domestic production and further compromise food security. Such crops as maize, yams, onion, tomatoes, potatoes, sorghum, millet, cowpea, and oranges are among the most potentially affected. (Nwajiuba, 2011 :2)

The following are few examples of various variations that are known to us in recent years, and these are clearly documented by the works of Ojoye (2010:23). They include:

- (i) Shifting in the sahelian zone and increase in desertification rate down south in North Africa and most especially in the northern parts of Nigeria.
- (ii) Uncontrollable famine in Sudan/Sahel region due to excessive drought in the last 20 years, examples include Somalia, Ethiopia, Sudan and north Niger.
- (iii) Flooding and over flooding in oceanic countries in the last 10 years eg Tsunami experience that cut across China, Japan, and parts of India and other oceanic countries..
- (iv) Rise in temperature and heat waves worldwide and late onset of rain in some places like Sudan and Somalia.
- (v) Melting of ice bergs in Arctic and Antarctic circles at alarming rate in the last 2 decades.
- (vi) Rainfall anomalies and storm dust over Nigeria in early 2010.
- (vii) Floods in both North and South Nigeria and increased erosion in the South-South (Nigeria), the

worst occurring in 1999 and 2000 with loss of life, property and agricultural produce amounting to billions of Naira.

- (viii) Hot dry season with record breaking temperature exceeded 50 Centigrade in North East Nigeria in 2000 resulting into thousands of deaths.

Apart from the above, there are regional occurrences that deserve our attention. For example, in the first two weeks of August 2010, calamity struck in Russia, China and Pakistan. In Pakistan there were excessive rains that wiped away many villages. Over 1,584 people were killed, 1 million lost their homes to flood and 20 million people were affected, and there were outbreak of water borne diseases. At the same time they were experiencing summer heat in other parts of the country. This was alien to their country, least not in the last forty years. The Russian case is that of excessive heat leading to burning hectares of land and communities. Despite technology, hundreds of people were killed while resources running to billions of dollars were destroyed. This also affected the whole of Moscow for a week without people breathing air and space (Olawepo 2011:64)

Similarly in September, 2010 in China (Gonsou province), mudslide after torrential rain claimed more than 1200 lives, the rain caused the land slide that swallowed villages while hundreds were made homeless and 600 were missing. In Portugal in the same week, temperature rose to 110 degrees Fahrenheit for the first time in twenty years leading to wild fire killing more than 100 people. In Saudi Arabia, 10 people died in January 10th 2010 due to flood where they were expecting dryness during the time of the year. Coming back home in Nigeria, there have been various effects of climate change and global warming, ranging from excessive

dryness to rainfall anomalies and flood. In August 2011 for example, there was the case of consecutive rainfalls for days in both Lagos and Ibadan with a loss of about 200 lives. Residents of Eti Osa beach in Lagos are also experiencing fast ocean surges eating into inland, destroying infrastructures and means of livelihood during the months of August and September 2011 NIMETS (2011, CNN,2011).

An impact of climate change that is becoming increasingly important is the aspect of heavy precipitation events, specifically their reference frequency and spatial distribution in a warming climate. Future increases or decreases in extreme potential to impact broad aspects of society through flooding and related natural disasters like the ones recently experienced in both Pakistan and Somalia in 2011. The Intergovernmental Panel on Climate Change (IPCC) (2001) projected that by the year 2050, the number of countries that will be faced with water stress will rise to eighteen (18) affecting about 600 million people with unprecedented impacts on the socio-economic development of many more countries in the sub Saharan Africa. This will invariably affect their food production levels, degradation of shared fresh water ecosystems and competing demands for shrinking natural resources to mention a few.

In view of these anticipated climate change related problems, further researches into climate change and improved early warning signals should be encouraged in all African countries, especially in our country Nigeria, where the perception levels of people on climate change is assumed low. Nigeria is the most populous country in Africa and one of the most vulnerable countries to climate change and climate variability. This situation is aggravated by the interaction of multiple stresses occurring at various levels such as endemic poverty, institutional weaknesses, limited access to capital, ecosystem degradation, coastal environmental pollution

and other complex disasters and conflicts in various locations.

5.0 THE POLITICS OF CLIMATE CHANGE AND GLOBAL WARMING.

Despite the various evidences of either existing climate change or a projected change due to existing information worldwide, there are political undercurrents to the scientific issue of global warming and climate change especially with regards to its causes and how to deal with the problem. The climate scientists themselves do not agree on the causes of the ongoing changes, especially whether it is man induced or natural. The situation has been more confounded by press reports on the projected impacts which tend to be alarmist and ignore the various assumptions of models used by scientists to make their predictions. Evidences across the world have shown that climate change is now a political issue. However, as yet there is no substantive framework for policy which offers coherence and consistency as to how national governments should cope with the long-term political challenge of climate change (Giddens, 2008). There have been several outcomes, part of which is organized conferences and public discussions instigated by the developed world. . Public discussion of climate change tends to be partial and disparate. Loosely connected debates hinge on the evidence that climate is occurring and estimates of its potential impacts; the prospects for agreeing an international framework for an economic response to, for instance, carbon trading; futurology surrounding the potential for technological innovation that could solve the problem (Giddens, 2008:3).

There have also been various political positions worldwide and the issue of climate change is being handled differently. Firstly various government bodies and international organizations have been organizing

conferences and debates in the last ten years to publicize and tackled the issue. On the other hand, some countries are idle and careless to focus on the problems of climate change. They are probably waiting for the industrialized world to finance various programmes and project relating to climate change. Giddens (2008) indicated that very few aspects of the climate change debate are uncontroversial, and the controversies between protagonists are often intense and even bitter. By their nature, it could be argued, democratic countries tend to be driven by the immediate concerns of voters at any one time, using climate change issue propaganda to winning votes. For example in Britain and the U.S.A, there has been increased clamor for 'increased greenhouse' taxation and asking for politics of returning to planning to reduce the effects of climate change.

In the world of politics relating to climate change, four different positions can be distinguished. First, there are the climate change skeptics, who claim the case that present -day processes of global warming and climate change are produced by human activity is not proven. Fluctuations in climate, they point out, produced by natural causes, has been a constant feature of world history. The current situation they assert is not different. Other skeptics accept that climate change is happening and that it is humanly induced, but argue that the threat has been exaggerated. For them, other world problems such as poverty, Aids, or the possible spread of nuclear weapons, are both more worrying and present more pressing dangers than climate change. The skeptics have dwindled significantly in numbers in recent years as the science of climate change has progressed, but they still get a significant hearing (Giddens,2008:6).

Second, there is a mainstream view (or, more accurately, spread of views) about climate change, represented above all by the publications of the IPCC. The IPCC has had

an enormous influence over world thinking on climate change-in so far as there is a consensus about its extents and dangers; it has played a large part of it. Indeed, that is its declared aim, to gather as much scientific data as possible, subject it to rigorous review, to reach over all conclusions on the state of scientific opinion. Those who are skeptical about climate change see the IPCC as the enemy of free and proper scientific thinking. For them it has become an establishment determined to see the world through its own eyes, the guardian of orthodoxy.

The third groups are the radicals who argue that there are threshold effects in climate change, as the naturally induced climate fluctuations we know about from the past reveal. There are those that believe that the current global climate change is not real and are only temporary. This is because climate change has been occurring before man-made emissions of greenhouse effects could have any impact and that studies have shown that the earth's climate had in the past moved from periods of warmth to cold and back again without any man made cause (e.g. the 1910-1945 warming was replaced by cooling up to the late 1970s). Some of this group however believes that it is already too late to avoid dangerous climate change. They had best concentrate most of our energy on preparing to adapt to it and cope as best as can.

The fourth group is people who believe that the current global warming was caused by the developed countries in their search for knowledge and economic development. Therefore they should fund mitigation measures and adaptation strategies in developing nations. This group also believe that it is a form of groupings on the basis of alignment i.e. it is a situation for developed countries to draw alignment for themselves among the poor countries.

For those who do not believe in the anthropogenic causes of global warming and Climate Change, mitigation measures are unnecessary, rather we should concentrate on adaptation measures. Those who believe on the other hand lay emphasis on mitigation measures and also, should be spearheaded by the industrialized countries which are the greatest emitters of greenhouse gases and consume most of the global resources. Developing countries argue that sustainable development is a good idea but it does not address the problem of intra-generational equity in terms of global resources utilization. To them the environmental effects of development are currently not fairly distributed (Ayoade, 2008:9)

The questions still remain:

- (a) Are the phenomena of global warming and climate change real, myth or mere propaganda?
- (b) If they are real is the cause man made or natural, or both?
- (c) Is it (or not) a way by the World's strongest countries (rich) to force the (poor) Third World Countries shift their allegiance and bases or support?
- (d) Can we do anything to stop global warming and climate change?
- (e) What will be the impacts of global warming and climate change on the economy of the Third World Countries?
- (f) How should we react to global warming and climate change in our local environment?

Correct answers to these questions require scientific researches that are totally devoid of politics. What we need is good funding, better attention and lots of preparation incase it becomes reality in our world and in our time.

6.0 THE LIKELY EFFECTS OF CLIMATE CHANGE ON RURAL PRODUCTIONS AND SOCIO-

ECONOMIC DEVELOPMENT IN NIGERIA.

The Federal Ministry of Agriculture in conjunction with the Nigerian Meteorological Society (NIMET) on 17th February 2011 predicted early and heavy rainfall in Nigeria. This is true but we must be expecting excessive flooding of our water beds to be followed by extensive drought in the coming years. After now, Climate change is expected to worsen the vulnerability of the poor through its impact on their livelihoods, water supply situations, health conditions food security and economic opportunities. For example, the IPCC (2001) opined that the poor are most at risk from the effects of climate change and identified some poverty related ones. These include reduction in crop yield that may result from variation in temperature, flooding, decrease in water availability and new/changed insect pest incidence. Others are the adverse effects on food security, employment and income and exposure of people to new health risks. While Africa is vulnerable to the predicted effects of climate change, the lack of industrial activities in many countries means it contributes little to greenhouse emissions; there is variation in the levels of the impacts. Yet, many countries depend on natural resources that are sensitive to changes.

Ayoade (2008) had identified the general impacts of climate change especially on issues relating to Global Warming. According to him, Palaeoclimatological studies indicate that the pattern of the general circulation of the atmosphere and the characteristics of global and regional climates will be different in a warmer earth from what we currently have. This may herald significant changes in global and regional climates in the following ways.

- (a) a shift in the boundaries of climatic zones,
- (b) increase in the length of the growing seasons in the middle and high

- latitudes that may allow the successful cultivation of new crops,
- (c) increase in precipitation extremes giving rise to increase in the occurrences of floods and droughts,
 - (d) increase in global average temperature and consequent increase in heat waves especially in urban areas and the melting of polar ice and glaciers in the coming years,
 - (e) tendency towards less severe winters and decrease in the occurrence of cold waves,
 - (f) possible increase in the occurrence of storms including tropical cyclones; and,
 - (g) a general rise in sea level as a result of thermal expansion of ocean water and melting of polar ice and glaciers of between 0.09 to 0.88 metres within a century leading to the inundation of low lying coastal areas and some oceanic islands.

Having viewed the likely impacts of climate change and global warming globally, it is essential to expatiate on the likelihood effect of a projected climate change on Nigeria, not minding the politics surrounding the issues of climate change. That a large proportion of Nigeria is vulnerable is a reality, and thus what should concern us is the possibility of reducing the effects on our environment. Bako (2007) and Adefolalu (2007) have identified some of the likely effects of climate change in Nigeria in the nearest future based on the various weather reports within the shore of the country. They include among others:

- (i) Nigeria is expected to witness an average 15-20% reduction in agricultural production in the next 3 decades due to drier conditions and crop damages. The major impacts on crop production will

come from change in temperature, moisture levels, ultraviolet radiation, carbon dioxide and increase pest and diseases. Similarly, high temperature in the Northern States may have detrimental effects on the development stages of some crops especially grains, thereby reducing yields and quality overtime.

- (ii) Livestock production will be affected negatively as the North becomes drier and there is possibility of desertification increase in the North as well as increased risks of fire outbreaks. Since water resources are linked with climate, the prospect of local climate will have serious implications for water resource development and utilization in Nigeria. For instance, the Lake Chad basin may dry up to capacity that is less than 1/4 of the existing water level and fishing would drastically reduce.
- (iii) Rivers Niger and Benue would reduce drastically, with low fish output and this may further affect electricity generation in Nigeria more in the nearest future.
- (iv) In recent years, it has become clear that climate change will have direct and indirect impacts on diseases that are endemic not only in Nigeria, but in other tropical countries of the world. Warm climate may increase the spread of disease like malaria, skin problems other environmental health disorders and the latest fear of humanity-cancer. The IPCC report of 1988 acknowledges that climate change will have an effect on vector-borne diseases in

African continent, Nigeria inclusive.

- (vi) Loss of natural habitats and wildlife in the Savannah and rain forests are also eminent. This may result from the effect of desertification which will be on the increase due to excessive drought and dryness. Desertification will essentially reduce potential vegetative productivity in both the savannah and the forest zones.
- (vii) Excessive flooding may be on the increase in the coastal locations as well as in the rain forest regions. The recent flood in Lagos and Ibadan are examples of what we may experience in the nearest future.

Apart from the above socio-economic implications of climate change on the Nigerian economy, the various politics of climate change can also have effects on the socio-economic life of the Nigerian citizens. Nigeria, as at today has been involved in various debates in both national and international forums. This has geared up various attentions on both adaptation and mitigation measures especially within the agricultural and industrial sectors. A positive politics of climate change depends on us deciding that politics works, that is how we focus collectively on a different future, and in focusing on it, make positive things happen. A positive thinking may accelerate the pace of development especially in the area of preparation that will lead to improved productions in agriculture and consequent food security and a cleaner industrial production. The politics may also have negative effects in that we may be slow in taking action with ill prepared motives with varying disasters. It may also mean more funding on climate related projects at the expense of more productive ventures. Unless

leaders of developed world, whose countries account for more than 80% of current greenhouse gas emissions, make a legally binding commitment, countries like Nigeria will continue to suffer the effects of climate change.

7.0 THE WAY OUT FOR NIGERIA.

The problems at hand need urgent attention both from the people and the Government. Rather than panic, we need to take immediate action, and make adequate preparation to reduce the risks. The following steps are essential for us to follow in order to create an enabling environment for implementing adaptation options:

- (a) establishment of monitoring and early warning systems by metrological Authority and Government Agencies is urgently advocated. This could be an establishment of a climate change center. The center could be saddled with researches, monitoring and overseeing all aspects of climate change relating to the country at large.
- (b) The impact of climate related disasters recently experienced in the country is very high and thus, the provision of timely warning by NEST, NIMET and NESREA could help reduce the projected impacts; the Government should therefore finance these agencies very well to enable them carry out their constituted duties efficiently;
- (c) the Federal Government should make landuse laws consistent to encourage proper land use management techniques that would protect crop productions on a large scale; this would reduce the likely effects of climate change on crop productions especially among the rural farmers;
- (d) introduction of climate change information into educational curricula in schools, universities and in our

religious institutions will help to educate people and expand their perception;

- (e) amend and/or develop funding policies which suit the conditions of the poor. There is the need to work with vulnerable communities at the local levels and take a participatory approach to project planning. This is very important and can generate valuable lessons, not only for adaptation success but also for sharing knowledge/experiences with vulnerable communities within the country;
- (f) formalize adaptation techniques among our local farmers through proper development of indigenous knowledge in agriculture with improved seedlings, storage facilities and modernization; the government could also develop funding policies which suits the conditions of the poor;
- (g) emphasis on the development of alternate energy power source especially in the usage of natural gases in thermal stations, this would reduce dependency on hydro power which may face downward trends in efficiency as a result of drought and low water levels;
- (h) encourage environmental friendly productions that will reduce gaseous emissions in industries as well as on our roads, Intensive research into energy usage and alternate renewable energy at household and industrial levels;
- (i) efficient storage and utilization of water resources need to be emphasized especially in the drier locations in the country;
- (j) the country must address the population factor in the development

process to reduce the share impact on the population on the environment; and
(k) refinement of early warning system through proper utilization of Nigeria satellite system.

If these recommendations are considered in planning and in a comprehensive national sustainable development strategy then the process of integrating adaptation is more likely to be effective.

CONCLUSION

The problem of human induced global warming and climate change has dominated the world's attention in the last ten years. Despite the magnitude of its likely impacts on the Third world Countries, until recently it has been viewed largely as an environmental concern, of little relevance to development policy makers. Climate change or global warming has become a new reality, with deleterious effects: seasonal cycles disrupted, as are ecosystems; and agricultural water needs and supply, and food production are all adversely affected. Global warming (climate change) also leads to sea-level rise with its attendant consequences, and increasingly fiercer weather, increased frequency and intensity of storms, floods, hurricanes, droughts, increased frequency of poverty, malnutrition and series of health socio-economic consequences. It has cumulative effect on natural resources and balance of nature (BNRCC, 2008).

Recent happenings in Nigeria have shown that the impact of climate change can be vast. This means that some sensitive ecosystems such as the Sahel Savanna will become vulnerable because warming will reinforce existing patterns of water scarcity and increasing the risk of drought in Nigeria and indeed most countries in West Africa. Well, the country's aquatic ecosystems, wetlands and other habitats will be overwhelmed problems for an already

impoverished populace. Similarly, based on the Intergovernmental Panel on Climate Change (IPCC) projections, the humid tropical zone of southern Nigeria, which is already too hot and too wet, is expected to be characterized by increase in both temperature and precipitation, especially at the peak of the rainy season in the coming years (BNRCC, 2008; 2). This and other occurrences have shown that climate change is a reality and not a myth

Even though there are lots of politics on climate change globally, the world should not wait endlessly to extend the influence of this "monster" to destroy our world. The developing countries should endeavor to lay emphasis on various adaptation measures, and if these are considered in planning and in a comprehensive national sustainable development strategy, then the process of integrating adaptation is more likely to be effective.

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