

CLIMATE CHANGE AND SOCIO-ECONOMIC DEVELOPMENT IN ANAMBRA STATE, 2002-2024

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Abstract

This paper focuses on climate change and socio-economic development in Anambra State, 2002-2024. It examines the factors influencing climate change, the challenges posed by climate change to the people and proffer solutions to the challenges posed by climate change to the people of Anambra State. The paper employs the qualitative approach and the main sources of data collection are primary sources. These primary sources are accompanied by secondary and tertiary sources which include textbooks and journal articles. The paper employed Anthropogenic Global Warming (AGW) Theory which was propounded by Swedish Scientist Svante Arrhenius in the year 1896. The theory contends that human emissions of greenhouse gases, principally carbon dioxide (CO₂), methane and nitrous oxide are causing a catastrophic rise in global temperature. During the past century, human activities such as burning of wood and fossil fuels as well as burning of forests are thought to have increased the concentration of CO₂ in the atmosphere by approximately 50%. Svante Arrhenius being the proponent of the AGW theory believes that man-made CO₂ emissions which is one of the causes of climate change is responsible for floods, drought, harmful harmattan and others. In Anambra State, human alterations of the natural world or man-made emissions has affected the environment which has led to flooding, drought, severe harmattan. flooding for instance, has affected Anambarians in critical ways and this flooding are caused by erection of structures in wrong places, burst of water main pipes, dam spills, poor agricultural practices, illegal mining, poor waste disposal, poor engineering practices without regards to environmental impact assessment, extraordinary heavy rainfall, deforestation, housing development in flood-prone areas and building in a very low lying areas. The research also discovered that the challenges posed by climate change to the people of Anambra State include: destructions of shop and goods; destruction of machines in some of the industries, destruction of farms and buildings; forcing some people out of their homes, food insecurity, destruction of schools, church and government projects. Arising from the above findings on the causes and consequences of climate change in Anambra State, the research concludes that the attention of both the state and Federal government of Nigeria are needed through: reducing the burning of fossil fuels, use of renewable energy source, introduction of environmental education in school curriculum from primary to higher institution, building of wing dam or wing dike in Anambra State; building of spillways; establishment of afforestation and building of artificial levees as these will go a long way in the managing or reducing the future consequences of the climate change effects in Anambra State.

Keywords: Climate Change, Gross Domestic Product (GDP), National Income, Per Capita Income, Socio-Economic Development

INTRODUCTION

Climate change which has been described as a statistical variation that persists for an extended period, typically for a decade or longer and has become a problem to the citizens of Anambra State because of its devastating effects to the people's homes, farmland and businesses. Climate change has affected Anambra State so badly that even the complaints of the residents of Anambra State have attracted the attention of both the local, state and the federal government of Nigeria. It has affected both the citizens and the socio-economic activities of the state¹.

Climate change has eaten deep into the fabrics of the ecosystem that government and people of Anambra State are today confronted with climate change challenges on a daily basis. Climate change may be the biggest health threat of the 21st century. Similarly, Onwuka maintains that the technological and scientific development has exacted much pressure on the eco-system causing stresses and strains.² In the same vein, Odeh opined that, it is deeply disturbing that the much desired man's environment has been seriously abused through continuous release of prodigious amount of pollutants in it, unfriendly behaviours such as deforestation in the name of civilization, industrialization, modernization and development.³

Apart from the above, climate change affects socio-economic development and economies whose economic activities are natural resource sensitive, such as agricultural activities. According to Onuoha, climate change leads to significant reductions in socio-economic development and agricultural productivity in developing countries.⁴ Indeed, the effect of climate change on agricultural activities can be viewed from various aspects. Climate change affects the distribution of rainfall and temperature during a year and this determines crop yields especially those crops cultivated under rain-fed conditions. Excessive rainfall leads to destruction of arable land, impairment of cultivated crops, increased growth of weeds and greater post-harvest loss while a significant reduction in rainfall

may culminate in drier land, reduction in water level in streams and rivers, increase in farmers' search for water for irrigation and consequently resulting in invaluable man hour losses and reductions in crop yield.⁵ Climate change also affects livestock production due to reduction in the available pasture land, reduction in surface water resources for animals, increase in salinity of water resources for animals, increase in salinity at watering points due to increased temperature and evaporation in the face of reduced rainfall. This implies that there would be a decline in the production of livestock, resulting in a reduction in the supply and availability of animal protein including meat, egg, milk and other animal produce such as hides and skins.⁶

In Nigeria, climate change also affects forestry due to erosion and excessive wind thereby resulting in decline in forest produce such as wood and cane. Consequently, it leads to reduction in forestry produce and low income, as well as an increase in the costs of building and furniture materials. Onuoha estimated the cost of deforestation and losses in non-timber forest products in 2019 in Nigeria at N120 billion per year, which is equivalent of 1.7% of Gross Domestic Product (GDP) in 2003.⁶ Obviously, climate change portrays a potential threat to the composition of agricultural output in particular and to aggregate national output in general.

THEORETICAL FRAMEWORK

The theoretical framework adopted for this work is Anthropogenic Global Warming (AGW) theory which was propounded by Swedish scientist Svante Arrhenius in the year 1896. Anthropogenic Global Warming (AGW) theory is the first theory of climate change, which contends that human emissions of greenhouse gases, principally carbon dioxide (CO₂), methane, and nitrous oxide, are causing a catastrophic rise in global temperatures.⁷ The mechanism whereby this happens is called the enhanced greenhouse effect. Energy from the sun travels through space and reaches the earth. The earth's atmosphere is mostly transparent to the incoming sunlight, allowing it to reach the planet's surface where some of it is absorbed and some is reflected back as heat into the atmosphere. Certain gases in the atmosphere, called "green-house gases," absorb the outgoing reflected or internal thermal radiation, resulting in earth's atmosphere becoming warmer than it otherwise might be. Water vapor is the major greenhouse gas, responsible for about 36-90% of the greenhouse effect, followed by CO₂, methane, and ozone.⁸ Human activities such as burning of wood and fossil fuels as well as burning of forests are thought to have increased the concentration of CO₂ in the atmosphere by approximately 50%. Svante Arrhenius being the proponent of the AGW theory believes that man-made CO₂ emission is responsible for floods, droughts, severe weather, crop failures, species extinctions, spread of diseases, ocean coral bleaching, famines, and literally hundreds of other catastrophes. According to Svante Arrhenius, all these disasters will become more frequent and more severe as temperatures continue to rise so that only large and rapid reductions in human emissions will save the planet from these catastrophic events.⁹

In justifying the aptness of this theory to the study, first of all, it is important to note that, Anthropogenic Global Warming is the name given to the rise in average global temperatures that is primarily attributed to human activity. Global warming is caused by the build-up of greenhouse gases in the earth's atmosphere. These gases form a "blanket" around earth that traps energy from the sun.¹⁰ Following the above assertion and considering the topic of this study, one can understand that the present study focuses majorly on how climate change affects the socio-economic development in Anambra State which is the core tenets of the theory adopted; which it was observed that, Anthropogenic Global Warming (AGW) theory is the first theory of climate change, which contends that human emissions of greenhouse gases, principally carbon dioxide (CO₂), methane, and nitrous oxide, are causing a catastrophic rise in global temperatures.

CLIMATE CHANGE IN ANAMBRA STATE

Climate change according to Odjugo is one of the most critical challenges ever to face humanity. It can cause the worst forms of economic and security problems for humanity. It determines the health of the resources on which the economy depends and this phenomenon is one of the challenges confronting West Africa among other sub-regions of the world of which Anambra State is not an exception. Climate change however arises from the release of greenhouse gases, carbon dioxide, water vapour and nitrous oxide into the atmosphere due to human activities, such as fossil fuel burning, gas flaring and deforestation.¹¹ According to Onuoha, it is expected to hit developing countries the hardest. Its effects—higher temperatures, changes in precipitation patterns, rising sea levels, and more frequent weather-related disasters—pose risks for agriculture, food, and water supplies. He further states that, the earth's average temperature has increased about one degree Fahrenheit during the 20th century. That might sound like it isn't a great change, but its effects on our environment have proven otherwise. The impacts of this small change in the temperature are many, from longer drought seasons and heat waves to more aggressive hurricanes.¹²

Furthermore, the increase in the earth's average temperature created a variety of problems that left a lasting scar on our environment. For example: This table shows the regionalization of the impact of climate change in the

communities located within Ogbaru wetland. From this figure, the area was organized by the model in a three group cluster as follows;

Climatic Change Impact: Similarities of Communities in Ogbaru

GROUPS	GROUP FEATURES	COMMUNITIES AND THEIR IDENTIFICATION NUMBER
1.	High climatic change impact	Okpoko (1) and Ogwuikpele (14)
2.	Moderate climate change impact	Odekpe (2) and Akili Ogidi (13)
3.	Low climatic change impact	Ohital (3), Atani (4), Akili Ozizor (5), Umuzu (6), Ochuche (7), Ogbakuba (8), Umunankwo (9), Ossamala (10), Obegwe (11), Ogwuanocha (12), Mputu (15) and Umuodu (16).

Source: Authors Fieldwork

The cluster analysis has thus agglomerated the 16 communities into 3 groups based on the degrees of impact of climate change on them, viz; Group 1 communities are those that are flooded for over 8 months of the year. Included here are Okpoko which is in the urban area of the wetland. The high level of impervious covering, blocking of drainage systems and manifest absence of any type of vegetation in this area together with its very low lying relief may have accounted for this. Then Ogwuikpele which is another community in this group is also usually overrun by flood for most part of the year, at times up to 9 months.¹³ The main reason here is as a result of its low lying relief and its location at the point where the river Niger seem to have one of the greatest discharge rates. The overflow of the river bank by the water from the river into the overlying plain is therefore an essential geographical feature of this location.

Group 2 are two communities that have moderate climate change impact. As in group 1, here only two communities are included and they are Odekpe which has a considerable level of urbanization. The other community is AkiliOgidi which is very close to Ogwuikpele. All the factors that gave rise to high level of flood in Okpoko and Ogwuikpele also account for the situation in these two communities.¹⁴

Group 3 are 12 communities that are classified as areas with low climate change impact. These are Ohita, Atani, Akili, Ozizor, Umuzu, Ochuche, Ogbakuba, Umunankwo, Ossomala, Obegwe, Ogwuanocha, Mputu and Umuodu. Half of the numbers of communities in this group are located at the river bank while the remaining half are located away from the banks. Those that are not located at the banks are Ohita, Atani, Umuzu, Umuodu, Mputu and Ogwuanocha which always have less severe flood problems. It could be indicated here that a whole range of agricultural and human activities are seriously affected by the flooding activities in the area. The generally low-lying nature of Ogbaru wetland makes it prone to flooding which destroy farmland, sack communities, cut road network, pollute rivers and water sources, reduce fish harvest and a number of other havocs.¹⁵

According to Adeleke, the alterations in meteorological patterns associated with warmer climate in the recent time are potentially the drivers to the increase of impact of meteorological disasters such as flooding. Observed and projected patterns of climate change can have a compounding or amplifying effect on existing flood risk, for example by:

- ❖ Augmenting the rate of sea level rise which is one of the factors in causing increased flood damage in the coastal areas.
- ❖ Changing local rainfall patterns that could lead to more frequent and higher level riverine floods and more intense flash flooding.
- ❖ Changing frequency and durations of drought events that lead to groundwater extraction and land subsidence which compounds the impact of sea level rise.
- ❖ Increasing storminess leading to more frequent sea surges.¹⁶

Climate change is a major cause of flooding. Changing climate means that one can no longer expect to keep water away from urban settlements and beyond. Also, changing flood patterns resulting from climate change, increased intensity of rainfall and rising sea levels are likely to ensure that such an approach will be less feasible in the future. Flash flooding and overtopping mean that the full complexity of flooding within an urban setting will need to be addressed.¹⁷

CAUSES OF CLIMATE CHANGE IN ANAMBRA STATE

Burning Fossil Fuels

Burning fossil fuels is increasingly influencing climatic change or earth's temperature and Anambra State is not an exception. This adds enormous amounts of greenhouse gases to those natural occurrences in the atmosphere, thereby increasing the green house effects or global warming. Human induced global warming is presently at the rate of 0.2c per decade.¹⁸

Natural Causes

Natural causes such as changes in solar radiation or volcanic activity are estimated to have contributed less than plus or minus 0.1 to total warming. Though this is mostly obtainable in developed countries of this world but in one way or the other influences climatic issues in Nigeria and Anambra State in particular.¹⁹

Deforestation

Trees help to regulate the climate by absorbing Co₂ from the atmosphere. When they are down, that beneficial effect is lost and the carbon stored in the trees is released into the atmosphere adding to the greenhouse effect. The urbanization or development of rural areas has led to the cutting down of trees in Awka and its environs such as Isuaniocha, Mbakwu and Amansea which has led to carbon monoxide stored in trees to be released, thus affected human health and environment.²⁰

Increased Livestock Farming

Cows and sheep produce large amounts of methane when they digest their food. The methane produced by these animals contributes to climatic effects. The influx of cattle rearers in Anambra State has affected the environment in a harmful way not just with the production of methane by these animals but also the environmental hazards it causes. This could be observed in some areas in Anambra state such as Agu Awka, Amansea and Ebenebe where they have cow or cattle rearing business.²¹

Changes in the earth's reflectivity

The amount of sunlight that is absorbed or reflected by the planet depends on the earth's surface and atmosphere. Dark objects and surfaces like the seas, rivers, forests and soil tend to absorb more sunlight. About 70 percent of the sunlight that reaches the earth is absorbed. All these have contributed to climate change in the past and still contributing in places like Isiagu, Aguleri, Omo, Anam and others where there are cases of natural bush burning caused by too much sunlight.²²

EFFECTS/IMPACTS OF CLIMATE CHANGE

Climate Change has continued to be a threat to human existence and has had far reaching effects on our environment and human development in the areas of flooding, erosion, harmattan, drought and general human consumption and development.

Flooding

Flooding is one of the effects of climate change which has affected some areas in Anambra State. The rising water levels, dam spills, erection of structures at wrong places, illegal mining activities, extraordinary rainfall, deforestation, building in low lying areas, housing development in flood prone areas and poor attitude to waste disposal have increased the chances of flooding which is one of the effects of climate change. Areas in Anambra state such as Awka the state capital, has continued to experience too much flooding due to poor infrastructural planning and poor attitude to waste disposal. Towns such as Omo, Anaku, Atani, Aguleri and others have continued to experience consistent flooding as a result of the proximity of the town to tributaries, low lying nature of the land and building of structures in water prone areas.²³

Erosion

Erosion is one of the consistent effects of climate change in Anambra State. This has led to the swallowing of people's houses and farm lands, thereby causing rural-urban migration and low agricultural productivity just like flooding. Several buildings, structures and roads have been destroyed while over 100,000 persons displaced by the menace of gully erosion in communities in Idemili South local government. Ozubulu in Ekwusigo local government area, Nkpor, Obosi communities in Idemili North, Atani, Okpoko communities in Ogbaru local government. The Agulu- Nanka road axis and Alor-Nnobi road have also been badly affected by this disaster and this has attracted both national and international visitors and several others, and has also affected vehicular movement or migration, agricultural productivity, arable lands and infrastructural development.²⁴

Harmattan

The harmattan brings desert-like weather conditions: It lowers the humidity, dissipates cloud cover, prevents rainfall formation and sometimes creates big clouds of dust which can result in dust storms or sandstorms. The wind can increase fire risk and cause severe crop damage.²⁵

Drought

Rising temperatures caused by climate change are making already dry regions and wet regions wetter. In dry region, this means that when temperature rises, water evaporates more frequently and thus increases the risk of drought. This is mostly noticed in northern part of Nigeria but the fact remains that climatic effects such as drought if not properly managed could spread to the southern part of Nigeria.²⁶

SOLUTIONS/MANAGEMENTS OF CLIMATE CHANGE IN ANAMBRA STATE

Use Renewable energy sources

It's no secret that extracting fossil fuels is wrecking our climate, which is why we need to shift to renewable energy sources. For example, the use of solar to generate electricity.²⁷

Planting of trees

When it comes to protecting the climate, trees are very essential and planting them has consistently ranked as top climate change solution. That's because trees help clean the air, stabilize the soil, protect biodiversity habitat and much more²⁸.

Divest from fossil fuels

A recent report revealed that oil, gas, coal and cement producers are directly linked to 80% of global fossil Co² emissions since the Paris Climate agreement in 2016. One way we can help steer the world towards renewable energy is by advocating for divestment²⁹.

Sustainable Transportation

Transportation is a top source of greenhouse gases, so eliminating pollution is essential in achieving net-zero global emissions by 2050 in Anambra State³⁰.

Measures to be taken by both State and Federal Government:

Some measures could be proactively taken by both state and federal government in order to combat the dangerous effect of flooding which is one of the effects of climate change and bring about effective and proactive management of flood in Anambra State. Some of the measures include building of dams, Wing Dykes, Afforestation, Enactment of Laws that will Guide against Building of House on Water Ways.

Building of Dam

A dam is a man-made barrier that, unlike a conventional dam, only extends partway into a river. These structures force water into a fast-moving center channel which reduces the rate of sediment accumulation, while slowing water flow near the riverbanks. There should be building or expansion of Dams in Nigeria in order to curtail the issue of flooding in Nigeria and Anambra State. But in the interim, some of our dams have to be de-silted, the tributaries of river Niger in Anambra State have to be expanded³¹.

Wing Dykes

Wing Dykes are slats that are placed in a river's 0 channel at 90 to the banks. Generally, they will be placed in pairs on either side of the channel with a gap between them that allows boat to pass through them behind dykes, sediment builds up and the channel is narrowed, forcing water to flow faster. This helps reduce the risk of flooding by getting water away from an area at risk of flooding as quickly as possible, preventing a buildup of water. They also aid navigation greatly. This can be established at the river niger and its tributaries in Anambra state (Omambala river and others) to curtail the velocity of water flows³².

Establishment of Afforestation

Afforestation is the establishment of a forest or stand of trees in an area where there was no recent tree cover. In comparison, reforestation means re-establishing forest that have either been cut down or lost due to natural causes, such as fire, storm, etc. Afforestation involves the planting of trees in drainage basins to increase interception and storage while reducing surface runoff. This reduces a river's discharge and so makes it less likely to flood. Afforestation also prevents mass wasting which reduces the amount of soil entering the river and keeps the river's capacity high. Afforestation has the benefit of creating new habitats for animals and improving water quality by filtering pollutants out of rain water.³³

Enactment of Laws that will Guide against Building of House on Water Ways:

The government should enact laws that will guide against building of house on water ways. This will in no small measure ameliorate the effects of flooding and also help in the proactive and effective management of flood in Anambra State. Such laws include laws on environmental impact assessment before building a house or laws against building on low lying areas.

EFFORTS OF ANAMBRA STATE GOVERNMENT IN SOLVING/MANAGING CLIMATE CHANGE AND ITS EFFECTS

The fact remains that Anambra State government has done so much in the past and still doing currently to combat the effects of climate change in the state. This is seen with the establishment of the Anambra State Erosion, watershed and Climate change Agency (ANSEWCCA). Before the establishment of this agency, the state has been at the forefront of supporting those affected by the effects of climate change such as flooding, erosion and so on. In 2020, when there was a serious flooding in some parts of the state, the State Government came to the needs of the affected communities and IDPs through the interventions of State-based Army and Navy formations, the police, churches, NGOs and the State Emergency Management Agency (SEMA), and its federal counterpart, National Emergency Management Agency (NEMA), as well as United Nations International Children's Emergency Fund (UNICEF) conducted needs assessment missions. Consequently, relief materials were delivered by the state government, NEMA and other donors. The state government in collaboration with the Nigerian Army and Navy continued in their evacuation, search and rescue (SAR) missions for stranded persons. Those evacuated were hosted in fifteen (15) IDP camps, namely, Sharon House, Bishop Crowder School, the Army Barracks, New Bethel Primary School, and Onitsha-South LGA premises in Onitsha; Health Centre Umueje, Community Primary School Igbakwu, the Skills Acquisition Centre Anaku, in Ayamelum LGA; St. Augustine Catholic Church and Unity Primary School Umuoba Anam; General Hospital Umuleri, and St Joseph Secondary School, Aguleri, all

in Otuocha and Schools in Ossomala, Atani and St. Gregory Church Odekpe in the Ogbaru LGA. The IDPs were accommodated, provided with medical care and fed by the Anambra State Government and its local collaborators³⁴.

Currently, the State government through the Anambra State Erosion, Watershed and Climate Change Agency (ANSEWCCA) has been at the forefront of safeguarding the environment of the state by engaging in community engagement and education. They also provide training and awareness programs to residents especially those living in areas prone to erosion and flooding. The agency serves as a focal point for coordination of efforts (state, federal, and donor agencies) towards erosion and watershed management and other ecological problems in Anambra State³⁵.

CONCLUSION

Having discussed climate change and socio-economic development in Anambra State, 2002-2024, this work concludes that, climate change is a threat already, having substantial impact on human beings and the natural ecosystem both in developed and developing countries but at varying degrees. Also that climate change affects socio-economic development and economies whose economic activities are natural resource sensitive such as agricultural activities.

The paper also noted that, in Nigeria including Anambra State, climate change affects forestry due to erosion and excessive wind thereby resulting in decline in forest produce such as wood and cane. Consequently, it leads to reduction in forestry produce and low income, as well as an increase in the costs of building and furniture materials. The work revealed also that, the recent flooding in Nigeria that affected the 36 States of Nigeria including the Federal Capital Territory (Abuja) could not only be attributed to the blocking of natural and man-made drainages but partly to climate change which was caused as a result of water released from Cameroun dam. The prime reason Anambra was affected mostly was that, Anambra State is situated at the lowest point of the River Niger and as such is flood prone.

From this analysis, this research has been able to identify the factors that directly or indirectly influences climate change in Anambra State which has had far reaching consequences to the people of the State in the area of environmental and economic hazards such as flooding, erosion, drought, severe harmattan. All these are threats to human existence, environmental safety, human and infrastructural development. This paper suggests that a pragmatic and feasible environmental education should be inaugurated and inculcated in school curriculums starting from primary to university levels. This would enable children to be aware of the dangers of not protecting our natural world and be made to understand the various means of contributing to a safe environment. The paper also suggests that government and the citizens should take the issue of climate change serious because of its threat to human and environmental existence just like nuclear weapons. Laws should be enacted to protect the environment and encourage planting of trees in various parts of Anambra State.

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