

Climate Change and Poverty Nexus

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Abstract—Climate change and poverty are global issues which cannot be waved aside in welfare of the ever increasing population. The causes / consequences are far more elaborate in developing countries, including Nigeria, which poses threats to the existence of man and his environment. The dominant role of agriculture makes it obvious that even minor climate deteriorations can cause devastating socio-economic consequences. Policies to curb the climate change by reducing the consumption of fossil fuels like oil, gas or carbon compounds have significant economical impacts on the producers/suppliers of these fuels. Thus a unified political narrative that advances both agendas is needed, because their components of an environmental coin that needs to be addressed. The developed world should maintain a low-carbon growth & real commitment of 0.7% of gross national income, as aid to developing countries & renewable energy approach should be emphasized, hence global poverty combated.

Keywords—Climate Change, Greenhouse gases, Nigeria, Poverty.

I. INTRODUCTION

A. Conceptual Framework

CLIMATE change is a pertinent issue in the global space due of its attendant problems, which pose a lot of threat to the existence of man and his environment. Climate change can be described as the biggest environmental issue of our time. It is global in its causes but its consequences are far more elaborate in developing countries, including Nigeria. Climate change refers to any change in climate overtime, due to natural variability as observed over a time-period or a direct (indirect) human activity which may alter the components of global atmosphere.

The Fourth Assessment Report (AR4) by the Inter-governmental Panel on climate change (IPCC) gave the most acceptable definition of climate change, which states that “climate change is a change in the state of the climate that can be identified (through statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer” [6]. Climate change does not have same meaning with terms like climatic fluctuations or variability. Climate fluctuation or variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc) of the climate on all spatial and temporal scales beyond that of individual weather events. Although climatic variability just like climate change, may be due to natural internal processes

within the climate system (internal variability), or variations in natural or anthropogenic external forces (external variability). The most crucial things about the concept of climate change is not only the time periods involved but also the degree of variability that the change is subjected to, as well as the duration and impact of such variability on man and the ecosystem [8].

The Federal Ministry of Environment in 2003 opined that climate change has become a global issue in recent times, manifesting in variations of different climate parameters which include cloud cover, precipitation, temperature ranges, sea levels and vapour pressure. The variance in climatic parameters has effect on agriculture, health, water resources, energy etc. Climate change is attributed to majorly anthropogenic activities like the continuous rise in the industrialization process in developed and emergent economies. These had led to the introduction of large quantities of greenhouse gases (GHGs), such as carbon oxide (CO₂) due to increased usage of fossil fuel and land use change, methane (CH₄) and nitrous oxide (N₂O) primarily due to agriculture released into the atmosphere. It is known fact therefore that the primary causes of global warming are the GHGs, hence the earth is getting warmer and human beings are mainly to be blamed for the development [3].

The World Health Organisation (WHO), defined poverty in absolute terms of low income which refers to individuals living below US\$2 a day. Although in reality, the consequences exist in a relative scale. However, poverty is seen as a state of being poor, lack of means of producing materials for basic needs. The nexus between climate change and poverty can then be seen as having negative consequences on human well being. Nigeria been a developing country, with large population, most of which are not skilled, depend on their immediate environment for survival. This survival instinct to reduce poverty is however threatened by the emission of GHGs. Climate change will therefore compound existing poverty. Its adverse impacts will be most striking in the developing nations because of their geographical and climatic conditions, their high dependence on natural resources, and their limited capacity to adapt to a changing climate. Within these countries, the poorest, who have the least resources and the least capacity to adapt, are the most vulnerable [5].

Noteworthy is that, the poor are not only at risk when national economies are held back but are mostly at risk when climate change arrives. Various researches had shown that, Sub Saharan Africa and Southeast Asia are home to many of the world poorest, and are therefore regions that can easily be destabilized by climate shifts. The World Bank warns that within twenty years, rising drought and heat could render 40

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percent of sub-Saharan Africa's farmland unsuitable for growing maize, a staple crop in global diets. Even when most of the continent's grazing land for livestock could also be degraded beyond being usefulness. In Southeast Asia, the 2010 floods that affected 20 million people in Pakistan could become commonplace, and altered monsoon patterns could wreck the livelihoods of many of India's farmers [9].

B. Research Problem

Majority of the rural populace are employed in the agricultural sector, which also contributes a significant percentage to the Nigerian Gross National Product. The dominant role of agriculture makes it obvious that even minor climate deteriorations can cause devastating socio-economic consequences. Policies to curb the climate change by reducing the consumption of fossil fuels like oil, gas or carbon compounds have significant economical impacts on the producers or rather the suppliers of these fuels. Nigeria is the eighth largest oil supplier in the world and the ninth largest reserves holder of natural gas. Although the mainstay of Nigerian economy is the revenue from oil, to reduce poverty, rural dwellers engage in subsistence agriculture. Climate change tendencies on the economy and living standard of the citizen will therefore be affected massively due to its effect on agriculture. The Nigerian national economy would be seriously affected by a sustainable reduction of fossil energy consumption. Nigeria is practically a monoculture: about 80% of the government income and more than 90% of the foreign exchange revenues evolve from the oil sector. Nigeria government over the past periods tried to diversify, but special attention is now been paid to gas which emerges in the joint-production of oil. The study, therefore, seeks to ascertain the extent to which climate change has affected Nigeria and the possible poverty reduction strategies adopted to manage the challenges associated with climate change. The link between climate change and poverty is pertinent therefore to employ necessary strategies at reducing the duo and hence improve on the living standard and Nigeria's economy.

C. Research Objectives

The broad objective of the research is to identify ways and means by which climate change impacts Nigeria and the challenges this poses on the nation's poverty levels. In order to achieve this, the research examines the following key specific objectives:-

- i. To identify the varied factors or activities responsible for climate change in Nigeria
- ii. To identify the various challenges such as flooding, drought, erosion, sea level rise and effects that climate change brings on the country.
- iii. To proffer solutions on how to reduce poverty related with climate change events in Nigeria.

II. LINKAGE BETWEEN HUMAN VULNERABILITY, POVERTY & CLIMATE CHANGE: THE GLOBAL AND REGIONAL LEVEL

Vulnerability refers to the degree to which people or the things they value are susceptible to, or are unable to cope with,

the adverse or negative impacts of climate change. Vulnerability therefore determines the level of severity the impacts of climate change. Vulnerability as it affects climate change involves three (3) components namely; *exposure*, *sensitivity* and lastly *adaptive capacity*. The degree at which people and things of value are exposed to climate variations is referred to exposure. Sensitivity on its own part is the degree at which exposure can impair people whilst adaptive capacity is the degree of mitigation against the potential of harm, through the action to reduce the exposure or sensitivity. Valuable items can be in form of spiritual, cultural and persons but not limited to economic wealth. Although, things of value may either be due to intrinsic reasons or due to need for successful functioning of the society.

However, people and things they value react differently to climate variations. Some people can be highly vulnerable to low- impact climate change because of high sensitivity or low adaptive capacity. Others may have little vulnerability due to high impact climate change due to insensitivity or high adaptive capacity. Notably, climate variations will result in impacts that are highly variable due to variations in vulnerability in space and time. Women typically spend more time and effort on care-giving to parents, children and the sick than men do; hence they are more vulnerable to climate change due to care-giving induced exposure. Disadvantaged group of people like the minorities, poorly educated or non-English speaking are very vulnerable than the majority, better educated, English speaking population. Lastly, the elderly or very young people, the sick and of course the physically or mentally challenged are also quite vulnerable to variations in climate. Sometimes, the groups above are combined, such that the poor may also be old, minority, non-English speaking and female. Another scenario that is very common is single-colored mother whose responsibility is to provide and give care to the children and entire family, whereas she is poor.

As a percentage of GDP, climate damages in Africa are expected to be higher than in any other region in the world, more than 10% higher than the next most exposed region (India) and more than twice as high as in the US, Russia, Eurasia and Latin America. According to Regional Integrated model of Climate and the Economy (RICE), Africa is not only expected to be more vulnerable to climate change than any other region in the world, but the vulnerability increases with higher temperature increases. When climate damages are plotted with different temperature increases, relative to the climate damages that Africa is projected to experience if temperatures increase by 2°C. Africa is the most exposed region at all temperature increases but the absolute gap between Africa and other regions increases for more extreme temperature increases [2].

A. Causes, Consequences & Types of Climate Change

The most harmful negative effects of climate change in Nigeria and other subtropical countries include frequent drought, increased environmental damage, increased infestation of crop by pests and diseases, depletion of household assets, increased rural-urban migration, increased

biodiversity loss, depletion of wildlife and other natural resource base, changes in the vegetation type, decline in forest resources, reduction in soil conditions (moisture and nutrients), increased health risks and the spread of infectious diseases, changing livelihood systems [1], [7].

However, two types of climate change exist; man-made & normal climate change. People that involve themselves in bush burning, cause the man-made type, while the normal type can exist without human life. There is enough evidence to show that the activities of human beings influence the global climate system. This is seen in the continuous rise in temperature, an increase which is due to emission of GHGs like CO₂. The Inter-governmental Panel on climate change (IPCC) in 2001 said the emission of CO₂ due to fossil fuel burning are the main causes of increasing atmospheric CO₂ in the 21st century. According to [3], which showed how weather patterns can easily explain climate change, the sun emits its rays of light on the earth surface. The ray of light is divided into three folds. Where the earth absorbs some heat and reflects some back into the atmosphere. The last part is sent out in form of infra red rays, which are then cushioned by the clouds and water vapour to stabilize the temperature of the earth. Simply put, the problem now with increase emission of GHGs, which are absorbed from the earth and re-radiated such that there is an increase in temperature is therefore called global warming.

Reference [7] believed that climate varies naturally as a consequence of interaction between ocean and atmosphere, earth orbital change and the amount of energy from the sun. Consequently, the GHGs have their own usefulness, because they also sustain plant life. This is due to the fact that, they allow the sun rays to enter, but stop some heat from leaving, hence the heat warms up the earth to allow for life thriving. A greenhouse effect then occurs when the production of GHGs makes more heat to be trapped and changing the climate unnaturally. The anthropogenic activities of humans that can lead to increase in GHG emissions are fossil fuel burning, deforestation and increased population. Fossil fuel such as coal, oil and gases when burnt will create energy, but some GHGs are released. Thus the energy created are used in heating homes/building, growing & cooking of food, transportation (bus, train or airplane), water treatment, manufacturing, just to mention but a few [7].

Carbon emission is however increased due to deforestation. The reduction of forests, due to faster rate of cutting trees than replacing them, leads to about 5.9 billion tonnes of CO₂ per year is released to the atmosphere, thus 20% carbon emitted is apportioned to deforestation, a percentage more than what the transportation sector produces. Noteworthy also is the fact that as a rise is experienced in the population, there is need for more food, livestock and energy. The demand for which will lead to increased emission. The influence of the sun cannot be waved aside with climate, because the sun is the main source of energy on the earth. Any variation therefore in its solar intensity will affect global climate.

The greenhouse gas effect which is the ability of the atmosphere to capture and recycle energy emitted by the earth surface is another major concern with climate change. The

sunlight heats up the earth during the day, as the surface warms up; it also releases some heat which cannot be seen like the sunlight. Ordinarily at the scale of whole earth, inasmuch as heat given by the Earth is received by the Sun, it keeps the temperature of Earth stable at about 15^oC [7]. The amount of heat received from the Sun round the year determines the seasonal variation (weather), throughout that year. The earth orbits the sun once every year. Although, the orbit is quite regular, but some tiny variations exist in the effect of heat received from the Earth by the Sun, hence the climate of the Earth, thus orbital variations is important in climate change analysis. The ocean being an important component of the climatic system interacts with the atmosphere. The ocean covers about 70% of the earth surface. Water stores some heat than air, hence the ocean will store immense amount of heat. Consequently, like the wind in air, water in oceans moves in series of currents (either deep down or surface), thus the ocean moves heat all over the world, majorly from area close to the equator to areas close to the poles.

B. Implications for Poverty

The implication of climate change on poverty is well noticed on health. This is due to the fact that Nigeria inhabitants already are suffering from nutritional imbalances. Hence the effect of climate change on food security most especially agricultural produce will be adverse. The already underprivileged citizen maybe exposed to vector borne diseases such as malaria (mosquito), sleeping sickness (tse-tse fly) due to shift in location of such diseases. In the rural areas where the drainage system had collapsed, mosquitoes will thrive at location where water logging characterizes the landscape. Malaria will increase due to prevalence of stagnant pools of water resulting from sea level related flooding. However increased incidence of heat waves may lead to more health problems. For example cerebro-spinal meningitis (CMS), which is most common in high temperate northern winter season and less in absolute humidity, is quite significant.

However, conflicts can ensue due to climate change problems. Most especially in developing countries, (e.g. Nigeria), these can be seen in the migration from drought prone zones down-South, leading to conflict between the original inhabitants and new comers. Of note therefore in tackling poverty are the twin phrase of “*health is wealth*” and “*a healthy population is a wealthy one*” thus for people already living below poverty line, their health status must be taken seriously to transform livelihoods. The health status of this group of people if well transformed can lead to a growth of labour force in agricultural sector. This is because, the low productivity of the agricultural sector on the continent which translated into low incomes for agricultural workers, can be eliminated. Hence poverty reduced to a minimum proportion of the population.

Moreover, visible disconnect is observed in poverty, nutritional levels and per capita income of some countries. Countries such as Tanzania, Liberia, Rwanda though with high poverty rate hence difficulty is experienced for

nutritional levels been satisfied. In Democratic Republic of Congo and Comoros which have a higher per capita income levels, they suffer grave undernourishment rate. This scenario can be likening to income being better directed to nutrition, which is more likely to occur when women receive income directly into their own hand. This is known as the positive income perspective. The other side of which is negative impact perspective, which may be from disruptions or conflicts that prevent cash incomes from reaching households. A significant amount of country research over several decades has shown, for example, that “households in which women have more resources often spend more on household and child nutrition diet (quantity and quality) than do male-dominated households” [4].

III. CONCLUSION AND RECOMMENDATION

A. Conclusion

Poverty and climate change are two of the most pressing challenges of mankind in this present generation. Reducing poverty and improving human livelihoods are at the core of the original Millennium Development Goals (MDGs), formulated in 2000. Though since then, growth had been experienced significantly, but with uneven economic and social progress. The global population is growing towards 9 billion people by 2050, with nearly 3 billion expected to join the middle class in the next two decades. However, about 1.3 billion people are still trapped below the poverty (\$1.25 per day), with another hovering on the brink (\$1.25-\$2.00). Thus, countries need to make specialized effort to achieve the aspiration of eradicating extreme poverty.

The climate challenge is also becoming very clear. Given the high rates of global greenhouse gas emissions, the manifestation of climate change is here. The last decade (2001-2010), is the hottest ever witnessed. Some effects already staring humanity in face are the shrinking of the Arctic sea, deadly heat waves, new diseases and food price spikes. People in the already vulnerable living condition will be hit most. Poverty, development and climate change are well linked; a link that cannot be easily broken. The achievement of development goals will be short-lived, if climate variations are not avoided. Consequently, if done rightly, investments in infrastructure, agriculture and energy, as well as traditional development issues, will be quite effective in reducing emissions.

A critical leverage point is created whenever the duo of growth and global warming are discussed. Aggressive efforts to cut down carbon emission will impede economic expansion and establish lack of access to energy. Thus the improvement to the standard of living of the already impoverished will nose dive, affecting the global poor negatively. At a period when governments throughout the world are struggling to boost growth, increase access to energy and improvement to food security, the full costs and benefits of climate policies need to be looked into. This is due to the fact that it cannot be a case of tackling one and leaving-out the other, both (climate change & growth) must be tackled together.

B. Recommendations

Based on the above, the following recommendations are given;

A unified political narrative that advances both agendas is needed. This is because climate change and development are two sides of same coin, but for reasons of complexity and politics their negotiations run parallel. Secondly the developing countries which are affected most by climate change did the least to cause the problem. Thus the developed countries should reduce carbon pollution and honor the commitment of 0.7 percent of gross national income, as aid to developing countries. The developing countries on their own part should make commitment to low –carbon growth.

As renewable energy is becoming more viable in global markets, it can provide needed avenues to combat global poverty. The distribution of solar panels in Sub-Saharan Africa (SSA) is proving effective way to quickly access energy in even the smallest and most isolated communities without having to wait for connection to national grid. The level of effectiveness and efficiency can be improved by injection of more funds to global warming policies and eradication of poverty. Ultimately, putting in place strong and fair approaches to sustainable development and climate change will improve the lives of billions of people. Thus our leaders should have the obligation to get it right!

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