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CHALLENGES OF CLIMATE CHANGE AND INDUSTRIAL SECTOR EXPERIENCE: A REVIEW OF EVIDENCE FROM NIGERIA

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ABSTRACT: *The world climate pattern has continued to generate serious concern in the recent times especially with the increasing effect of human activities on the global environment. Nigeria, as an integral part of the world also had its own share of the evolving challenges of the climate change phenomenon (such as flood, rising sea level and extreme weather events, drought and excess rainfall, temperature rise and precipitation among others)especially its effect on sensitive agricultural resources and production.Therefore,with relative few studies and dearth of information on climate change activities towards industrial sector especially in Nigeria, the study decided to explore the literature and review various challenges of climate change vis-à-vis the experience of Nigeria's industrial sector. Based on the reviewed studies, the industrial activities had negative experience with challenges of climate change in Nigeria, with many of the climate-sensitive productive materials and critical infrastructure such as agriculture and coastal resources, pipelines, road networks and power plants among others,(that were agents of industrial production) negatively affected. Hence, this reduces the total output of the sector. However, a comprehensive adaptation process of mitigating the negative effect of climate change on Nigeria's industrial sector is sacrosanct.*

KEYWORDS: Adaptation Measures, Green House gasses, Climate Change, Industrial Sector, Nigeria.

INTRODUCTION

The Earth is strategically located and close enough to the sun to get substantial energy, but also far away enough to prevent severe scorching this makes the conditions of the earth perpetually perfect (Gunther, 2005). These conditions according to the author are kept constant by a layer of greenhouse gases in which the earth is enclosed. This layer keeps the earth warm, shielding it from the cold of the universe; this effect is commonly known as the greenhouse effect. The gases: Carbon (iv) oxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O) and fluorinated gases are the main drivers of the greenhouse effect and they enter the atmosphere through fossil fuel energy use (oil, natural gas and coal), solid waste, trees and wood products, and also as a result of chemical reactions such as cement production (Gunther, 2005). Meanwhile, the Intergovernmental panel on climate change (IPCC) (2007) defines climate change phenomenon as statistically significant variations that persist for an extended period, typically decades or longer. It includes shifts in the frequency and magnitude of sporadic weather events as well as the slow continuous rise in global mean surface temperature; while Ozor (2009), defined it as change in climate over time, whether due to natural variability or as a result of human activity and is widely recognized as the most serious environmental threat facing our planet today. Aside these definitions, Nasiru (2009), viewed Climate Change as a change in weather condition that is attributable directly or indirectly

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to human activities that alter the atmospheric compositions of the earth, which eventually leads to global warming. He further stated that the phenomenon has become a reality with changes in weather patterns that are capable of upsetting seasonal cycles, harsh ecosystems and water supply, which affect the agricultural farming systems, food production, sea level rise and flood, landslides, drought and famine among others. Climate Change phenomenon has continued to generate serious concern in the recent times especially with the rising level of carbon and emission of other Green House gasses, due to increase in human activities across the globe (Gunther, 2005; Dutse & Ibrahim, 2013).

The major issue that currently constrains proper climate change adaptation in Nigeria is the lack of implementation of adaptation framework for climate change at the National, State and local government level. This phenomenon has become more threatening, not only to the sustainable socio-economic development of any economy but also to the totality of human existence (Dutse & Ibrahim, 2013). Nigeria, as an integral part of the world is not left out of the challenges of climate change. Although according to Yahaya, *et al.* (2011), Nigeria is not regarded as a major player in the green house gas emission compared to other developed countries but contributed to the depletion of the ozone layer through uncontrollable gas flaring emission by multinational oil companies in the south-south region of the country. Climate change also poses both immediate and long term threats to the life support systems on which we all depend. These include food, water, habitat, health, ecosystem services and critical infrastructure such as energy, transport and coastal protection. Jones *et al.* (2009) revealed that higher temperatures also have negative effects on industrial output, aggregate investment and economic growth in poor countries, and as one such country, Nigeria is likely to be adversely affected due to its low lying coastline that is highly populated with a heavy concentration of GDP generating industry and infrastructure in many parts of the country (see also Dutse & Ibrahim, 2013). Based on the international standard industrial classification (ISIC) of all economic activities, the United Nations (1990), refers to industrial sector as one of the major centers of economic activities in any economy with its major sub-sectors as manufacturing; mining and quarrying; electricity and power; construction; transport and communications; tourism and recreation; wholesale and retail trade; real estate and agro-allied among others. This, ISIC set by the United Nations is similar to what operate in the developing world in respect of industrial classification of economic activities. Unlike the service sector, almost all the industrial activities are sensitive to climate change (United Nations, 1990; Lashof and Tirpak, 1990).

Meanwhile, the assessment by IPCC (2001), revealed that most of the research conducted has focused mainly on agriculture, particularly crop yields and climate change, but the relatively few studies on climate change activities and industry especially in Nigeria has necessitated this study with review from extant studies.

Challenges of Climate Change in Nigeria

Climatic change is not a problem that has appeared overnight, it has been in existence since scientists first alerted the world on the dangers surrounding the climate disorder. The changes in nature have serious implications for human and economic system. Gunther (2005), estimated the potential economic damage caused by the effects of global warming to amount to hundreds of

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billions of dollars each year. This study also reviewed some of the various challenges caused by climatic change in Nigeria as follows.

According to Confalonieri *et al.* (2007a), floods are low-probability and high- impact events that can overwhelm physical infrastructure and human communities Flood can also be as a result of increase in the frequency and intensity of heavy rainfall events caused by atmospheric changes (Ezeabasili & Okonkwo, 2013). Nigeria had experienced a major flooding in the year 2012 which affected 21 states and eventually led to the displacement of thousands, the destruction of homes, farmlands and infrastructure – particularly roads, electric poles and pipelines, which resulted in shortage of food production in the second half of 2012 (Okonjo-Iweala, 2013; Ujah, 2009).Also, about $13 billion is at risk of loss through rising sea level which resulted into flood in the Niger Delta region of Nigeria. The Increase in rainfall in Southern Nigeria combined with irregular rainfall events also sparked off flooding, which negatively affected mining operations as well as offshore drilling in that region(Federal Government of Nigeria(FGN), 2003). Similarly, DFID report of 2009 also showed that Manufacturing Sector suffered a great loss through flooding which inhibit its ability to meet production target. This is because the sector depends largely on agricultural products as inputs that are vulnerable to climate change. The report also indicates that rising level of sea increase the chances of flooding which is capable of destroying infrastructure, as well as productive raw materials for manufacturing plants, which may hinder productivity and efficiency in the sector. Also corroborating FGN (2003) and Department for International Development(DFID)2009) reports, Yahaya *et al*. (2011) submitted that global warming effect on the climate- vulnerable sectors of the economy such as agriculture and coastal resources that provide inputs for industry had threatened infant industries and the small and medium scale enterprises. This development according to the authors will adversely affect the country's GDP by way of inability to have access to manufacturing inputs for operation.

Forest destruction also constitutes a confronting challenge which exposes the environment to more severe effect of climate change. Forests purify the air, improve water quality, keep the soils intact and provide the teeming population with food, wood products and medicines as well as providing shelter to many of the world's most endangered wildlife species (Gunther, 2005). Also according to the author, an estimated 1.6 billion people worldwide rely on forests for their livelihood, including 60 million people who depend on forests for their subsistence. He further stated that forests also protect the earth from climate change by absorbing huge amounts of Carbon (iv) Oxide (CO_2) which is a major source of pollution that causes climate change. Also according to NEST (2008b), Climate change is expected to potentially increase the incidence of pests and diseases that decimate forests trees. The study also adduced reasons for gradual disappearance of forest tree species in the various ecosystems of Nigeria such as Iroko tree and oil bean in the South East, various mahogany species in the Southwest, the baobab and the locust bean in the northwest and gum Arabic in the Northwest Forests such as rapid destruction through logging and burning for farming or livestock purposes. These activities according to NEST (2008b) are quite responsible for the release of huge amounts of Carbon (iv) Oxide (CO_2) and other harmful greenhouse gases into the atmosphere which ordinarily could have been prevented by the forest. Gunther (2005), also in his own submission, reported that Scientists claim that 20 percent of global carbon emissions that come from deforestation are greater than the combined emissions from every car, truck and plane on the planet. The implication is that instead of taking refuge in our forests in

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solving the climate change crisis, deforestation is making the situation worse. Similarly in support of Gunther submission, Watson (2000), in Nwanakoala & Osigwe (2013) stated the fact that forests which had been the source of help to filter and purify the air may soon be put at risk with bush and forest fires, which may become frequent and more intense to orchestrate climate change. Also in the same vein, Yahaya *et al.* (2011), posits that forest remain the abode for wildlife and if the forests disappear, the wildlife goes with it. This makes sites of tourist attractions in Nigeria more vulnerable to climate change and consequently leads to loss of patronage and revenue to tourism industry.

Climate change also leads to food insecurity. The impact is greatly felt on food availability, accessibility and utilization in many parts of the world (Dutse & Ibrahim, 2013). More than 800 million people in tropical and sub-tropical countries are currently food insecure (UNO, 2010). This is as a result of increased crop failure and loss of livestock. The challenge of food insecurity from Climate change experience is also expected to affect human health and livelihoods, people's purchasing power at household level and more so, as, Crops occupy nearly 94 percent of the agricultural sector in Nigeria (Dutse & Ibrahim, 2013). While some areas are already experiencing loss in the length of growing days by 20 percent, growth rates of crops like maize, guinea corn, millet and rice are being depressed through rise in temperature. In addition, Pests and crop diseases can also spring up in response to climatic variations which may hamper food storage (Dutse & Ibrahim, 2013). Dutse & Ibrahim (2013), also submits that warming of the environment makes the challenge of food insecurity worse off by making storage of root crops and vegetables increasingly difficult for those without access to appropriate preservation techniques, while emphasizing Food security as highly dependent on the age-long ability of farmers to be able to predict when they are able to plant their crops. This has misled some farmers to plant early, leading to the crops being damaged by an unexpected weather condition in form of dry spell. This combined with the late arrival of rains orchestrated by climate change often led to harvest failures. This situation usually forces many farmers in Nigeria to plant afresh and abandon earlier plantations (Dutse & Ibrahim, 2013). Also, the extreme weather events like storms, heavy winds and floods may ravage farmlands, leading to crop failure and food shortage (Adejuwon, 2006). In addition, the warming trend According to Adejuwon also hinders livestock production with reduction in animal weight and diary yield, as livestock were subjected to long treks to find water and grass. The author further gave an instance of the persistence drought situation in the 1970s and the 1980s in Nigeria where close to 1 million livestock were lost, which culminated into shortage of meat and dairy supply throughout the country. Also in the same vein, desertification and the reduction in the Lake Chad water levels (as a major source of irrigation water) are likely to cause food shortage in the Northern Sahel region, which accounts for 26.6 percent of Nigeria's land area (Boko *et al.*, 2007), while Agricultural practice in Southern Nigeria is also affected by climate change because of low elevation structure of the area, which subjected it to salt water intrusion as the sea level rises (FGN, 2003). The alarming increase in the occurrence of flood, erosion, bush burning, pests and diseases, increased temperature, erratic rainfall and drought in this area makes agriculture not viable, which also affected agricultural productivity, and forces many inhabitants to relocate (FGN,2003).Also, supporting climate change-food insecurity argument, the Millennium Ecosystem Assessment in 2005, established that agricultural intensification has not met the rising demand for food in most part of the world due to activities of climate change, thereby causing food shortage and insecurity.

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Rising Sea level and extreme weather events are another climate change oriented challenges of the environment, with evidences that glaciers are retreating worldwide, the Artic Sea ice is thinning as well as the increasing incidence of extreme weather events in some parts of the world due to climate change (Watson, 2000).According to Watson, many islands and coastal cities around the world are capable of submerging following rising levels and incursion of sea waters to the land while People living in and around these areas would probably have to relocate, unless projects are put up to hold back the seas from transgressing onshore. In Nigeria, the challenge of rising sea level also affect the supply and distribution of manufacturing products through destruction of major channels such as road networks and Terminals by excess flood and erosion from rising sea level. Thus, affecting the wholesale and retail trade business (NEST 2006).Also, Tourism especially beach-based is negatively affected. The beaches and lagoons are usually taken over by excess water due to rise in sea level, as in the case of Lagos bar beach and Lekki Island in Nigeria (DFID 2009); while in 2010, 90 per cent of all the flights at Nigeria's airports were also cancelled or delayed due to a thick fog in the atmosphere resulting from rising sea level and extreme weather events. The development poses serious danger to flight operations in Nigeria Airports (Adebola, 2010).

The persistence of drought and low rainfall effects of climate change were also experienced in Nigeria with drying of streams and rivers in some communities, which ultimately leads to the search for water in the neighboring communities with its attendant man hour losses and propensity to trigger conflicts and hardships on people (Ozor, 2009). This situation according to the author aggravates the living condition of many people as incidence of drought alters the variability and quantity of available water for the growing population, which also triggers distributional conflicts and poses major challenge to water management systems in Nigeria. Anyadike(2009), also reported that drought provoking conflict had resulted into death of 200,000 and displacement of over 2 million people in Dafur, while the first climate change war occurred in both Taraba and Adamawa states in Nigeria between Fulani cattle rearers and the farming communities over graze land and water bodies was largely due to drought(Ozor, 2009). This conflict according to Ozor led to several deaths of Farmers and Pastoralists in the region.

Confalonieri *et al. (*2007b) also identified the effects of climate provoking drought on health to include sudden deaths, malnutrition, infectious and respiratory diseases .He also asserts that drought situation is capable of reducing variety in diets and overall consumption, which can lead to micronutrient deficiencies. Countries within the "Meningitis Belt" in semi-arid sub-Saharan Africa had experienced the highest endemic and epidemic frequency of meningococcal meningitis in Africa, although other areas in the Rift Valley, the Great Lakes, and southern Africa were also affected (Confalonieri *et al.*, 2007b). The authors further explained that spatial distribution, intensity, and seasonality of meningococcal (epidemic) meningitis appear to be strongly linked to climate and environmental factors, particularly drought.

Apart from reporting on the effect of climate change provoking drought on certain health issues, confalonieri *et al.* (2007c) also expressed the possibility of human exposure to numerous health challenges through changing weather patterns (such as temperature, precipitation, sea-level rise and more frequent extreme events) and indirectly through changes in water, air and food quality and changes in ecosystems, agriculture, industry and settlements as well as the economy. Some of

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these health challenges, which characterizes climate change according to the authors includes malnutrition, malaria, increased deaths, infectious diseases and injury, diarrheal, increased frequency of cardio-respiratory diseases (due to high concentrations of ground-level ozone in urban areas related to climate change) among others. To buttress the strong association between varying health challenges and climate change, Confalonieri *et al.* (2007c) stressed that malnutrition would increase due to climate change, while in their own quantitative assessment on both regional and global health challenges and climate change, Campbel-Lendrum & McMichael (2007), discovered a wide range of factors, including climate change, which responsible for high amount of premature morbidity and mortality both at regional and global level. Similarly, Adebola (2010) also discovered high incidences of Meningitis in Nigeria since the year 2009 as a result of excessive heat, with over 200 people killed by the disease in both Nigeria and Niger Republic in the year 2009. There were also several reported cases of cataracts (eye disease) in the Northern parts of Nigeria due to low cloud cover and greater intensity of the solar radiation; increased cases of Malaria and Typhoid due to increased rainfall and temperature in certain parts of the country; increased cases of water borne diseases such as cholera and dysentery among others, due to urban flooding and improper disposal of wastes (Anyadike, 2009).

On the other hand the low rainfall effect of climate change also affects current thermal electricity generation that relies heavily on the availability of flowing and cooling water (Smith and Tirpak, 1989; Solley *et al.*, 1989); while output of hydro-electricity generation plant may be reduced as well and this explains why the supply of water to Kainji and Shiroro dams for hydro-electricity generation in Nigeria (to boost industrial operation) is usually low, with shrinking amount of water whenever there is a reduced flow of water from the polluted rivers and low rainfall (FGN, 2003).

Climate Change and the Nigeria's industrial Sector Experience

Flood as one of the extremes of Climate Change has been identified as a ravaging experience affecting industrial activities in Nigeria; with many of the offshore drilling and mining around the coastal region of the southern part of the country; as well as manufacturing, which depend largely on agricultural products as raw materials being negatively affected through excess rain provoked flood. The development has affected productivity and efficiency from these industrial activities in Nigeria (FGN, 2003; DFID, 2009).Similarly, construction, manufacturing, transport and communication, tourism, wholesale and retail trading activities were reviewed having negative experience with rising sea level and extreme weather events caused by climate change in Nigeria. This fact was supported by the studies of Gwary (2009); NEST (2008b); DFID (2009) & Adebola (2010), where it was revealed that rising sea level and extreme weather events negatively affected these major industrial activities across the country. In the same vein, Yahaya *et al.* (2011) confirmed the vulnerability of the waterfalls, the lakes, the river basins, the ocean views, the beaches and the ranches as a severe threat to huge investment of both the government and private sector in tourism and leisure activities. This, according to him could also lead to loss of revenue and impose financial strain on the economy as a result of lay-off of workers in the sector. Deforestation which account for 20% of the world's carbon emissions through Climate Change (Ifeanyi-obi, *et al.*,2012) also posed serious danger to means of livelihood, including major industries, which depend on forest for survival in Nigeria. This claim agrees with Yahaya *et al.*(2011); NEST(2008b); Nwanakoala & Osigwe (2013), which submitted that forest

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disappearance and wildlife extinction negatively affected tourism industry in Nigeria through loss of patronage and revenue.

The persistence of drought and low rainfall pattern orchestrated by climate change were also identified as a common challenge especially for countries where most current thermal electricity generation relies heavily on the availability of sufficient and cooling water (Smith and Tirpak, 1989; Solley *et al.,* 1988) The review revealed the possibility of persistence drought and low rainfall caused by climate change to have negative effect on electricity generation. The supporting evidence from Nigeria also revealed that hydro-electricity generation through supply of water to kainji and shiroro dams is usually low, with shrinking amount of water at a reduced flow from the polluted rivers and low rainfall exacerbated through climate change (FGN, 2003).The implication of this is that many industries in Nigeria that are expected to produce at maximum capacity were left with the option of producing less or even fold up in the event of low generation and distribution of electricity occasioned by low rainfall caused by climate change (Mendelsohn *et al.,* 1994; DFID, 2009).

Conceptualizing Climate Change Adaptation Strategies in Nigeria

Adaptation concept according to Ifeanyi-obi *et al.* (2012); refers to adjustments in practices, processes or structures in response to projected or actual changes in climate with the good of maintaining the capacity to deal with current and future changes; while describing climate change adaptation as the activities that reduce negative impacts of climate change and takes advantage of new opportunities that may be available.

"Climate *change adaptation is also increasingly becoming an area of growing interest and engagement for many developing countries that unfortunately bear the brunt of an overheating planet caused by developing countries. The uncertain effects of a changing climate on Nigeria's economy pose significant setbacks for meeting development targets such as Nigeria's aspiration to be among the twenty best performing economies of the world by the year 2020 (vision 20:20:20); and achievement of the millennium development goals (MDGs)" (Ijemoa, 2012)* .

NPC (2010), recognizes the need for Nigeria government to adapt existing national policies, strategies and plans to address climate change response, in ensuring that adaptation and mitigation concerns are properly integrated into current national development plan known as vision 20:20:20; while Ijeoma (2012) also identified mitigation and adaptation as both necessary to alleviate the impacts of a changing global climate on our local community and national economy. He however, suggested some climate adaptation strategies for Nigeria such as marshalling the health care system; adoption of appropriate water management strategies; phase in weather adapted agriculture; develop climate ready housing stock; encourage insurance programs to help share and mitigate the risks; invest weather prediction and response technology; develop a more resilient local economy; and rally and coordinate government ministries departments and agencies (MDAs). In a similar response to climate change from both mitigation and adaptation angles, the report of the United Nations Framework Convention on Climate Change (UNFCCC) revealed a support for Nigeria as well as other 10 developing countries under the national economic and development study (NEEDS) initiative to facilitate the identification of priority mitigation and adaptation measures; and how these measures can be effectively supported financially by sources

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from various quarters (FGN, 2009). This report also presented the findings of a rapid assessment study on Nigeria's required sectoral mitigation and adaptation measures as well as financial needs within the context of advancing National sustainable development while promptly addressing the development and environmental challenges of climate change in the country (See also FGN /NEEDS, 2010). The FGN/ NEEDS study also revealed that the country has many ongoing policy and strategy initiatives, if properly implemented can serve as adaptive climate change measures, with such initiatives as anticipatory adaptation measures even though they are not clearly spelt out; and they are capable of addressing climate change effect in the country. Also according to the needs study, a major constraint to the policy initiatives on climate change is that government has not been able to put in place a comprehensive implementation strategy that will enable these policies to translate into meaningful inter-sectoral activities for sustainable environmental management, which could easily become anticipatory adaptation options for Nigeria's response to climate change (see also NPC, 2010).

Thaddeus *et al.* (2011a), in their own assessment had identified lack of policy implementation on climate change and tardiness in the enforcement of regulations aimed at halting anthropogenic activities that exacerbate climate change. They also noted the absence of a statutory body charged with the coordination of climate change information or promoting adaptation measures in Nigeria; while the level of awareness shown by farmers, especially in the Niger-Delta Region of Nigeria is still very low. More so, a more robust collaboration among stakeholders was suggested (especially among farmers who produce raw materials for industries), for evolving innovative approaches and adaptation measures for the climate change phenomenon (Thaddeus *et al.*, 2011b). Some indigenous adaptation measures were also identified and suggested by Anselem *et al.* (2011) to be used by farmers in order of importance, which had relatively high profitability indices. According to the authors some of these adaptation measures include multiple/intercropping, agro-forestry, afforestation, mulching, and expansion of cultivated land area, the use of herbicides and pesticides, purchase/harvest of water for irrigation and the use of resistant varieties among others. The authors went further to observe six factors that constrained farmers from climate change adaptation, which include poverty, efficient inputs, information and training, land tenure and labour constraints among others.

CONCLUSION

The study reviewed some challenges of climate change and the corresponding experience of Nigeria's industrial sector. Extant studies have also shown that there is a synergy between industrialization and climate change phenomenon. Based on the studies reviewed, it was concluded that most of the industrial activities such as manufacturing; mining and quarrying; construction; transport and communication; tourism and recreation; wholesale and retail trade; real estate and agro-allied had negative experience with major events of climate change such as flood, rising sea level and extreme weather events, as well as droughts and low rainfall pattern among others in the country. However, in order not to undermine the benefits of industrialization in the advent of climate change, the study however, suggest the encouragement of a low carbon economy with changing patterns of energy services as well as development of more comprehensive adaptation measures for climate change at all level of government and other stakeholders in the country. This,

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to a large extent will specifically assist the industrial sector and the nation at large to mitigate the negative effect of climate change.

REFERENCES

Adebola, S. (2010). "Climate Change Effects in Nigeria".*The Guardian Newspapers 30-03-2010.*

Adejuwon, J. (2006). Food Security, Climate Variability and Climate Change in Sub Saharan *West Africa.* A Final Report Submitted to Assessments of Impacts and eaptations to Climate Change (AIACC). Project No. A.F 23. Published by The International START Secretariat, Washington, DC, USA.

Anselm,A.E.,Ignatius,I.M.,Josephat,C.M.,Anthony,C.O.,Elizabeth,A.O.&Fidelis,E.(2011). Study of "Indigenous Agricultural Adaptation to Climate Change: Southeast Nigeria". African Technology Policy Studies Network, Research Paper **No 6.**

Anyadike, R.N.C. (2009). "Climate Change and Sustainable Development in Nigeria: Conceptual and Empirical Issues". African Institute for Applied Economics, Enugu Forum Policy Paper 10.

Boko, M., Niang, A., Nyong, C., Vogel, A., Githeko, M., Medany, B., Osman, E., Tabo, R., &Yanda, P. (2007). Climate Change 2007 - Impacts, Adaptation and Vulnerability. Africa. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,

Campbell-Lendrum, D & McMichael, A (2007).How much disease could climate change cause? Climate Change and Human Health: Risk and Responses, Geneva, Switzerland: World Health Organization (WHO)/World Meteorological Organization (WMO)/United Nations Environment Programme (UNEP), in IPCC AR4 WG2 2007.

Confalonieri,U.,Parry,M.L.Canziani,O.F.,Palutikof,J.P.,VanderLinden,P.J.&Hanson,C.E. 2007a)."Human Health": Winds, Storms and Floods: Missing or Empty. In IPCC AR4 WG2 2007.

Confalonieri,U.,Parry,M.L.,Canziani,O.F.,Palutikof,J.P.,VanderLinden,P.J.&Hanson,C.E. (2007b). **"**Human Health": Drought and infectious disease: Missing or empty. In IPCC AR4 WG2 2007.

Confalonieri,U.,Parry,M.L.,Canziani,O.F.,Palutikof,J.P.,VanderLinden,P.J.&Hanson,C.E. (2007c). "Human Health. In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change". Cambridge University Press, Cambridge, U.K., and New York, 391-431.Retrieved 2015-11-12.

Chete, L.N., Adeoti, J.O., Adeyinka, F.M. & Ogundele, O.O. (2014). "Industrial development and Growth in Nigeria: Lessons and Challenges". World Institute for Development Economics Research, WIDER Working Paper 2014/019.

Department for International Development (DFID). (2009).Impact of Climate Change on Nigeria's Economy. Final Report.

Dutse, U.Y. &Ibrahim, D.B. (2013). "Potential Challenges of Climate Challenges of Climate Change to the Nigerian Economy" *IOSR Journal of Environmental Science, Toxicology and Food Technology, 6(1), 7-12.*

ISSN: 2052-6350(Print) ISSN: 2052-6369(Online)

Eboh, E. (2009). "Implications of Climate Change for Economic Growth and Sustainable Development in Nigeria – Introduction". African Institute for Applied Economics, Enugu Forum Policy Paper 10.

Ekwe,A.A.,Chukwudumebi,L.E.,Festus,O.A.,Teddy,A.M.,Emmanuel,T.W.&Leroy,W.C.(2011) "What Policy Options can Promote Agricultural Innovations for Climate Change Adaptation and Food Security in the West African Sub-Region?" African Technology Policy Studies Network, Techno policy Brief **No 29.**

Ezeabasili, A.C.C. & Okonkwo, A.U. (2013).Climate Change Impacts on the Built Environment in Nigeria. *An International Multidisciplinary Journal, Ethiopia, 7 (4), 288-303.*

Federal Government of Nigeria, (2003). Nigeria's first National Communication under the United Nations Framework Convention on Climate Change. A Report submitted to Federal Ministry of Environment, Abuja.

Federal Government of Nigeria, (2009).Reports of the Vision 2020 National Technical Working Groups on (i) Agriculture and Food Security, (ii) Culture, Tourism and National Re-orientation,(iii)y Energy Sector,(iv) Environment and Sustainable Development,(v) Health,(vi) Transport,(vi)Water and Sanitation and(viii)Urban and Regional Development.

Federal Government of Nigeria, (2010).National Environmental, Economic and Development (NEEDS) For Climate Change in Nigeria. Federal Ministry of Environment. Abuja, Nigeria.

Gunther, M. (2005). Earth Hour city Challenge. World Wildlife Fund's Energy Report

Gwary, D. M. (2007). Climate Change, Food Security and Nigerian Agriculture. A Report submitted to Federal Ministry of Environment and UNDP, Abuja.

Ijeoma, S.(2012).Nigeria and Climate Change Adaptation. *International Society of Sustainability Professionals. ISSP Insight.1-6.*

Ifeanyi-Obi, C.C., Etuk, U.R. &Jike-Wai, O.(2012),Climate Change, Effects and Adaptation Strategies; Implication for Agricultural Extension System in Nigeria. *Greener Journal of Agricultural Sciences.Vol.2 (2), 053-060.*

Intergovernmental panel on climate change (IPCC), (2001).Summary for Policy Makers. Climate Change 2001: The Scientific Basis. Contribution of Working Group 1 to the Third Assessment Report of the Intergovernmental Panel on Climate Change.

Intergovernmental panel on climate change (IPCC) (2007). Impact, Adaptation and vulnerability. Contribution of Working Group 1 of the intergovernmental panel on climate change to the Third Assessment Report of IPCC.London: Cambridge University Press.

Jones, B., Olken, B. & Dell, M. (2009). "Does Climate Change Affect Economic Growth?" *VOX* Research-based Policy Analysis and Commentary from Leading Economists.

Lashof, D.A. &Tirpak, D.A. (1990).Policy Options for stabilizing Global Climate. Report to Congress, U.S.Environmental Protection Agency, Office of Policy, Planning, and Evaluation, Washington, DC, 810.

Mendelssohn R, Nordhaus W & Shaw D. (1994). The impact of global warming on agriculture: A Ricardian Analysis. *American Economic Review **84**: 753–771.*

Millennium Ecosystem Assessment,(2005).Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC.

Nasiru, I.M. (2009).Climate Change threat to Nigeria. Overview of FCT, Abuja and its PlanningConcept.Retrievedfrom http//environmentalsynergy.wordpress.com/2016/09/16/climate-change-a-threat-to-nigeria/

ISSN: 2052-6350(Print) ISSN: 2052-6369(Online)

National Planning Commission,(2010).Nigeria Vision 20:20:20: The First Implementation Plan(2010-2013)-Sectoral Plans and Programmes.

Nigerian Environmental Study Action Team (NEST), (2008b). Facts on Climate Change in Nigeria: Repercussions for Agriculture, Food Security, Land Degradation, Forestry and Biodiversity. A Report of the Federal Ministry of Environment, Abuja.

Nwanakoala, H.O. & Osigwe, O. (2013).Implications of Global Warming for Sustainable Economic Development in Nigeria. *International Journal of Sustainable Energy and Environment.**Vol.1, No.8,** 158-166.*

Okonjo-Iweala, N. (2013).“Nigeria’s Development Prospects in a Changing Climate”. Minister of Finance Speech at the World Bank Group Reports on Climate Resilience and Carbon Finance in Abuja, Nigeria.

Ozor, N. (2009).“Implications of Climate Change for National Development-The Way Forward”. African Institute for Applied Economics, Enugu Forum, Policy Paper 10.

Solley,W.B.,Merk,C.F.&Pearce,R.P.(1988).Estimated use of Water in the United State in 1985.Circular 1004,U.S.Geological Survey,Washington,DC.

Smith,,J.B.& Tirpak,D.A.(1989).The potential effects of Global Climate Change on the United States.EPA-230-05-89,Office of Policy, Planning and Evaluation, U.S. Environmental Protection Agency,Washington,DC,411.

Thaddeus, C.N., Chukwudumebi, L.E., Nnaemeka, A.C & Victor, C.A. (2011a). “What Policy Options can Promote Climate Change Awareness and Adaptation in the Niger Delta Region of Nigeria?” African Technology Policy Studies Network, Techno policy Brief No 28.

Thaddeus, C.N., Chukwudumebi, L.E., Nnaemeka, A.C & Victor, C.A.((2011b). “Farmers’ Perception of Climate Governance and Adaptation Constraints in the Niger Delta Region of Nigeria”. African Technology Policy Studies Network, Research Paper No 7.

Ujah, O.C. (2009). “The Development Challenge of Climate Change and Impacts on Nigeria”, African Institute for Applied Economics, Enugu Forum Policy Paper 10.

United Nations Organization,(2010).Climate Change Conference in Cancun leads to agreements.

United Nations, (1990).Internatiotinal Standard Industrial Classification of All Economic Activities. *Statistical Papers, Series M, **No.4, Rev.3,** New York, NY, 52.*

Victor, O.O., Kenechukwu, N.J. & Eze, O.R. (2013). “Capital Market and Industrial Sector Development in Nigeria: A Theoretical Analysis”. *Journal of Emerging Trends in Economics and Management Sciences, Scholar Link Research Institute Journals, 2013 (ISSN: 2141-7024)).*

Watson, R.T. (2000).Report of the Intergovernmental Panel on Climate Change. Presented by the Chair of IPCC at the sixth Conference of Parties to the United Nations Framework Convention on Climate Change, 13th November, 2000, 1-20.

Yahaya, K.A., Salam,M.O.,& Bamigbade,D.(2011).Economic Implications of Climate Change and the imperative of Re-Directing financial resources in Nigeria. *British Journal of Humanities and Social Sciences.**Vol.2 (2),** 10-18.*

Zhang, L.Y. (2009). “Does Climate Change makes Industrialization an Obsolete: Development Strategy for Industries in the South?”Fifth Urban Research Symposium. Development Planning Unit, University College, London. United Kingdom.

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