Climate Change and Human Security in Rivers State, Nigeria.

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ABSTRACT

The paper examined climate change and human security in Rivers State, Nigeria. The security environment in Rivers State has degenerated in the last few decades. The old security challenge has assumed a devastating dimension, while new threats such as climate change have propped up. The concept of human security is about people-centred security, an unconventional aspect of national security, which was previously focused on protection from external aggression and protection of sovereignty but now includes social, economic, and environmental problems that threaten global security. At present, human security is viewed from the angle of freedom that the citizens of a nation enjoy a peaceful and safe environment. However, the change in weather conditions has become a serious threat to human security. The effects of climate change include health challenges, high temperature, flooding and erosion, poor agricultural harvests, among others. The investigation was informed on the fact that greenhouse gas emissions emanating from anthropogenic activities have adverse effects on the inhabitants of Rivers State. The study aims at interrogating the cause and effects of climate change in Rivers State. The study adopted a qualitative method of data gathering technique. The paper unravelled that climate change has serious effects on human security emanating from flooding, poor agricultural harvest, health challenges, among others. The paper recommends the government should intervene in the adaptation of climate change to sustain the Rivers State inhabitants.

Keywords: *artisanal refining, climate change, gas flare, human security, flooding.*

INTRODUCTION

In the last century, "the atmospheric scientists noted that the ozone layer, especially above the Antarctic, was rapidly thinning. Major culprits were CFCs –chemicals that have been widely used in industry, such as aerosol propellants and refrigerants, and in the manufacture of polystyrene" (Barash and Webel, 2014, p.433). The consequence of ozone depletion led to climate change. The recent change in weather conditions is triggered by the "greenhouse effect, which is caused by carbon dioxide (CO2) from fossil fuel burning and discharges of other chemical gases "(Rourke and Boyer, 2004, p.416).

The effects of climate change prompted the World Meteorological Organization in its 40th Executive Council, 1988, to establish a new international scientific assessment panel to be called the International Panel on Climate Change (IPCC). The 2007 IPCC's fourth and final Assessment Report (AR4) revealed that there is a considerable threat of climate change that requires urgent global attention. The Report further attributed the present global warming to largely anthropogenic practices (IPCC, 2007,p.8). "The Earth is almost at a point of no return as it faces environmental threats which include atmospheric and marine pollution, global warming, ozone depletion, the dangers of pollution by nuclear and other hazardous substances, and the extinction of various wildlife species" (Shaw,1995 cited Ayodele, 2010, p. 105)

The environmental security in Rivers State has been threatened in the last few decades. The old security threat has not been completely being erased, yet new threats have emerged in recent times, especially the effects of climate change. The cause of climate change is attributed to anthropogenic activities in the Rivers State. Rivers State is a commercial hub and destination of some multinational oil companies who are into oil exploration and exploitation since 1956 when oil was discovered in Oloibiri in commercial quantity. The oil production leads to a gas flare. Gas flaring is a major contributor to climate change globally. Nigeria is one of the largest producers of crude oil in Africa and flares a greater percent of her gas. The degree of emission emanating from gas flare contributes to change in the weather event in the state. Besides oil exploration and exploitation, artisanal refining of siphoned crude oil also contributes to emissions of greenhouse gases during the refining process. At present, there have been variations and uncontrollable extreme weather emanating from hundreds of artisanal refining camps in the Rivers State. Ikanone, Egbo, Fyneface, Oduma, and Ebimondikonyo (2014, p.41) noted that:

> During the refining process, the air around the operation usually turns dark with thick fumes. Carbon-based gases are consistently discharged into the atmosphere during the boiling process with all the consequences that this has for global warming and the phenomenon of climate change.

These anthropogenic activities have adversely impacted the weather events in Rivers State and Niger Delta region at large. Though, several authors have doubted the existence of the phenomenon (Barnett and Adger 2007, Nordas and Gleditsch 2007, Raleigh and Urdal 2007).

The consequence of climate change is enormous on the inhabitants of Rivers State, Nigeria. The effects of climate change in Rivers State include flooding and erosion, poor agricultural harvest, health challenges leading to death and displacement of the inhabitants. These adverse effects have become a 21st-century threat to national security. National security was initially viewed from a state-centric perspective; however, the demise of the Cold War in 1992, there was a paradigm shift from state-centric (traditional security) to peoples centred (human security) approach to national security. The import is that national security is focused on citizens and those challenges that non-conventional that adversely affects individual or citizen in the country. They include socio-political, economic violence and environmental degradation. Hence, Imobighe (1990,p.224) viewed the national security from the perspective of non-conventional approach as the "condition, in which citizens of a country enjoy a free, peaceful, and safe environment, and have access to resources which will enable them to enjoy the necessities of life or as freedom from danger, or from threats to a nation's ability to protect and defend itself, promote its cherished values and legitimate interests, and enhance the well-being of its people."Adedoyin (2013, p.125) cited the definition of human security from the Commission on Human Security as:

> The ability to protect the vital core of all human lives in such a way that it enhances human freedoms and human fulfillment. Human security means protecting fundamental freedoms that are the essence of life. It means protecting people from serious and persistent threats and situations. It means using processes that build on people's strengths and aspirations. It means creating political, social, environmental, economic, military and cultural systems that together give people the building blocks of survival, livelihood, and dignity."

Climate change affects rights to freedom, a peaceful and safe environment in Rivers State. The harsh socioeconomic conditions suffered by some communities, particularly those domiciled in the den of oil exploration calls for urgent attention. Therefore, the paper investigates the sources and effects of change in the weather conditions on the inhabitants of River State that endangers national security.

Conceptual Clarification

Climate change:

Climate change "is perhaps one of the most serious environmental issues that the present world's population is facing though the issue is not new" (Rahman, 2012, p.2). The United Nations Agency known as the United Nations Framework Convention on Climate Change (UNFCCC) refers to Climate Change as a change of climate emanating from anthropogenic activities (IPCC, 2007, p.30).

Historically, a French Physicist known as Jean-Baptist Joseph Fourier in 1820 was the first to discover a change in the climate. Fourier examined various possible sources of the additional observed heat. In 1824, Fourier presented an essay to the Academic Royale des Sciences in Paris on the regulation of the planetary temperatures. In his essay, Fourier understood that the "atmosphere is asymmetrical to the transmission of incoming solar energy and outgoing terrestrial energy-the constituent gases of the atmosphere are more opaque to outgoing thermal energy than they are to incoming short-wave solar energy" (Hulme, 2009, pp. 42 & 43).

Tyndall (1861) while experimenting in the laboratory in 1859 discovered that the atmosphere absorbs the differing amount of short - wave and long wave radiation. Tyndall discovery was further advanced after several years, which established for the first time that the molecules of water vapour, carbon dioxide, methane, nitrogen oxide, and ozone each display's some unique absorptive properties when radiant (infra-red) heat is passed through them; thus, for example, water vapour is 16,000 times more active in absorbing infra-red radiation, molecules, than is oxygen. The changes in the amount of any of the radioactively active constituents of the atmosphere could have produced all the mutations of climate which the researches of geologists' reveal (Tyndall, 1861, pp. 276-277).

By the 1890s, Suante August Arrhenius was the first to perform the calculations of a parameter which presented before the Stockholm Physical Society in 1895. Arrhenius was already familiar with the concept of the greenhouse, thinking of Fourier and Tyndall's experiment of water vapour. Arrhenius draws these ideas and data together to show that splitting or amplifying the concentration of carbon dioxide in the global atmosphere would lead to changes in the average surface air temperature of the Earth between about 40 and 50C. Even though it was known that nearly a billion tons of coal worldwide was being combusted annually at the turn of the century, the belief was that little of the released carbon dioxide would remain in the atmosphere. When contended with his discovery, Arrhenius conceded that such combustion might induce a notable increase in atmospheric carbon dioxide over the cause of a few centuries - such as warming, he deduced might be beneficial for humanity by starving off the next glacial cycle (Arrhenius, 1896, p.274).

Hulme (2009, p.61) argued that "the physical climate change is a change at all time - scale and we humans have become an active agent of change. But this alteration in perspective did not happen instantly, and it was not driven purely by science." The idea of anthropogenic climate change has today achieved such prominence in scientific, political and popular discourse. According to Handerson et al (2018, p.317) revealed that:

> The Earth's average temperature has been increasing since the Industrial Revolution. Between 1880 and 2015, the average global surface temperature rose by 0.9oc (1.5off). In 2016, the Earth experienced its third conservative hottest year since recordkeeping began. There is a broad consensus in the scientific community that this warming has been largely driven by increases in the atmospheric GHGs, particularly carbon dioxide (CO2), methane (CH4), and nitrogen oxide (N2O). (Emission of GHGs [is] often measured in equivalent units of CO2 emission, or CO2eq, by indexing the 100-year global warming potential of each gas to that of CO2). GHG emissions have grown since the Industrial Revolution and were 60% higher in 2014 than they were in 1990.

Climate change has atmospheric values, seasonal changes, and inter-annual variability that is a likely frequency of weather. "Since 1880, atmospheric CO2eq concentration has risen from around 290 ppm to 430 ppm" (IPCC, 2014, p.45). Nevertheless, the risk of climate change and the challenges of adaptation and mitigation cannot be continually viewed from natural science, especially the anthropogenic induced climate change. Liverman (2001, p.202) asserted that:

> To understand the real risk of environmental for society, research must move beyond basic environmental science and climate model for social sciences analysis of cause and effects. A more sophisticated and detailed analysis of the social causes of global change is required to project and manage the rates and locations of those human activities, such as industrialization and land use transformation, that is driving environmental change.

Hence, there have been several conferences to address climate change from the 1960s to date. They include the 1960s Environmental awakening, the 1972 Stockholm Conference on Environment, the greenhouse summer of 1988, the Paris Treaty of 2015, among others. The first major Intergovernmental Conference on climate change was

held in Toronto with representatives from forty–eight nations. The Conference statement on 'The Change Atmosphere: Implications for Global Security' called for a 20 percent reduction in carbon emission from 1988 levels among the industrialized nations by 2005. Still, in 1988, the World Meteorological Organization formally approved, at its 40th Executive Council, the establishment of a new international scientific assessment panel to be called the International Panel on Climate Change. However, the Intergovernmental Panel on Climate Change Reports (1990 and 2007) has proven that climate change exists. These reports have attributed the recent change in the climate to human activities on climate variability observed a period.

Traditional Security to Human Security

The concept of security has been controversial among scholars, especially in the field of security studies. The origin of the concept of security was traced to Cicero and Lucretius by Hans Brauch. According to Brauch (2005, pp.7&8),

> Security was introduced by Cicero and Lucretius referring to a philosophical and psychological state of mind, or the subjective feeling of freedom from sorrow. It was used as a political concept in the context of 'Pax Romana' by referring to political stability in the era of Augustus. In the theological Christian discussion, 'securitas' was used subjectively, being in continuous tension with 'certitude'. Since the Augustan period, and in the Middle Ages 'securitas' became a positive political concept that was closely linked with 'pax' and 'libertas', sometimes also associated with 'quietness'.

Towards the end of 16th century, security became 'securitas publica', which was aimed at protecting the "ruled provided by the rulers in peacetime while the ruled are obliged" (Brauch, 2005, p.8). Hobbes (1658) argued that security of individuals is essential "not only their consent but also the subjection of their wills in such things as were necessary to peace and defence and in that union and subjection the nature of a city consisted … for security is the end wherefore men submit themselves to others" (cited in Brauch, 2005, p.8). Thomas Hobbes further argued that the rulers are not bestowed with the responsibility to ensure and provide "safety" to be understood as "not the sole preserve of life … but to its happiness" (Hobbes, 1658 cited in Brauch, 2005, p.8).). Hobbes reached conclusions on "human experience and how individuals interact in the state of nature… it means that while all human beings seek self-preservation, their ability to establish definitively what enhances or decreases their security is deeply circumscribed. Since individuals possess no authoritative knowledge regarding the character of the external world, they reach different and often contradictory conclusions about what may pose a threat to their physical safety" (Rana, 2012, pp.428 &429). Another scholar who argued from the point of safety was John Locke. For Locke security is anchored on the power of society, which he considered as "peace, safety, and public good of the people" (cited in Brauch, 2005, p.8). The 17th-century security according to Kaufmann (1970) was "the security of the individual with the development of 'social security." Which is anchored on the "internal security of the state (police) and the external security of states (armed forces, military alliances) that refers to both a psychological and subjective feeling of being secure and safe and an objective situation and legally defined status of being protected" (Brauch, 2005, p.8). Between 18th to 19th centuries, the aim of security began to be key criterion for social steering. Security became institutionalized and governed by the law. The 20th century security became associated with averting dangers both internal and external through the use of "police and the courts (justice and home affairs) and other political, economic and especially military measures (security and defence)" (Makropoulos, 1995, pp.745-750 cited in Brauch, 2005, p.18).

Reconceptualization of Security

The doctrine of national security was developed by the United State during World War II "to explain America's relationship to the rest of the world" (Yergin, 1977, p.193). Thereafter, the concept of national security became stronger during the Cold War, particularly in respect to internal and national, alliance and international security, which was dominated by international bipolarism anchored on doctrines of deterrence to prevent a nuclear war. "National' and 'alliance' security focused on military and political threats posed by the rival system" (Brauch, 2005, p.18). Recently, many scholars (Buzan, Wæver, and Wilde, 1998) observed the widening and deepening of the concept of security in OECD countries. In some of these countries, the narrow concept of military security has further prevailed (Aydin, 2003 and Kam, 2003). "Within the UN and NATO as well as among EU member states,

different security concepts coexist, namely a Hobbesian state-centred political and military security concept and an extended Grotian concept that includes economic, societal and environmental security dimensions" (Brauch, 2005, p.18).

However, since 1990, particularly after collapse of Cold War, there was a paradigm shift in the scope of 'securitisation'. That is, from the national security to a human centred security concept with the UN system (UNDP 1994), hence, researchers and academic focused their study on peace studies with prejudice to security community. The "concept of human security represents a powerful, but controversial, an attempt by sections of academic and policy to redefine and broaden the meaning of security" (Acharya,2008,p.492). The definition of human security by the United Nations system Report in 1994 is the most widely cited. The UN Report "human security implies protection from sudden and hurtful disruptions in the patterns of daily life - whether in homes, in the job or communities" (UNDP,1994). Others have viewed human security from the perspective of attainment of "social, environmental and economic conditions conducive to a life in freedom and dignity for the individual" (Hammerstad, 2000, p.395).

The reconceptualize security fundamentally "became an analytical tool which attention on the individual, not the state" (Jolly and Ray,2006, p.5). The "primary goal behind the concept of human security… is the need to restore the security of people" (Nishikawa, 2009. p.215). It is argued that "human security goes beyond the conventional paradigm of security in more ways than one" (Sheehan, 2005, p.5) but addresses challenges that threaten human existence beyond external aggression which used to be the core value of the traditional security. Thakur (2004, p.348) noted that "human security is both "human-centered" and "security-oriented." It is human-centred in the sense that it focuses on people both as an individual and a group of individuals or communities, and it is security-oriented because its emphasis is on freedom from fear." However, there articulation of the idea of human security as a form of national security both in academic and policy levels were contentious. Hence, Brauch (2005, p.23) considering the various contentious positions of many scholars writes that:

> While many Hobbesian pessimists, neo or structural realists and the strategic studies community (Paris 2001), as well as state-centered peace researchers (Buzan 2000, 2002; Muller 2002), have rejected the human security concept, but other authors from the liberal and constructive perspective who are expected in peace research such as Grotian or Kantian have sustained this concept. Other proponents who are critical of the concept as 'freedom from want' have also taken the position (Krause 2004; Mack 2004).

The positions of various scholars vary in their scope and limitation on the concept of human security, but Uvin (2004, p. 352) buttressed that, "defining human security clearly or consensually is impossible. It shares this essentially unfixable quality with many of the other key concepts in both personal and public life. It is more of a process definition, focusing on the sorts of mental and policy changes that are required, leaving open what exactly the specific aim." Presently, there has been growing advocacy at the local, national and international for freedom from hazard impacts. It is pertinent to note that "while 'security studies' have returned to a narrow concept of national military security, specialists in environmental change and peace research have used the concepts of 'environmental' and 'human' security and their linkages" (Brauch, 2005, p.18).

A synoptic review of Rivers State.

Under Decree No. 14 of 1967, Rivers State was created out of the former Eastern Region by the General Yakubu Gowon administration on the 27th of May 1967 with the Port Harcourt as its capital. "The old Rivers State at its inception in 1967 covered a geographical area; measuring 15, 786 square miles with a population of one million, five hundred and forty-four thousand, three hundred and fourteen" (Sika, 2018).

Rivers State is located in the delta region (South-South Zone) of Southern Nigeria. Rivers State covers 11,077 square kilometers. Rivers State is constrained on the North by Anambra, Imo and Abia States; the South by the Atlantic Ocean, the West by Bayelsa and Delta States and the East by Akwa Ibom State. Rivers State has a topography of the fairly flat plain caught in a web of 72 rivers, creeks and tributaries, creating what Okonny (2002, p.18) denotes to it as 'a water environment'. Foremost of these rivers include New Calabar, Orashi, Bonny, Sombreiro, St. Bartholomew and Santa Barbara. There exists a balance between the sea and the land as Okonny (2002) noted that "the sea is either gaining on the landmass or the land is gaining on the sea."

There are three different and broadly similar geomorphologic and Geotechnical zones. The zones include, Saltwater/Fresh Water Transitional and Freshwater Upland Saltwater (marine) Coastal. These zones constitute the major environmental zones of the Eastern Niger Delta (Bell-Gam, 2002). The monthly rainfall in Rivers State is almost expectable and follows a temporal order to rise toward July-August before reducing in the dry season months of November – February. Oyegun and Ologunorisa (2002, p.57) noted that "the weather and climate of Rivers State is a function of its geographical location within the humid tropical environment, the short distance away from the Atlantic Ocean, the urban factor of pollution and the prevailing Tropical Maritime (TM) air mass which blows over the state at different times of the year."

The Rivers economy is divided into two with the Upland areas produces 'food-basket' in the state while the Riverine areas constitute the 'fish-basket'. Other traditional occupations in Rivers State include canoe carving, craftwork, and trading (Ayolagha and Onuegbu, 2002, p.39). Rivers State has a "high concentration of marine and forest resources that are sources of food, medicines, and shelter and industrial raw materials" (Nyanayo, 2002, p.68).
At present, Rivers State is one of the oil and gas-bearing states of Nigeria. Rivers State is among the states in the Niger Delta region that has highly concentrated drilling and oil production activities. The state is the heart of Nigeria's hydrocarbon industry and is responsible for over 48 percent of crude oil produced onshore, and almost 100 percent of the gas currently being exported to several countries in liquid form" (Rivers State Government Bulletin, 2003).

Factors that contribute to climate change in Rivers State, Nigeria

Gas flare: The gas flare is a common phenomenon among oil-producing countries and has become an environmental challenge globally. Ubani and Onyejekwe (2013, p.246) described gas flare as the "burning of natural gas and petroleum hydrocarbons in flare stacks by upstream oil companies in [the] oil fields during operations." "It burns through a gas flare on oil wells, in refineries, or chemical plants" (Gervet,2007, p.2). "The burning process produces carbon dioxide, carbon monoxide, and sometimes soot, depending on the efficiency of burning and the hydrocarbon composition of the natural gas" (Okotie, Ogbarode, and Ikporo, 2018, p.65). Similarly, Aniefiok and Udo (2013,p.70) noted that:

> In the petroleum industry, poor efficiency in the flare systems often results in incomplete combustion which produces a variety of volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and inorganic contaminants. …In some oil–producing host communities, most flaring and venting systems are located near residential areas and/or farmlands; and the resultant emissions potentially contribute to global warming as well as some local and/or regional adverse environmental impacts.

The gas flare increases greenhouse emissions in the Rivers State. Okotie, Ogbarode, and Ikporo, (2018, p.65) further revealed that "in developed countries that have hydrocarbon in commercial quantities, gas flaring has been banned and offenders pay severe penalties, which has made flaring of associated and non-associated natural gas a less attractive alternative for gas management."

Farina (2011, p.7) disclosed that "the amount of gas that flared is approximately 150 billion cubic meters of natural gas yearly globally." Out of 150 billion cubic metres of associated gas that are flared and vented annually globally, Africa flares 40 billion cubic metres yearly, and sub-Sahara Africa flares 35 billion cubic metres. In Nigeria alone, gas flaring amounts to about 23 billion cubic metres per annum in over 100 flare sites, constituting over 13 percent of global gas flaring (Okafor and Aniche, 2016, p.44). Farina (2011, p.7) revealed that "environmental degradation associated with gas flaring has a significant impact on local populations, often resulting in loss of livelihood and severe health issues." This level makes Nigeria one of the top countries in terms of the volume of gas flared, worldwide" (Omuta, 2017, p.73). Rivers State is endowed with a crude oil deposit and a host to several multinational oil companies operating in the state. There are several gas flare stations in various oil-bearing communities in Rivers State, which burns for twenty-four hours daily.

Deforestation: Besides, the deforestation for the cultivation of crops among farmers in Rivers State inhabitants, others include seismic and oil spill deforestation. Forest absorbs carbon dioxide from humans and animals. It also absorbs carbon from industrial pollution. Hence, constant deforestation increases the circulation of carbon dioxide leading greenhouse gas emission which depletes the ozone layer that protects the human from direct sunray.

Rivers state occupies part of the rainforest in the Niger Delta region, Nigeria. Oil exploration in Rivers State has resulted in types of deforestation. The first is deforestation by oil exploration and transportation. This involves clearing carried during oil exploration and pipeline construction that clearing of the forest. Okotie et al (2018, p.58&59) disclosed that "clearing destroys vegetation such as rainforests and mangroves, which are rich in biodiversity…Pipeline construction involves the clearing of vegetation and excavation of soil up to 3-6 ft. This requires a right of way of about 20-30 ft. In the process, the vegetation and the habitat of animals are destroyed, and the animals are driven into new habitats. Arable lands for farming are also destroyed." The second is deforestation through an oil spill. This is common with rusted oil pipes that have laid for decades. Deprecation of oil pipes leads to oil spills. Another type of oil spill led to deforestation is caused by oil theft in the Niger Delta. The process of siphoning oil requires a high level of expertise which is lacking these oil thieves. Hence, the oil thieves end up spilling the oil all over the forest or river.

Artisanal refinery: The inhabitants siphon crude oil from the NNPC pipeline and refine it to various petroleum products and sell to citizens. This criminal enterprise has gained moral support and popularity as vocation among youths in the state, particularly those from the oil-bearing communities. This illegal collection of crude oil from the pipes most time leads to the outbreak of fire. The process of refining crude oil leads to greenhouse gas emissions. The creek where this refining takes place, bush clearance is carried out to install the equipment, while trees are cut down and as firewoods for the refining of the crude oil. This exercise takes days and weeks. Sadly, the Hydrocarbon Act of 1968 disallows any individual or group of persons other than the government to refine crude oil. As a result, the Federal government deploys security agents to monitor and protect the oil pipes. However, the security agents who are trained in dismantling refining equipment prefer to burn them down. This leads to greenhouse gas emissions. Most times, the equipment usually has oil in them and they burn for days.

The effects of climate change on human security in Rivers State, Nigeria.

Increase in temperature:

The effects of the rise in temperature are unbearable on Rivers State inhabitants, particularly those communities where gas flare stations are sited. The rise in temperature leads to stunts growth of food crops, body rashes, among others. Obi and Osang (2015, p.4) disclosed that "soil temperature regulates seed germination, plants and roots growth and the availability of nutrients… Heavy mulching (a type of soil cover) can slow the warming of the soil, and, at the same time, reduce fluctuations in surface temperature." "High temperature does not enhance plant physiology, therefore, impairing a plant's normal growth, photosynthesis, and flowering" (Chukwuka et al, 2018, p.134).

Public Health: The citizen's health is central to economic growth and development. Health is an integral part of human security. A healthy nation is a wealthy nation. A nation whose citizens are not healthy cannot maximize her productive force. Nations ensure that her citizens are healthy; hence, the nation's annual budget for the health sector is huge. Change in the weather variation has become a global threat, not to countries alone, but also international organizations.

Costello, et al (2009) considered climate change as "the biggest global health threat of the 21st century." The Rivers State atmosphere is very hot. There is extreme rainfall in the Rivers State. Both high temperature and extreme rainfall have severe consequences for health outcomes. The World Health Organization (WHO) (2002, p.21) disclosed that "many of the main global killers of children, including malaria, diarrhoea, and malnutrition, are sensitive to climatic conditions such as flooding." In the Rivers State, there is a strong indication that the high temperature emanating from gas flare "led to severe health crises such as deformities in children, lung damage, pneumonia,…" (Onigbinda et al, 2018. p.8). There are common cases of cataracts (eye disease), malaria and typhoid, weakness of the body, heat rash, cholera, and dysentery, among others in Rivers State emanating from a change in weather events.

Food Security: Climate change threats food production in Rivers State and Nigeria at large. The traditional economy is predominantly farming, fishing, and forest resources. The seafood constitutes a significant food component of the rural dwellers, especially those in the coastal communities. The sea-level rise affects the mangroves- habitats for some kinds of seafood such as crabs, shrimps, fishes, salt, periwinkles, oyster, mullets,

mudskipper, and the increase in temperature affect the crop yielding. Some species of this seafood are going into extinction. Some of these kinds of seafood serve as sources of nutrition and income for the inhabitants.

The alteration in the weather pattern leads to poor agricultural harvest and shortage of food production. The extreme weather condition leads to flooding, erosion, wetland, drought which poses danger to farmland and crops cultivated on it. Climate change also increases the spread of pests and diseases on crops, thereby leading to a poor harvest. The high temperature also hinders livestock and fish production, weight gain of livestock and depresses the production of arable lands.

The majority of the crops, forest resources, and seafood in the Rivers State have gone into extinction because of sea-level rise, erosion, and flooding or increase in temperature emanating from the gas flare. Agriculture is not only essential to the socio-economic development of a nation but serves as part of nutrition to the citizens. The rise in temperature affects agricultural production in Rivers State. Isichei and Sandford (1976) noted that "flare sites had higher temperatures, and this had profound effects on soil fertility, standing vegetation, and crop growth."

Erosion, Flooding, Force migration, and displacement:
Climate change has increased the flooding in the country from north to the south, east to west in Nigeria. All parts of the country have experienced flooding leading to loss of human lives, destruction properties, and farmlands. Ward (1978, p.326) defined flood "as any relatively high flow, which overtops the natural or artificial banks in any reach of the streams or as a large quantity of water covering an area after held capacity is reached."

The International Federation of Red Cross and Red Crescent Societies (2012, p.1) disclosed that the "heavy rains between July and October 2012 in Nigeria led to the overflow of reservoirs, forced the release of dam water and breach of riverbanks, causing damage to roads, bridges, and other infrastructure, loss of property, livestock and displacement of people. The intense rains caused flooding in 33 of the 36 states, affected 7 million people, displaced 2.1 million and killed 363" in Nigeria.

Al Jazeera (2012) reported in 2012 that “Nigeria suffered disastrous floods across 30 of its 36 states. Hundreds of people died, and some two million people were left homeless.” In 2018, more than “141 lives were lost to a rainstorm, windstorm and flood disasters across the country …” (Amaize et al, 2018, p.1).

Most "communities along with river/waterways with low elevation/relief, gentle slope and close distance to shoreline influence their vulnerability to coastal dynamics" (Ogoro et al, 2016, p.6). Most communities in the Orashi region in Rivers State are examples of communities along with coastal areas that have experienced heavy flooding in recent times. In 2018, “no fewer than 2,000 persons have been rendered homeless” (Onukwugha, 2018) in Ogba/Ebema/Ndoni Local Government Area, Rivers State. In 2012 and 2018 flooding in Rivers State, the most vulnerable inhabitants were the children, women, aged and the physically challenged. “Children, especially young children, are in a stage of rapid development and are less well equipped on many fronts to deal with deprivation and stress”(Amangabara and Obenade, 2015,p.81). Most of the flood victims were forced to migrate to “Internally Displaced Person camps in Akinima, Mbiama, Abuoha and Akiniso in Rivers State where they were provided with relief materials such as “bags of rice, beans, garri, salt, and detergents as well as children and adult wear, mattresses, blankets, mosquito nets and drugs… cartons of beverages, seasoning cubes, bathing soap, tinned tomatoes and milk as well as bottles of palm oil” (ThePunch, 2018). The relief materials were also extended to flood victims those accommodated by their relatives and friends. Besides, the relief package, the flood victim’s camps are confronted with various challenges such as toilet facilities, water-borne diseases, and other health issues. Oriji (2015, p.123) described the 2012 flood victim’s experiences in Orashi axis of Rivers State disclosed that:

> People in flood areas are infected with fever, cholera, dysentery, diarrhoea and other diseases, due to their contact with contaminated drinking water and wastewater facilities, as well as vector-borne diseases arising from flooding.

Conclusion and Recommendations

Climate change is experienced in parts of Rivers State and Nigeria at large leading to adverse effects on human security. Well-being of citizens is central to national security. The environment constitutes part of national power; hence, anything that affects the environment negatively impacts the citizens. The paper revealed that various threats posed by the climate change such as poor harvest and food shortage, flooded farms and residents, displacements, destruction of lives and properties, health challenge and increase in temperature, among others have the potential to undermine the national sovereignty resulting to periodic refugees in Rivers State and other parts of Nigeria. Therefore, the paper suggest that climate change must be examined not only on the bases of adaptation but the factors that contribute to the phenomenon in the Rivers State and Nigeria at large. Second, there should be a comprehensive method of adaptation, which shall involve the local people including women and youths. Third, the government should establish a modular refinery in Rivers State, which will constitute an alternative to artisanal refineries. Fourth, the government should in the adaptation of climate change to sustain the Rivers State inhabitants.

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