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CLIMATE CHANGE UNDER THE NIGERIA PETROLEUM INDUSTRY ACT (PIA) 2021

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Abstract

An important issue that needs to be addressed urgently across the globe is the issue of climate change. Nigeria as a country is not left out in the battle against climate change. One of the major things that drives Climate Change is the low level or inadequate laws governing activities which lead to Climate Change. This author examined the effects of Climate Change on the Nigerian environment and further made an overview of the international conventions on Climate Change, while also evaluating the legal regime in Nigeria concerning all forms of environmental challenges generally and their their effectiveness. The author adopted the doctrinal legal research methodology in reviewing the primary and secondary sources of research. The primary sources of law used include statutes and case laws. The secondary sources of information used are books, articles and internet sources. The author concluded that the laws available are ineffective as the level of compliance with the existing laws is extremely low pointing out ignorance and inadequate education on the part of Nigerians as another major issue. The author found that inadequate eduction on the part of Nigerians has affected their level of understanding of the grave impacts of their day-to-day activity that cause Climatic Change condition .The author recommended inter alia, that Nigerians and the Nigerian Government have to be proactive in implementing these environmental protection laws to curb carbon emissions and invariably reduce the effect of climate change in Nigeria.

KEYWORD: *Nigeria, Climate Change, Enforcement, Environment, Protection*

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1. Introduction

Climate change is a global problem that directly affects human life and also destroys property. It is the resultant effect of pollution of the atmosphere. When there is excessive emission of Greenhouse Gases (GHG) into the atmosphere, it becomes polluted. Greenhouse gases are accumulating in Earth's atmosphere as a result of human activities, causing surface air temperature and subsurface ocean temperature to rise. Anthropogenic acts such as the burning of fossil fuels, deforestation, gas-flaring amongst others, are some of the major causes of climate change in Nigeria.[1]

Nigeria is experiencing adverse climate conditions with negative impacts on the welfare of millions of people. Persistent droughts and flooding, off-season rains and dry spells have sent growing seasons out of orbit, in a country dependent on rain-fed agriculture. 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, hydropower generation and other uses. The main suspect for all this havoc is Climate Change.[2] In a study commissioned by the World Bank in 2007, Nigeria accounted for roughly one-sixth of the worldwide gas flaring which in turn spews some 400 million tons of carbon dioxide into the atmosphere.[3]

Climate change has the potential to affect all sectors of our socioeconomic development, including the natural ecosystems. In Nigeria, the sectors which are considered most vulnerable to climate change are agriculture and food security, water resources, public health, and habitat. Vulnerable regions are coastal regions and erosion and desertification-prone areas in the South-Eastern and Northern parts of the country. Vulnerable groups include farmers, fisherfolks, the elderly, women, children and poor people living in urban areas. Climate change is expected to increase the frequency and intensity of severe weather events. Sea level rise may lead to increasing coastal inundation and flooding of low-lying areas. Unfortunately, many States in Nigeria largely lack the infrastructure necessary to respond adequately to such events. Diseases such as malaria are likely to have wider ranges, impacting more poor people that are already most affected by such diseases. Climate change will also have direct impacts on biodiversity. While some species like grasshoppers or other pests may increase in abundance or range, climate change will increase existing risks of extinction of many threatened species and lead to greater loss of biodiversity.[4]

Changing rainfall patterns could devastate the rain-fed agriculture on which so much of the population of Nigeria depends to survive. Increased occurrence of drought may lead to declining agricultural yields and diminished food security. Water supplies may also be altered, primarily through changes in temperature and rainfall[5].

2. Conceptual Framework

2.1 Climate Change

Much ink has flowed as authors make efforts to define the term Climate Change, to define truly understand the term, this research paper will outline some of the various definitions of Climate Change. The United Nations Framework Convention on Climate Change (UNFCCC), has defined climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable periods."

Climate change refers to the change in the state of the climate that can be identified by changes in the mean or variability of its properties and that persists for extended periods, typically decades or longer.

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[1] L Badru, 'Climate Change in Nigeria: Causes, Effects and Legal Framework' (2020)(4)(1) *UNILAG Law Review* 186

[2] A.O. Olaniyi and Others, 'Review of Climate Change and its effect on Nigerian Ecosystem' (2013)(1) *international Journal of African and Asian Studies-An Open Access International Journal.*

[3](*n 1*) 57

[4]Federal Ministry of Environment(Department of Climate Change) National Policy on Climate Change available at https://climatechange.gov.ng/wp-content/uploads/2020/09/national-climate-change-policy-1-1.pdf<acessed on the 16th of October, 2022)

[5](*n4*) 26

Climate change occurs when the amount of energy stored by the "climate system" is varied. The variation occurs when the balance, for example between energy received from the sun and the radiated energy is disturbed. This disturbance can be caused by several natural mechanisms such as variations in the earth's orbit, variations in ocean circulation, and changes in the earth's composition. In recent times the disturbance is caused by human activities.[6]

Climate change refers to a change in climate that is attributable directly or indirectly to human activities that alter the atmospheric composition of the earth which leads to global warming. Climate change has the potential of affecting all natural and human systems and may be a threat to human development and survival socially, politically and economically.[7]

2.2 Global Warming

Global Warming is an overall warming of the planet, based on average temperature over the entire surface, while climate change is a change in regional climate characteristics including temperature, humidity, rainfall, wind and severe weather events[8].

According to the National Oceanic and Atmospheric Administration (NOAA), of Europe, seven indicators would be expected to increase in a warming world as a result of climate change. They are; tropospheric temperature, humidity, temperature over oceans, sea surface temperatures, sea level, ocean heat content, and temperature over land. Three indicators would be expected to decrease They are: glaciers, snow cover and sea ice.[9] It has been argued on several occasions that, Global warming and Climate change are coequal and indistinguishable. This is not correct as global warming can be described as one of the major aftereffects of climate change.

2.3 Greenhouse Effect

This is the process by which radiative energy leaving a planetary surface is absorbed by some atmospheric gases, called greenhouse gases. The Sun is Earth's only external form of heat. It emits solar radiation mainly in the form of shortwave visible and ultraviolet (UV) energy. As this radiation travels toward the Earth, about 25% of the radiated energy is absorbed by the atmosphere and about 25% is reflected by the clouds and other gases back into space. The remaining radiation travels unimpeded to the Earth and heats its surface. The atmosphere acts like the glass in a glass greenhouse, allowing much of the shortwave solar radiation to travel through unimpeded, but trapping a lot of the long wave heat energy trying to escape back to space. The greenhouse gases transfer the energy to the surface and lower atmosphere and it is reradiated in all directions, including down towards the Earth's surface. This process makes the temperature rise in the atmosphere just as it does in the artificial greenhouse.[10]

The Earth's Natural Greenhouse Gases in their natural state of occurrence do not constitute any danger to the environment. The Earth's natural greenhouse effect transfers energy to the Earth's surface and lower atmosphere; so that the temperature there is higher than it would have been if direct heating by solar radiation were the only warming mechanism. This process has a warming effect of about 33oC, without which the Earth will be uninhabitable.[11]

2.4 Greenhouse Gas (GHG) Emission

A greenhouse gas (GHG or GhG) is a gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapour (H2O), carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and ozone (O3). Without greenhouse gases, the average temperature of Earth's surface would be about −18 °C (0 °F),

[6]Available at http://en.wikipedia.org/wiki/climate_change>accessed on the 19th of November, 2022.
[7]O.A. Fagbohun, Law and climate change in Nigeria (Being paper presented at the 2010 Edition of the Faculty of Law, University of Ilorin Law workshop on the 13th of May, 2010)
[8]*(n7)*
[9]M.B. Anzaki, "Climate Change: The Legal Framework", available at http://www.thelawyerschronicle.com/climate-change-the-legal-framework/>accessed 15th November, 2022).
[10]http://www.ace.mmu.ac.uk/eae/Climate_Change/Older/Greenhouse_Effect.html,
[11]http://en.wikipedia.org/wiki/global_warming

rather than the present average of 15 °C (59 °F). The atmospheres of Venus, Mars and Titan also contain greenhouse gases.[12]

Human activities since the beginning of the Industrial Revolution (around 1750) have increased the atmospheric concentration of carbon dioxide by over 50%, from 280 ppm in 1750 to 421 ppm in 2022. The last time the atmospheric concentration of carbon dioxide was this high was over 3 million years ago. This increase has occurred despite the absorption of more than half of the emissions by various natural carbon sinks in the carbon cycle. At current greenhouse gas emission rates, temperatures could increase by 2 °C (3.6 °F), which the United Nations' Intergovernmental Panel on Climate Change (IPCC) says is the upper limit to avoid "dangerous" levels, by 2050. The vast majority of anthropogenic carbon dioxide emissions come from the combustion of fossil fuels, principally coal, petroleum (including oil) and natural gas, with additional contributions from cement manufacturing, fertilizer production, deforestation and other changes in land use[13].

2.5 Legal Framework for Climate Change in Nigeria

2.5.1 The Constitution of the Federal Republic of Nigeria (CFRN)[14]

The 1999 Constitution of the Federal Republic of Nigeria 1999 (as amended) is regarded as the fundamental and supreme law of the land. It provides the basic framework for other laws and also establishes the powers and duties of various authorities and governments. The Constitution states that the State shall protect and improve the environment and safeguard the water, air and land, forest and wildlife of Nigeria.[15] This provision makes for the constitutional protection of the environment in Nigeria. However, by Section 6(6)(c) of the Constitution, this constitutional protection of the environment is not justiciable as it falls under Chapter II of the constitution[16].

In spite of the fact that, the Nigerian Constitution lacks any enforceable provision with respect to environmental protection. Section 4 of the CFRN 1999 further empowers the National Assembly to make laws for the peace, order and good government of the federation or any part thereof. It is pursuant to this power that the National Assembly has enacted some national legislations seeking to protect the environment for the peace, order and good of all Nigerians and the environment. Thus, legislation with provisions of close relation to the protection of the environment and mitigation of climate change shall be discussed below:

2.5.2 Petroleum Industries Act (PIA)[17]

In 2021, the Nigerian Government signed into law the Petroleum Industry Act (PIA) as a comprehensive legislative enactment that is targeted at resolving the extant issues, including environmental matters in the petroleum industry. Environmental protection is an integral part of developing host communities and achieving sustainable development in the petroleum industry. Commentaries on the provisions of the Nigeria Petroleum Industries Act on Climate Change will be made in the later part of this work.

2.5.3 Climate Change Act[18]

In 2021, Nigeria promulgated the Climate Change Act, which provides a framework for climate actions at the national level. Most of the initiatives envisioned in Nigeria's new Climate Change Act build on prior climate change policies, most of which were adopted in 2021 (i.e., the Revised National Climate Change Policy; National Climate Change Programmes; the 2050 Long-Term Low Emission

[12]https://en.wikipedia.org/wiki/Greenhouse_gas
[13] (*n12*)
[14] Constitution of the Federal Republic of Nigeria 1999 (as amended) Cap C23 LFN 2004
[15] Section 20 of CFRN 1999
[16] AG Ogun State &Ors v AG Federation &Ors (1982) 3 NCLR 166
[17]Petroleum Industries Act, 2021
[18]Climate Change Act 2021, LFN

Vision. The Climate Change Act is the first stand-alone comprehensive Climate Change Legislation in West Africa.[19]

Nigeria's 2021 Climate Change Act provides an ambitious framework for mainstreaming climate actions in line with national development priorities and sets a net-zero target for 2050-2070[20]. The Act codifies national climate actions by mandating the Ministry of Environment to set, among others, a carbon budget, keeping the average increase in global temperature within 2oC and pursuing efforts to limit the temperature increase to 1.5^{o}C above pre-industrial levels. It further approves of formulation of a National Climate Change Action Plan in every five-year cycle to ensure that the national emission profile is consistent with the carbon budget goals and prescribes measures for identifying actions for climate adaptation and mitigation.[21]

The Act obligates any private entity with employees numbering 50 and above to put in place measures to achieve the annual carbon emission reduction targets in line with the Action Plan; and designate a climate change officer responsible for submitting annual reports to the National Climate Change Secretariats, at meeting its carbon emission reduction and climate adaptation plan[22].The Act also establishes the National Council on Climate Change, chaired by the President of Nigeria, with members from both the public and private sectors, including members of the civil society, women, youth, and persons with disabilities. It empowers the Council with significant powers to coordinate national climate actions, administer the newly established Climate Change Fund. The Climate Change Fund is envisioned as a financing mechanism for prioritized climate actions and interventions[23]. The promotion and adoption of nature-based solutions to reducing GHG emissions and mitigate climate change is encouraged. In a way of protecting the atmosphere, it provides for climate change education by encouraging projects and partnerships relevant to the formulation and development of educational curricula and programmes geared towards adaptation and risk mitigation.[24]

Legislative oversight is enabled through the Secretariat's obligation to partner with civil society organizations, promote climate education, report annually to the National Legislative Assembly on the state of the nation's climate change activities, and evaluate reports on the performance of climate change duties by private and public entities in Nigeria[25].

The National Environment Standard And Regulations Enforcement Agency (NESREA) Act 2007
The NESREA Act became operational in 2007. It replaced the defunct Federal Environmental Protection Agency (FEPA) Act[26] and has since become the leading environmental protection legislation in Nigeria. By virtue of section 7(a) of the Act, the agency amongst others is mandated to "enforce compliance with Laws, guidelines and standards on Environmental matters". In furtherance, the agency is also empowered to: Enforce compliance with the provisions of International agreements, protocols, conventions, and treaties on the environment, including climate change, biodiversity, conservation, desertification, forestry, oil and gas, chemicals, hazardous wastes, ozone depletion, marine and wildlife, pollution, sanitation and such other environmental agreements as may from time to time come to force.[27] The above provisions validate the enforcement of the aforementioned International Convention on climate change i.e. The UNFCCC in Nigeria. However, for NESREA to enforce compliance of such relevant treaty, its domestication into the Nigerian laws must have been made by the Legislative arm of government both at the Federal and State level.

[19]Muhammed Tawfiq Ladan, A Review of Nigeria's 2021 Climate Change Act: Potential for Increased Climate Litigation. https://www.iucn.org/news/commission-environmental-economic-and-social-policy/202203/a-review-nigerias-2021-climate-change-act-potential-increased-climate-litigation>accessed on the 16th of November, 2022
[20]Explanatory Memorandum Climate Change Act, 2021
[21] Section 19 and 20 of the Climate Change Act, 2021
[22] Section 24 Climate Change Act, 2021
[23] Section 15 of the Climate Change Act, 2021
[24]Section 26, Climate Change Act.
[25]Section 23 and 24 of the Climate Change Act
[26] Cap. F10, Laws of the Federation of Nigeria, 2004.
[27] NESREA Act, s. 7(c).

The Agency is additionally mandated to "enforce compliance with guidelines and legislation on sustainable management of the ecosystem, biodiversity conservation and the development of Nigeria's natural resources."[28]

2.5.4 The Environmental Impact Assessment (EIA) Act[29]

The EIA Act is of relevance also to the regulation of climate change in Nigeria. It is currently administered by the NESREA. Although, by virtue of section 5 (1) of the Act, certain projects have been excluded from the requirement of an environment assessment, the Act generally is designed to ensure that Environmental Impact Assessment (EIA) is conducted with respect to any project which is likely to cause significant effect on the Nigerian environment.

2.5.5 The National Oil Spill Detection and Response Agency (Nosdra) Act[30]

Of relevance to climate change is the NOSDRA Act also. The major objectives of the Agency are to co-ordinate and implement the National Oil spill contingency plan for Nigeria.[31] In so doing, the Agency shall "establish a viable national operational organisation that ensures a safe, timely, effective and appropriate response to major or disastrous oil pollution".[32] By virtue of section 5(c) of the Act, the Agency is further charged with the responsibility of establishing the mechanism to monitor, assist and direct the response with a view to saving lives, protecting threatened environment, and cleaning up impacted sites.

2.5.6 The Flare Gas (Prevention of Waste and Pollution) Regulations 2018

Gas flaring is a major cause of climate change in Nigeria. Thus, the remarkable step taken by the government in enacting a legislation which directly regulates the flaring of gas into the Nigerian environment is a significant leap. This regulation was made by President Muhammadu Buhari, in his capacity as Minister of Petroleum Resources in pursuance to the powers conferred upon him by section 9 of the Petroleum Act and section 5 of the Associated Gas Re-injection Act. The objectives of the regulation by virtue of section 1 are: the reduction of the environmental and social impact caused by the flaring of natural gas; the protection of the environment; the prevention of waste of natural resources; and the creation of social and economic benefits from gas flare capture.

In furtherance of the objectives of this regulation, the regulation by virtue of section 12 provides that: "no producer shall flare gas from any facility operated by such producer except pursuant to a certificate issued by the minister further to the provisions of the Associated Gas Re-Injection Act. It provided also that "no permit holder shall engage in Routine Flaring or venting of natural gas from any facility operated by such permit holder. Additionally, no producer shall engage in Routine Flaring or vent natural gas from any green field project.It is believed that, the strict compliance with these regulations will effectuate the reduction of gas flaring in Nigeria which shall mitigate the concentration of GHGs in the atmosphere.[33]

2.6 International Legal Framework

2.6.1 The Intergovernmental Panel on Climate Change (IPCC)

This is a scientific intergovernmental body, and an organ of the United Nation, tasked with evaluating the risk of climate change caused by human activity. The panel was established in 1998 by the World Meteorological Organization and the United Nations Environmental Programme.

According to IPCC, the extent of climate change effects on individual regions will vary overtime and with the ability of different societal and environmental systems to mitigate or adapt to change.[34]

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[28] NESREA Act, s. 7(e).
[29] Cap. E12, Laws of the Federation of Nigeria, 2004
[30] The National Oil Spill Detection and Response Agency (NOSDRA) (Establishment) Act, 2006.
[31] NOSDRA Act, s. 5.
[32] NOSDRA Act, s. 5(a).
[33](*n1*)202
[34] (*n1*)

The United Nations Framework Convention on Climate Change (UNFCCC)
The first report of IPCC in 1990 was what led to the adoption of the UNFCCC at the United Nation Conference on environment and development, Rio de Janeiro in 1992. It was ratified by 50 countries and came into force in March, 1994.[35]

The UNFCCC is the most recognized international agreement on climate change. It was based on the concept of "common but differentiated responsibility" recognizing the need for global actions and the differing levels of obligations placed upon industrialized and developing countries.[36]

By virtue of Article 2 of the Convention, the main objective of the Convention was to stabilise greenhouse gas emissions at a level that would not interfere with the climate system or food production, but which would still allow sustainable economic development. Sequel to the above, the Convention also provided that, objectives are to be met within a time frame that would allow ecosystems to adapt to any changes.

The Convention divides countries into two main groups namely;

i. Industrialised countries (41 countries) comprising of Organization for Economic Cooperation and Development (OECD) countries and economies in transition.
ii. Developing countries (145 countries).

By way of general commitments, countries (based on common but differentiated responsibilities) were to compile inventories of GHG emissions caused by human activities; compile inventories of activities that remove GHGs from the atmosphere (sinks); develop regional programmes to mitigate climate change; develop and transfer technologies, practices and processes to control GHGs in all relevant industrial sectors (including energy, transport, agriculture, forestry, and waste management); promote mechanisms to remove GHGs from the atmosphere; take climate change considerations into account in formulating and implementing social, economic and environmental policies; and promote research, education and public awareness.

The UNFCCC established a conference of parties (COP), a law-making body that meets annually and is charged with devising ways to implement UNFCCC goals. The foremost conference of parties took place in Kyoto, Tokyo. Kyoto protocol and subsequent COP which held shall be discussed below:

2.6.2 The Kyoto Protocol

The Kyoto protocol (KP) was negotiated and came into force in 2005. It sets binding emissions limitations on developed countries that have signed it. It was intended that the limitations must be met between 2008 and 2012.

The protocol aimed to reduce emissions to above 30% below what would have occurred under a business atmosphere. An advantage of the protocol is that it provides for flexibility by allowing each country to make its own decisions on how to reduce emissions.[37]

2.6.3 The Bali Action Plan (Bali Road Map)

The parties to the UNFCCC met in Bali (Indonesia), to review implementation of the convention in 2007. It noted that climate change is unequivocal and recognised the need for cuts in global emissions. There was also the agreement that the role of forests as carbon sinks should be specifically recognised and deforestation in developing countries should be avoided.[38]

2.6.4 Copenhagen Climate Change Summit 2009

In December 2009, parties to UNFCCC met in Copenhagen, Denmark, for the 15th Conference of the Parties (COP15). A framework for international climate change mitigation as a successor to the Kyoto protocol after 2012 was to be agreed upon there. The document recognised that climate change is one

[35] (*n7*)14
[36] (*n7*)15
[37](*n1*)198
[38] (*n1*)198

of the greatest challenges of the present and that action should be taken to keep any temperature increases to below 20c.

2.6.5 Paris Climate Agreement 2015

This agreement happens to be the most recent conference of parties in implementation of the UNFCCC, which held in Paris (France) in 2015. At this conference, nearly every nation on earth committed to actions aimed at shifting away from fossil fuels and towards cleaner, smarter energy options in order to limit global temperature rise to 20c – or 1.50c if possible.[39]

2.7 Causes of Climate Change in Nigeria

In Nigeria, natural resources are being used extensively for construction, industries, transport and consumption. Human factors have contributed to climate change and presently, the scientific consensus on climate change is that human activity is very likely the cause for rapid increase in global average temperature over the past several decades.[40]

Also, reference has been made to some specific natural factors which also cause climate change. Thus, both the natural causes and human causes of climate change shall be examined below.

2.7.1 Natural Causes

Ocean Currents: The oceans are a major component of the climate system. Ocean currents are located at the ocean surface and in deep water below 300 meters (984 feet). They can move water horizontally and vertically and occur on both local and global scales.[41] Ocean currents carry heat around the Earth. The direction of these currents can shift so that different areas become warmer and cooler. Oceans store a large amount of heat, so that small changes in ocean currents can have a large effect on coastal and global climate.[42]

Meteorite Impacts: Meteorite Impacts have contributed to climate change by releasing some powerful materials into the atmosphere. These materials insulate the earth from solar radiation and cause global temperature to fall; the effects can last for a few years. After the materials released (such as dust and aerosols) fall back to earth, the greenhouse gases (Carbon-dioxide, water, methane etc.), caused by the interaction of the impact remain in the atmosphere and can cause global temperature to increase; the effects can last decades.[43]

Solar Variations: The sun is the source of energy for the earth's climate system. Although the sun's energy output appears constant from an everyday point of view, small changes over an extended period of time can lead to climate changes.[44]

Volcanic Eruptions: Volcanic eruptions pump out clouds of dust and ash, which blocks out some sunlight. The ash particles being heavy, they fall to the ground within three months[45]. Volcanoes affect the climate through the gases, and dust particles thrown into the atmosphere during eruptions. The effect of the volcanic gases and dust may warm or cool the earth's surface, depending on how sunlight interacts with the volcanic materials.[46] However, there are no volcanoes in Nigeria and volcanic effect on climate change is not applicable to Nigeria. Other natural causes are: (v) Continental Drift (vi) The Earth Tilt and (vii) Comets.

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[39]M. Denchak, "Global Climate Change: What You Need to know" https://www.nrdc.org/stories/global-climate-change-what-you-need-know>accessed 19th of November, 2022.

[40] (n1)188

[41](n39)

[42] (*n39*)

[43](n39)

[44] (n39)

[45]NOAA Earth System Research Laboratory, "Teacher Background: Natural climate change" available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjY3Kqvz_DpAhWI2BQKHVKiBlEQFjAAegQIAxAB&url=https%3A%2F2Fwww.esrl.noaa.gov%2Fgmd%2Feducation%2Finfo_activities%2Fpdfs%2FTBI_natural_climate_change.pdf&usg=AOvVaw0Uy4U7TvDnjA9YdH5Olil, >accessed on the 19th of November, 2022

[46]British Geological Survey, "Discovering Geology" available at https://www.bgs.ac.uk/discoveringGeology/home.html>accessed 19th November, 2022.

2.7.2 Anthropogenic (Man-made) Causes

The main cause of climate change in Nigeria has been attributed to high concentration of greenhouse gases (GHGs) in her atmospheres. The excessive emission of these GHGs causes the atmosphere to be in a polluted state.[47] Basically, the greenhouse gases which contribute to the surfacing of climate change are the following:

Methane: This is a hydrocarbon gas produced through both natural sources and human activities including the decomposition of works in landfills, agriculture, ruminant digestion and manure management associated with domestic livestock.

Nitrous Oxide: Nitrous Oxide is a powerful greenhouse gas which is produced through soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuels combustion, nitric acid production and biomass burning.

Chlorofluorocarbon (CFCs): They are gases of industrial origin used in a number of applications, but now largely regulated in production and release to the atmosphere by international agreement for their ability to contribute to destruction of the ozone layer.[48]

Carbon-di-oxide (CO2): Carbon dioxide is a component of the atmosphere which is released through natural processes such as respiration and volcanic eruptions and through human activities such as deforestation, land use changes, and burning of fossil fuels. The concentration of carbon dioxide in the atmosphere has increased through human activities and industrial works. It is noteworthy that of all the greenhouse gases listed above, carbon dioxide (CO2) has been identified as the gas which singularly contributes the most to climate change.[49] With particular respect to Nigeria, the main sources of carbon dioxide (CO2) are (i) The burning of Fossil fuels; (ii) Deforestation and (iii) Gas Flaring.

Burning of Fossil fuels: The components of fossil fuels are oil, coal and natural gas. The actual combusting of these components causes excessive carbon dioxide to flow into the atmosphere, thus, causing pollution of the atmosphere which inevitably results into climate change.

Gas Flaring: Gas in this content relates to the associated gas in oil production process. This associated gas could be harnessed to the benefit of the country when employed for domestic use and export. Unfortunately, in Nigeria, associated gas is extravagantly flared into the atmosphere, channelling ways for climate change to surface. Nigeria has been reported to be flaring an estimated 2.5 million cubic feet of gas each day which amounts to almost 40% of the total gas consumption in Africa.[50] Additionally, Nigeria is responsible for one sixth of the entire gas flared in the world as it pumps over 400million tons of carbon dioxide into Nigeria's environment.[51] With all these statistics, Nigeria has been held as one of the countries which flares gas the most in the world.

Deforestation: This is a process of clearing of forests, by cutting down or burning all the trees grown in such forest. Nigeria also leads the world in deforestation as the thick forests have been wantonly cleared for logging, timber export, wood fuel, agriculture etc.[52] It has been reported that between 2000 and 2005, the country cleared 55.7% of forests.[53] Sadly, these trees which are cut down serve as a major absorbent of carbon-dioxide (C02) through the process of photosynthesis. Thus, by the reckless removal of trees for economic and domestic utilization, the atmosphere is substantially deprived of the instruments which should protect it against carbon-dioxide (C02) effects.

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[47] *(n1)*190

[48] (*n46*)

[49] S.G. Ogbodo, "Climate Change and Natural Disasters: Issues and perspectives" (2013) 1(3) *Olabisi Onabanjo University Journal of Public Law: Environmental Law and Practice*.

[50] "Is the Clean Development Mechanism An option in Nigeria's Quest to Eliminate Gas Flaring?", available at http://www.trpng.com/pdffiles/Is%20clean%20development%20mechanism%20an%20option%20in%20Nigeria.pdf>accessed 19th November, 2022.

[51] A. Sampson, "Gas Flaring: Nigeria Govt. Under Pressure", available at https://www.scoop.co.nz/stories/WO0812/S00359/gas-flaring-nigerian-govtunder-pressure.htm>accessed 19th November, 2022.

[52] (*n45*)5

[53] (*n46*)5

2.8 Effects of Climate Change in Nigeria

When climate change surfaces, there is a sudden change in rainfall patterns, wind patterns, and also increase in temperature amongst others which result inevitably to natural disasters like flood, drought, desertification etc. some of the effects of climate change in Nigeria shall be discussed seriatim.

Flood: The rise of sea levels beyond its carrying capacity, due to climate change, may lead to overflow of the sea water which is capable of causing flood. Climate change effectuates irregularity in rainfall patterns. Thus, causing rain to fall in an unusual manner, this sometimes may be excessive result in flooding, which destroys lives and property of the citizens. In 2002, more than 16 states were flooded in Nigeria, resulting in many deaths as well as displacement of over 2 million people.[54]Most recently in 2022, was the flood in many parts of Nigeria especially the south-south and south-east which was majorly as a result of rise in sea level.

Drought: When irregularity in rainfall occurs, rain ceases to fall for an unusual long period of time. The effects of this when taken with the after effects of the increasing average temperature of the earth due to climate change will result in drought. Drought is a period of dryness that causes damage to crops and prevents successful growth of plants.[55]

Desertification: This is the process by which an area becomes a desert. It is substantially caused by the combined effect of deforestation and the unusually over-heated climate. It occurs majorly in the northern parts of Nigeria. Reports have it that, 35% of previously cultivable land in 11 northern states of Nigeria has been overrun by desertification.[56]

Bad Health Condition: Climate change affects human health directly or indirectly. According to the World Health Organization, "climate change is expected to cause approximately 250,000 additional deaths per year" between 2030 and 2050. As global temperature rises, so do the number of fatalities and illnesses from heat stress, heat stroke and cardiovascular and kidney disease.[57] The direct consequences of climate change in Nigeria includes cerebrospinal meningitis, cardiovascular respiratory disorder of elderly people, skin cancer, high blood pressure, malaria, cholera and child and maternal health issues.[58]

Diminishing Agricultural Productivity: Due to the irregularities in weather conditions, farmers now find it hard to predict the perfect season for planting. Farmers now plant in the midst of great uncertainties, thus resulting in untold losses as their investment waste away from lack of rainfall at the right time. Consequently, this results in decline in productivity and the income of Nigerian farmers.[59] With respect to desertification, the agricultural and economic consequences of the loss of such significant portion of cultivable land are incalculable.

Remedies to Climate Change

The available options for remedying climate change in Nigeria are: Mitigation and Adaptation strategies. These strategies will be briefly discussed below;

2.9 Mitigation Strategy

This means that the measures must be taken by various nations to reduce rate and magnitude of global climate change caused by human activities. According to IPCC, the mitigation options includes reduction in burning of fossil fuels and reduction of greenhouse gases and soot from the energy sector, reduction of deforestation, increase in reforestation and afforestation and modification of agricultural practices to reduce emissions of greenhouse gases and build up soil carbon. Other mitigation options

[54] (*n49*)5
[55] (*n1*)193
[56] (*n50*)2
[57]M. Denchak, "Global Climate Change: What You Need to know" https://www.nrdc.org/stories/global-climate-change-what-you-need-know>accessed 19th November, 2022.
[58] I.F. Monday, "Investigating Effects of climate change on Health Risks in Nigeria", available at https://www.intechopen.com/online-first/investigating-effects-ofclimate-change-on-health-risks-in-nigeria>accessed 15th of November, 2022.
[59]M. Olufemi, "Climate change and its effects on present-day Nigeria", available at https://tribuneonlineng.com/climate-change-effects-present-day-nigeria/>accessed 11th November, 2022.

include; geo-engineering to reverse the effect of global warming by creating cooling effects which will offset greenhouse heating and conceiving the development of technology for cleaning the greenhouse gases from the atmosphere.[60].

2.10 Adaptation Strategy

Adaptation means that we should take measures to reduce the adverse impact of global warming on human life and the environment. Some of the options that are available include; changing the cropping patterns, stopping further development on wetlands, flood plains, and close to sea level, developing crops that are resistant to drought, heat and salt, strengthening public health and environmental engineering defense against diseases, designing and building new water projects for flood control and drought management and construction of dykes and storm surge barrier against sea level rise.[61]

Climate Change under the Nigeria Petroleum Industry Act (PIA)
To state that the PIA does not make mention of or provision for environmental protection or climate change is a misstatement which must be debunked. No matter how relatively inadequate its provisions on Climate Change, the PIA cannot be construed in isolation from environmental protection and Climate Change concern. The PIA has made certain notable provisions geared towards the protection of the environment. They include but not limited to;

2.11 Environmental Management Plan

As a way of protecting the environment from hazardous operations in the petroleum industry, the PIA mandates a licensee or lessee who engages in upstream and midstream petroleum operations to submit an environmental management plan in respect of projects which require environmental impact assessment to the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) or the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA).[62]

The PIA further provides in subsection 3 of section 102 that the commission shall only approve of the environmental management plan if it complies with the relevant environmental laws and where the applicant has the capacity to rehabilitate or manage negative impact on the environment as a result of its activities. The commission or authority is also to take into account the policy thrust of the Government regarding environmental protection and management. Hence, any environmental management plan that does not comply with the policies of the government on environmental protection will not be approved by the commission and such licencee will not commence upstream, downstream and mining operations in Nigeria.[63]

Furthermore, by subsection 7 of section 102, the PIA banned the use of chemicals in upstream and downstream operations. The down side to the provision against the use of harmful substances/chemicals which would ordinarily have been a plausible provision is that the Act does not specifically mention the kind of chemicals which are prohibited and under what circumstances the commission will grant the permission for the use of such chemicals. Also, the exception permitting the use of such chemicals upon the approval of the Commission or Authority is too permissible given the rate of corruption in Nigeria. The said provision leaves a serious lacuna as any chemical could be approved for use when money exchanges hands notwithstanding its impact on the environment. Worse still, the PIA failed to provide expressly, the criteria for the approval for use of such chemicals thereby leaving too much power at the whims of the Commission or Authority.

2.12 Remediation of Environmental Damage

The PIA made further efforts towards environmental protection by providing that as a condition precedent for the grant of a petroleum exploration, prospecting or mining lease or licence and prior to the approval of an environmental management plan, a licencee is required to pay a prescribed financial

[60](*n2*)59
[61](n2)60
[62] Petroleum Industry Act 2021, ss. 102(1).
[63] Petroleum Industry Act 2021, ss. 104

contribution to an environmental remediation fund for the rehabilitation or management of negative impacts on the Nigeria environment with respect to the petroleum activities carried out by the licencee or lessee.[64]

2.13 Gas Flaring

The issue of gas flaring/venting has been fully addressed earlier in this research paper, here we will outline and make commentaries on the efforts of the PIA in curbing gas flaring in the Nigeria environment.

By section 104(1) of the PIA, the Act prohibits act of gas flaring in Nigeria. This would have been a plausible provision but for the exceptions giving leeway to the licencee to flare gas in case of the emergency and exemption by the commission or authority without really defining what constitute an emergency, the Act also failed to define circumstances within which a licencee or lessee can be exempted to flare gas. The third exemption is that a licencee can flare gas for safety measures or purposes and strategic operational reasons. Resting on the ambiguous provisions of "safety measures" or "strategic operational reasons" the licencee can whimsically flare or vent gas.[65] Another clog on this provision prohibiting gas flaring is the fact that the penalty imposed a culprit caught flaring gas whimsically is payment of fine. The truth of the matter is that these licencees will rather keep the fine money ready for payment than obey the said law prohibiting gas flaring.

The PIA further provides for the licencee to install before commencement, metering equipment conforming to the specifications prescribed on every facility which natural gas should be flared. This provision would been plausible if the Act provided for a way to check the mere to ensure adequacy of operation of the meter so installed by the licencee, and appropriate measures to be taken to ensure that the licencee does not tamper with the meter. This research recommends that the meter should be installed and checked by commission to ensure it works accurately and without interference.

While we appreciate the effort of the PIA in prohibiting gas flaring and protecting the environment, it must be note as highlighted above that the some of the said provisions are ambiguous giving room to such lacuna a licencee can rest on to pollute the environment. Nigeria has to intentionally, deliberately and out rightly ban gas flaring by making laws without loopholes.

2.14 Compliance with Extant Laws

Also by virtue of Section 202 of the PIA, a production distribution license shall be deemed to have been granted subject to the duty of the holder to conduct its licensed activities safely and reliably in compliance with any law in force and prescribed environmental, health and safety regulations issued under the PIA or any other Act of the National Assembly.[66]

3. Conclusion

From the findings above, it evident that Nigeria has a plethora of laws protecting its environment and invariably seeking to curb climate change; especially with the advent of the Climate Change Act 2021 with its salient provisions on Climate Change. It is no news that regardless of the laws put in place to protect the Nigeria environment, the anthropogenic activities which are detrimental to the Climate is on the increase, Nigeria needs to make concerted efforts towards the implementation of the said laws and education of the general public about climate as most Nigerians do not know the least about climate change and the effect of their day-to-day activities on the environment.

4. Recommendations

a. It is noteworthy that, the above mentioned international convention and agreements such as the UNFCCC, the Kyoto protocol etc. have been ratified by Nigeria, but are yet to be domesticated in accordance with Section 12 of the Nigeria Constitution[67], thus having no application to the

[64] Petroleum Industry Act 2021, ss. 103
[65]Section 102(1)a-c, section 107 of the PIA
[66]Climate Change Act 2021, ss.202(c).
[67] Constitution of the Federal Republic of Nigeria , 1999(as amended)

country. This paper recommends that, the Nigerian government should do the needful with regards to domesticating these treaties and protocols to make up for the lapses in the PIA, Climate Change Act and the Nigerian constitution.

b. Mitigation strategy alone cannot work because global warming is already occurring and cannot be stopped. Also, adaptation strategy alone will not work because adaptation will get costlier and less effective as global warming grows. Therefore this paper recommends that Nigeria should apply the mitigation strategy to avoid the unmanageable consequences of global warming, and the adaptation to manage the unavoidable effects of climate change in Nigeria. To this end Nigeria should support/establish scientific research projects/centres, relevant to the formulation programmes geared towards adaptation and risk mitigation.
c. This paper recommends that Nigeria should take a decision whether it is outlawing gas flaring or not thereby ending the confusion on whether gas flaring is actually banned in Nigeria. An outright ban without exceptions that constitute loopholes for licencees to hide under to continue their deleterious activities against the environment will be very much appreciated.
d. This paper therefore recommends that the Nigerian government should not only declare its intention to curb carbon emission she should actually make concerted effort to fight against those activities that cause carbon emissions like, illegal mining activities in the Niger Delta region of Nigeria which is a major contributor to carbon emission (the release of CO2-carbon dioxide) in the Nigerian atmosphere.
e. This paper recommends also that Climate change education should also become an integral part of the education system, as part of the general studies curriculum and through modules on environmental issues. This could contribute to increasing environmental consciousness among students and young Nigerians in general. Thanks to the similar provision in the Climate Change Act.[68]
f. Another way to curb carbon emission is through the diversification of Nigeria's source of energy supply to include renewables. This paper recommends that the Nigeria Legislature should make laws that will enable Nigeria transit successfully to renewable sources of energy supply thereby making a shift from hydrocarbon as the only source of energy supply which in all description is deleterious to the Nigeria environment.

[68]Section 26, Climate Change Act, 2021.