ADDRESSING ENVIRONMENMTAL AND CLIMATE RELATED DISASTERS IN GROWING AND EMERGING SETTLEMNTS – A REVIEW OF LOCAL CLIMATE ADAPTATION EFFORTS IN NIGERIAN COSMOPOLITAN CITIES

ABSTRACT

Climate Change which refers to the gradual and /or abrupt change in weather and Climate sequence have become a major global concern. All through the globe, the world struggles with rising global temperatures, and other related climate crisis. The crises include severely rising global temperatures which gives rise to eat wave, ice melting, wild Fires and flooding. Torrential rainfall which gives rise to Flooding, Destruction of farm lands, all kinds and magnitudes of Erosion, Landslides resulting in serious land destruction and attendant negative impact on food security are major outcomes which gives rise to global rise in food prices. Very severe Infrastructure damages, Dam Collapse leading to Power Outages, and associated energy crises have been reported. In very extreme poles Volcanism and Magmatic Activities have resumed as result of unprecedented heat. Emerging cosmopolitan Nigerian cities especially in Anambra State South East Nigeria has its own challenges associated with climate Change. Government have tried its bit to control Climate Change through a number of ways. Reports show that the State Government has massive tree planting campaigns within ecologically endangered zones, formulated policies around the proble by setting up institutional reforms within the Climate change sector. The Federal Government has several laws and policies on climate mitigation. Local action in cosmopolitan cities are challenged by rising population, lack of any clear policy on population control and ever increasing rural to urban migration. While noting what has been done so far with the planting of at least twenty – eight Thousand Eight Hundred trees in ecologically endangered zones within the cosmopolitan cities. The study shows that despite the efforts of the Government, the negative impact of Climate Change remains a concern as climate related disasters remain a challenge within the city – an evidence that the efforts of Government though has helped but have not completely solved the problem as more work needs to be done.

Key Words: Weather, Climate, Climate Change, Forecasting, Predictions, Carbon(iv)oxide, Methane, radiation.

1.0. INTRODUCTION

Carbon dioxide (CO_2) and methane are mostly referred to as greenhouse gases because of their climate implications. They are transparent to sunlight, allowing it through to heat the earth's surface. When the Earth emits that heat as infrared radiation the gases absorb it, trapping the heat near the Earth's surface. As the planet heats up it causes changes like the loss of sunlight-reflecting snow cover, amplifying global warming. This is the say that the phenomena of climate is a result of gaseous and heat energy reaction giving rise to radiations and global heat events. This

Phenomenon of radiation and global heat events is called Climate Change and then has its accompanying consequences on the environment. These consequences can be direct and applied.

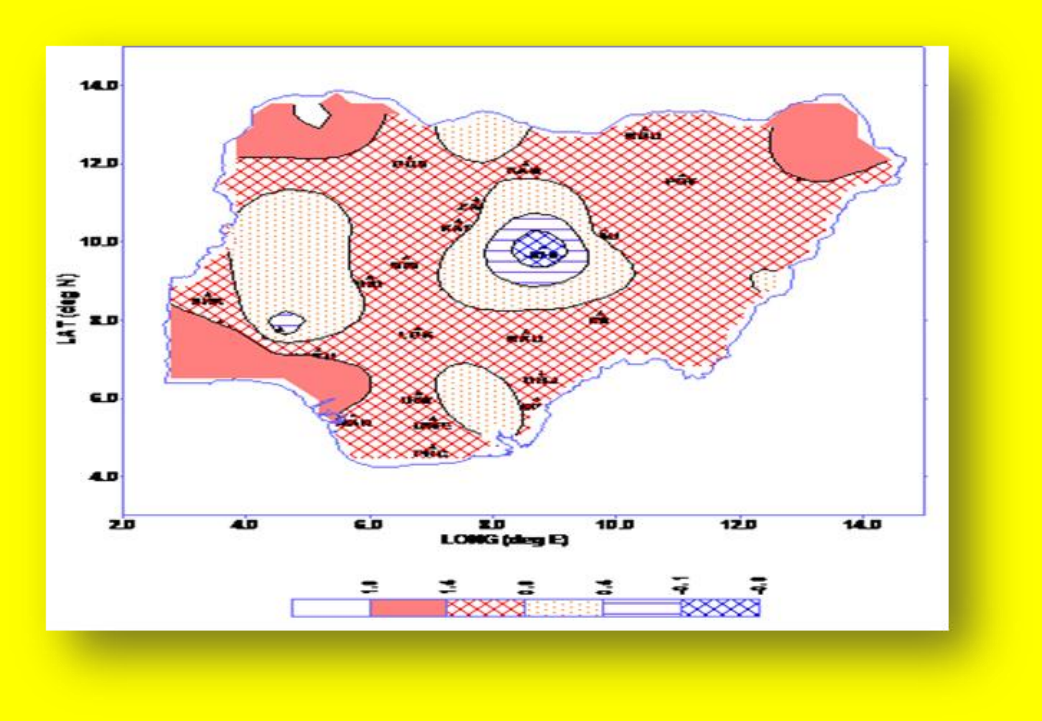

Figure 1: Map of Nigeria Showing temperature distribution within the Nation (Phil-eze, P.O. 202)

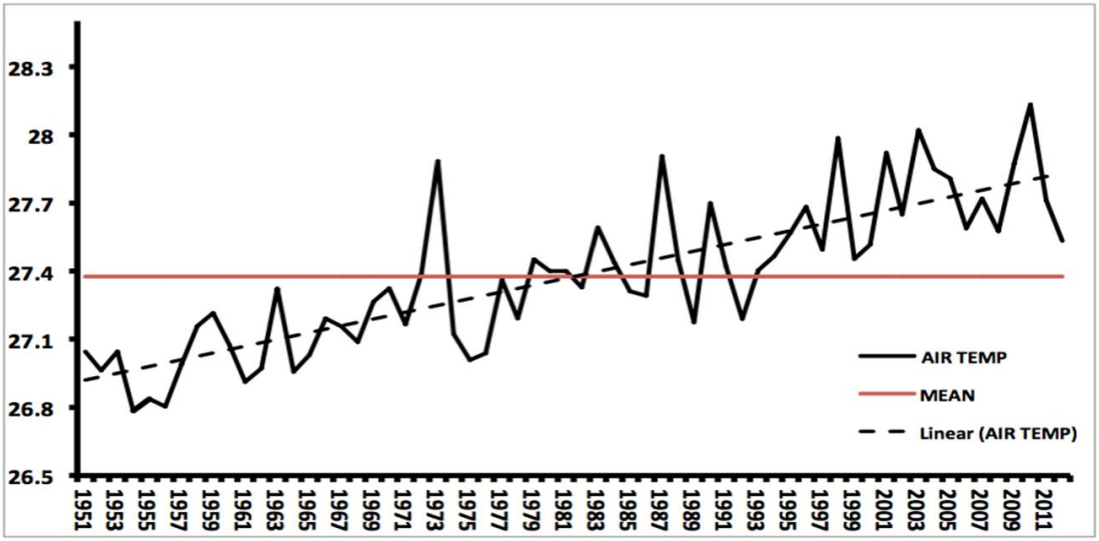

Figure 2: Map of Nigeria Showing a graphical view of temperature distribution from 1951 to 2011 (Phil-eze, P.O. 202)

Beyond the global scope, the challenge of Climate change is faced in actual local communities' md cities mad efforts and outcomes to combat this challenge are local and relate to day to day actions of people and Government at local level.

2.0. HISTORIC REVIEW OF THE RISE IN GLOBAL TEMPERATURES

Climate Change is not a one-morning affair. The growth of the earth and civilizations across years have an impact on the climate over the years. With things getting worse as the years go by. There was little net warming between the 18th century and the mid-19th century. Climate information for that period comes from climate proxies, such as trees and ice cores. Thermometer records began to provide global coverage around 1850. Historical patterns of warming and cooling, like the Medieval Climate Anomaly and the Little Ice Age, did not occur at the same time across different regions. Temperatures may have reached as high as those of the late-20th century in a limited set of regions. There have been pre-historical episodes of global warming, such as the Paleocene–Eocene Thermal Maximum. However, the modern observed rise in temperature and CO_2 concentrations has been so rapid that even abrupt geophysical events in Earth's history do not approach current rates.

Evidence of warming from air temperature measurements are reinforced with a wide range of other observations. There has been an increase in the frequency and intensity of heavy precipitation, melting of snow and land ice, and increased atmospheric humidity. Flora and fauna are also behaving in a manner consistent with warming; for instance, plants are flowering earlier in spring. Another key indicator is the cooling of the upper atmosphere, which demonstrates that greenhouse gases are trapping heat near the Earth's surface and preventing it from radiating into space.

2.1. REGIONAL ASPECTS TO TEMPERATURE RISES – EASTERN NIGERIA IN PERSPECTIVE

Regions of the world warm at differing rates. The pattern is independent of where greenhouse gases are emitted, because the gases persist long enough to diffuse across the planet. Since the pre-industrial period, the average surface temperature over land regions has increased almost twice as fast as the global-average surface temperature. This is because of the larger heat capacity of

oceans, and because oceans lose more heat by evaporation. The thermal energy in the global climate system has grown with only brief pauses since at least 1970, and over 90% of this extra energy has been stored in the ocean. The rest has heated the atmosphere, melted ice, and warmed the continents.

3.0. STATEMENT OF PROBLEM

Over the years, Government and stakeholders at all levels have made several efforts to address the matter of Climate Change. While these efforts are made, detailed records of these efforts have not been taken to asses to what extent they have helped in addressing the problem. This has led to non-availability of data to track the efforts of Government in the Sector. This work will review the effectiveness of Government efforts and explore ways to strengthen these efforts. The paper aims to review local climate adaptation efforts in Nigerian cosmopolitan cities, document efforts and provide way forward.

4.0. METHODOLOGY

Being a review paper, the study will gather data through a variety of ways and shall utilize Awka, Nnewi and Onitsha in Anambra State as emerging cosmopolitan cities:

a. Review various Climate related disasters and their impacts
b. Review of the National Policy on Climate Change
c. Review of relevant National and State laws on Climate Change
d. Review of Institutional arrangements on Climate Change across the cities as it may affect the cities under review.
e. Review of Government efforts on Climate Change
f. Adoption of Questionnaire outcome for Climate Change awareness.
g. Review the presence or absence of dedicated Climate Change professionals in decision making in several organs of the Government.
h. Review tree planting efforts in Select State Government establishments aimed at combating climate change.
i. Report on Tree planting efforts in dedicated State-led climate change adaptation efforts.
j. Review waste management practices across cosmopolitan cities in Nigeria.

4.0. RESULTS AND DISCUSSIONS

4.1. IMPACTS OF CLIMATE CHANGE

The basic question will be what happens when temperatures rise within a system? Temperature rises in any situation will cause immediate, short term and long term consequences and have strong impacts on systems connected to it. Hence a chain reaction is triggered across the systems and all other systems connected to it.

Table 1.0. Table Showing Global Impacts of Climate Change and its Physical, Socio and Economic Outcomes

S/n	Global Impacts of Climate Change	Physical, Environmental and Socio-economic Outcomes and Consequences
1	Severely rising global temperatures	Heat waves Ice melting Wild Fires Flooding Volcanism and Magmatic Activities
2	Torrential Rainfalls	Flooding Destruction of farm lands Erosion Landslides Negative impact on food security Global rise in food prices Infrastructure damages Dam Collapse leading to Power Outages Energy Crises.
3	Desertification	Deseret Encroachment Waters Scarcity Disruption of Agriculture and negative impact on food security

		Herders migration Communal and Conflicts between farmers and herders.
4	Adverse and Irregular and unpredictable Weather patterns	Failure of prediction and negative impacts on any reasonable planning Rapid physical Environmental changers Impacts on biodiversity Species extinction Diseases Food Crises Economic Losses Energy Crises

The table above is originally prepared to show how several climate parameters produce both environmental, social and economic consequences within the locality. This shows that climate change is not just an environmental challenge, but also an economic challenge, an Agricultural challenge, a security threat and health risk as well among other far reaching consequences.

Figure 3: Picture of a flood ravaged community in Ayamelum Local Government Area of Anambra State South Eastern Nigeria. (Phil-Eze P.O. 2023)

4.2. CONTROLLING AND MITIGATING CLIMATE CHANGE – GLOBAL AND LOCAL OUTLOOK

Reducing and Recapturing emission is the core Objective of climate Change mitigation. All efforts in the reverse of the climate are in these two (2) areas of emission reduction and Recapturing. These have to be as a way of Proactive and Reactive measures.

a. Emission Reduction (Proactive Measure)
b. Emission Recapturing (Reactive Measure)

Emission Reduction (Proactive Measure) – Ways, Targets locally and globally

Climate change can be mitigated by reducing greenhouse gas emissions. This has to be a kind of point source pollution control mechanism, where efforts are made to control or stop or reduce greenhouse gases from being generated or let out into the atmosphere. In order to limit global warming to less than 1.5 °C with a high likelihood of success, global greenhouse gas emissions needs to be net-zero by 2050, or by 2070 with a 2 °C target. This requires far-reaching, systemic changes on an unprecedented scale in energy, land, cities, transport, buildings, and industry.

To reduce pressures on ecosystems and enhance their carbon sequestration capabilities, changes would also be necessary in agriculture and forestry, such as preventing deforestation and restoring natural ecosystems by reforestation.

4.3. EMISSION RECAPTURING (PROACTIVE MEASURE) THROUGH AGGRESSIVE TREE PLANTIN

Table 2.0: Table Showing number of trees planted at ecologically endangered areas of the State from within the last five years.

S/N	NAME OF SITE	NEWMAP – WORLD BANK	NIGERIA CONSERVATION FOUNDATION	MINISTRY OF AGRICULTURE
1	Amachalla	400	00	00
2	Neros Plaza	400	00	00
3	Abagana	1500	00	1500
4	Omagba	1000	00	00
5	Nnewichi	1500	2700	2500
6	Ojoto	1500	00	00
7	Enugwu Ukwu	1500	1800	00
8	Abidi Umuoji	500	00	00

9	Ekwueme Square	00	00	00
10	Ikenga Ogidi	500	00	00
11	Ugamuma Obosi	500	00	00
12	Nkpor Flyover	500	00	00
13	Ire Obosi	500	00	00
14	Other Interventions to Communities reached under the SCCF Intervention on seedling distribution	10,000	00	00
	TOTAL	20,300	4,500	4,000

GRAND TOTAL = (20,300 + 4,500 + 4,000) = 28, 800 TREES PLANTED. NEWMAP 2023.

While other agencies and private organizations are doing their beat, available records showed that a total of Twenty –Eight Thousand Eight Hundred (28,800) trees have been planted by the State strictly focused on ecologically endangered areas. The other tree planting efforts by the State could not de documented due to lack of data.

4.4. FOREST CONSERVATION AND CLIMATE CHANGE MITIGATION – AN EMISSION RECAPTURING STRATEGY

a. Policy options – This involves making laws that requires Nations, organizations and individuals to take emission recapturing initiatives. This may be in the form of gas recycling and gas trapping.

b. Global Tree planting Targets – Nations and cities may be required under this initiative to set land to vegetation cover targets. Nations may place a target to have at least 40% - 50% of their land covered with vegetation. This National target gets broken down into city/County/local tree planting targets. These targets may differ from city to city looking at each city's pollution index and air quality level. Cities with high pollution index may be required to raise their land to tree percentage. This is popularly called Land-Use-Land Cover (LULC).

c. Local Tree Planting Targets – In keeping with the above as discussed in global tree planting, local countries and cities will be required to build its own LULC ration and work to implement the same.

d. Individual Tree planting Targets – Individual land owners and developers may be required to meet certain LULC ratios in and within their properties and in such manner reach the local target and by extension the global target.

4.5. IMPACTS OF CLIMATE CHANGE EFFECTS ON ICREASED EROISON RATE

The implication of this will be more surface run-off associated with both increase in land use and associated climate change induced rice in precipitation, the doom day is projected to be between the nest 25 to 50 years as we expect to cross to cross the 50-50 land use land cover balance in the adjoining areas within the next 25 years. This projection does not take into account long distance travelling waters from other catchments contributing to the basin as development generally rises in upland areas.

Figure 4: Erosion progressing into the Settlement in Ezioko (Picture taken by Lead Author)

Figure 5: Erosion progressing into the Settlement in Ubahu Nanka (Picture personally taken by Lead Author)

5.0. ADDRESSING THE CAUSATIVE FACTORS OF CLIMATE DISASTERS

5.1. THE ACCELERATING HUMAN SETTLEMENT CHALLENGE

Overpopulation has long been an issue for Nigeria. Thousands of people migrate from the country sides and across Africa into Lagos daily, in search of work. The city's rising population is putting massive pressure on housing, and the lack of it is the direct result of why places like Badia exists.

5.2. ADDRESSING THE POPULATION EXPLOSION FACTOR

Total world population reached 7 billion just after 2010 and is expected to count 9 billion by 2045. Projections put Nigeria's population at above 200 million and Anambra State on the way to 10 Million people with the highest number of people living in the three (3) urban centers of Awka, Onitsha and Nnewi. Other emerging urban centers will also include Ekwulobia and Ihiala. Records does not show that there is any deliberate effort to control population neither is there any to control rural to urban migration. On the strength of the above the impact of rising population and the associated rural to urban migration of the rising population continue to put enormous pressure on

the cosmopolitan cities. The relationship between rising population, waste generation, tree planting and energy consumption remain on the upward trend thus putting a shrink on climate resilience.

6. 0. WAY FORWARD FOR EMERGING COSMOPOLITAN CITIES IN TACKLING CLIMATE RELATED DISASTERS

Use your car less, whenever possible, instead use sustainable transportation, such as bicycling, or use public transportation more often. In the case of long-distance travel, trains are more sustainable than airplanes, which cause a great deal of the CO_2 emitted into the atmosphere. If you're into cars, remember that every kilometer that you increase your speed will considerably increase CO_2 emissions and expenses. According to the CE, each liter of fuel that your car uses, equals 2.5 kilos of CO_2 emitted into the atmosphere.

Government at all levels should invest more in alternative energy and other things to reduce emissions.

8.0. CONCLUSION AND RECOMENDATIONS

The study concludes that climate change remains a critical problem in emerging cosmopolitan cities causing severe damages and consequences. The study recommends that without a reasonable population control policy, adequate control of rural and urban migration, adequately addressing Climate Change resilience in emerging cosmopolitan cities will be impossible leading to more climate related disasters especially in cosmopolitan cities of South Eastern Nigeria.

To be able to manage the issue of Climate Change, and its threat to existence, the State and local Government authority needs to do the following:

a. Raise its budgetary funding to the Climate Change management sector.
b. Create Climate change desks and directorates in all Local Governments of The State.
c. Scale up awareness on the issues of Climate Change through the media and other measures.
d. Engage funding opportunities for the Climate change sector through leveraging in foreign grants and aids in the sector for ecologically endangered African Nations. Such funding are available with the World Bank, the African Development Bank and the Special Climate Change fund, amongst others.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

Conflict of Interest:

The authors declare that there is no conflict of interest in this work.

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