

Analysis of the Implication of Climate Change Policies on Urban Planning and Development in Calabar Metropolis.

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Abstract

All aspects of Nigeria's development are vulnerable to climate-related stressors. Its natural capital (including land, forests, landscapes, water, and fisheries) and physical capital (including cities, infrastructure, and other kinds of produced capital), as well as its human capital, are highly susceptible to the impact of climate change. Nigeria's economy and other sectors of development are equally very vulnerable to climate change. Climate change affects the ability of natural capital, which is the main source of income and livelihoods for the majority of Nigerians, to deliver its wide range of products and services (including food, fodder, timber, and the regulation of water cycles), some of them vital. Extreme weather events, such as floods, storm surges, and heat waves can strain cities, roads, drainage systems, power plants, ports, and other types of infrastructure. Aso, climate change further threatens the national ability to build and maintain its human capital, particularly through health and education. The gloomy externalities of urban progress in the form of poor and inadequate housing, filth and decaying infrastructure and the progressive brutalization of man in such an environment are now casting doubts on the real essence of cities. Overwhelmed by the enormity of city problems, most governments in the developing countries continue to grope for solution, sometimes formulating self-contradicting, self-defeating policies. The paper examined the analysis of the implication of climate change policies on Urban planning and development in Calabar metropolis. However, the living conditions in Calabar Metropolis are outcomes of a gradual process of environmental degradation.

Keywords: *Climate change, Urban planning, Development*

Introduction

The incident of climate change had been a worried information across the global. Every year millions of people worldwide are affected by climate change disasters (de Leon and Pittock, 2017, Lee et al., 2016). Over a ten years period, 1995 to 2015, over two billion people were affected by climate change about 56% of all those affected by weather-related disasters (Centre for Research on the Epidemiology of Disasters and United Nations Office for Disaster Risk Reduction, 2016) causing economic damage, fatalities, and social hardship around the world (Ward et al., 2018). Yet, extreme climate events producing severe crisis which may put additional stress on societies are likely to grow in frequency (Forzieri et al., 2018). Therefore, for cities in developing countries, that are already grappling with a myriad of economic and social

challenges, managing climate change is a challenge of high priority (Egbinola et al., 2017, Douglas, 2017). Given that there is now a growing recognition that climate change cannot be entirely avoided (Tingsanchali, 2012, Jongman, 2018), taking it adaptation actions is championed to reduce risk, minimise impacts and speed up recovery (Alfieri et al., 2016).

Urban planning and development have been functioning indisputably as cities are the centre of arts and culture, and “the home of the highest achievement of man”. Their growth and spread to all parts of the world epitomize human progress and advancing civilization. Studies confirm that everywhere, a city has the largest concentration of jobs, consumer market and science-based automated industries within its region. It provides a variety of conditions for personality building and the development of technology which tremendously changes our habits and ways of life. In fact, the city is “where the action is” (Blair, 2019) and this explains its powerful attraction to many activities and people.

Many uncertainties, however, remain concerning the timing and degree of the enhanced greenhouse effect. Despite these uncertainties, the balance of opinion suggests that climate change is real and favours early action in tune with the precautionary principle. This has led to various abatement measures by international organisations like the IPCC. Moreover, it is commonly argued by some people that the climate change issue should be paid only minor attention in Nigeria for three main reasons:

(a) present greenhouse gas emissions from Nigeria (like other African countries) are negligible on a global scale.

(b) climate change is a problem that is largely caused by emissions from industrial countries hence, these countries (developed countries) should bear the main responsibility and the major costs of reducing emissions.

(c) While the low contribution of Nigeria to climate change might seduce one into advocating for indifference on the part of Nigeria and for the buck to be passed to the developed countries that are the chief culprits historically, it should be noted, however, that effect of climate change such as a rise of 1m in sea level could seriously affect nearly millions of people along the coasts of Nigeria. Increases in population growth rates in the principal coastal cities of Nigeria, combined with a likelihood of a 1 m sea-level rise, could create conditions for significant negative impacts on tourism-oriented economies, ecology, and human lives of this area.

Thus, this study examines the implication of climate change policies on urban planning and development in Calabar metropolitan. The economic, social and technological advancement in cities is today rapidly turning out disenchanting experiences which tend to nullify or obliterate their advantages. This study looks at the issue of slum development in cities as it relates to social and environmental decay in Nigeria’s context, using Calabar as a case study. The contention of the study is that the ineffectiveness of housing policy measures adopted by governments in Nigeria has made the attainment of liveable urban environment a planner’s agreement.

Statement of the Problem

The implication of climate change policies on urban planning and development in Calabar metropolitan, Nigeria resolves around two issues namely: that of quantity and quality of available housing. There is ample evidence in the literature that residential housing provision is grossly inadequate in most Third World cities (Iwueze, 2016). But the problem of inadequate supply of residential housing seems to be exceptionally serious in Calabar. For example, an estimate of available residential structures stood at 15, 846 units in 2018 and this figure represents only 25 per cent of the quantity actually needed (Animashaun, 2017). Less than five per cent of this quantity is provided jointly by both the public and the organized private sector. A bulk of the residential housing provision is met through the effort of the unorganized private sector. The problems of inadequate supply of residential housing as well as that of poor housing environment has, no doubt, attracted public attention and has necessitated palliative policies from government even through some of these policies are at variance with the peoples need. Between 1984 and 1986, the government of South Eastern State (now Cross River State) embarked on a demolition exercise in parts of Calabar. The objective of this action was to give a face-lift to Calabar as a State capital. Consequently, poor and substandard houses which were along the major streets were pulled down. However, this attempt by government was stiffly resisted in the traditional core areas of Calabar Metropolis. Regrettably, even some of the poor structures are back in place today in those areas where demolition exercise was carried out because of lack of strong will on the part of government to prevent their return.

Environmental quality parameters of the residential houses are as poor as the qualitative indices. Houses are mostly huddled together in the traditional core areas. However, in terms of quantity, both housing provisions by the Federal and State Governments were inconsequential, judged by the housing need, even as at that time. A rather more perturbing problem was that of misallocation of the houses. The criteria for eligibility were loosely defined so as to favour selected people. Today, government seems to have given up the idea of direct provision of housing. The unsatisfied demand in successive years has accumulated to huge dimensions. Immigration continues unabated and without regard to the stress on housing supply. The end result of these forces is the crowding of people and structures (Abiodun, 2015) and a rapid deterioration of the housing environment in Calabar. A chain of negative repercussions follows from the squalid nature of the housing and its environment. As the quality of the living houses decreases, it causes an acceleration of the rate at which the houses deteriorate to slum condition. A study by Blair (2019) revealed a striking relationship between overcrowding and human health. This observation is confirmed by Sule's (2000) study of Calabar Municipality when he discovered a real relationship between incidence of psychoneurotic problems in man and the quality of the living environment. Other problems associated with living in the slum area of Calabar include accentuated psychological disturbance, widespread outbreak of epidemic diseases, and behaviour patterns which encourage drunkenness, armed robbery, delinquency and prostitution.

Research Objectives

The objectives of this research are as follows:

1. To provide a comparative analysis of two contrasting housing environments in Calabar;

2. To demonstrate the process of climate change and failure of government policies aimed at poor housing development in Calabar;

Research questions

1 What are the comparative analysis of two contrasting housing environment in Calabar?

2.What are the causes of climate change and failure of the government policies?

Literature review and theoretical framework

Climate change is a complex environmental problem because of its long-term uncertain time frame, scales of occurrence, differential impacts and vulnerabilities, as well as equity and justice within the global power asymmetries. For instance, the impacts of climate change are already driving people back into poverty and undermining growth. Beyond recognizing the potential devastating effects of climate change on the socio-economic and environmental development of the country and implications for the wellbeing of the populace, the Government of Nigeria intends to strengthen its management of climate-related development challenges through an appropriate policy and institutional arrangements that will not only mainstream climate change into its development priorities, but also encourage the implementation of mitigation and adaptation actions at all levels of governance for climate compatible sustainable development.

In 2012, the Federal Executive Council approved a comprehensive strategy policy on climate change: The Nigeria Climate Change Policy Response and Strategy (NCCPRS), the overarching objective of the policy is to promote low-carbon, high-growth economic development and build a climate-resilient society through the achievement of the following targets:

(I) Implement mitigation measures that will promote low carbon as well as sustainable and high economic growth;

(ii.) Enhance national capacity to adapt to climate change;

(iii.) Raise climate change related science, technology and R&D to a new level that will enable the country to better participate in international scientific and technological cooperation on climate change;

(iv.) Significantly increase public awareness and involve private sector participation in addressing the challenges of climate change; and

(v.) Strengthen national institutions and mechanisms (policy, legislative and economic) to establish a suitable and functional framework for climate change governance.

Through the 2012 Policy, Nigeria intends to foster sustainable development by means of national initiatives that strengthen the country's strategies on climate change preparedness, adaptation and mitigation across all segments of society including vulnerable groups. The Policy has been guiding policy decisions and led to action in responding to climate change in the country. Several approaches abound on how possibly this could be pursued. These include:

1) Collaborative strategic goal oriented programming (CoSGOP). This approach was first adopted as a theoretical framework for analyzing redevelopment processes in distressed large urban towns in Europe. It is “a collaborative and communicative way of strategic programming, decision making, implementation, and monitoring oriented towards defined and specific goals” (Wikipedia: en.wikipedia.org/wiki/Urban_planning). Wikipedia maintains that this approach benefits the hindsight of critical analysis of available of information, participation of stakeholders, and the creation of awareness among actors with the aim of managing development process.

2) Collaborative planning

Collaborating planning first introduced the US aims at to empowering stakeholders by raising them to “level of decision makers through direct engagement and dialogue between stakeholders and public agencies. Stakeholders’ ideas are not sought but their active participation in the community planning is desired. In fact, Wikipedia observes: Active public involvement can help planners achieve better outcomes by making them aware of the public’s needs and preferences and by using local knowledge to inform projects. When properly administered, collaboration can result in more meaningful participation and better, more creative outcomes to persistent problems than can traditional participation method (Wikipedia, en.wikipedia.org/wiki/Urban_planning; 9 of 24).

3) Environment or ecological and effective governance approach: Ecological urban planning departs from the orientation that “cities are the centre of the ecological catastrophe”, which according to Zacharouli (<http://apn.gr/pylh/0911-Astkh.html>, (cited in Ecological Planning in Built Environment-Ideas-Repec: <http://www.ntnu.edu/studies/msa1>)): Linkages with other Policies and Strategies.

Nigeria has adopted a number of policies, strategies and action plans that are related to addressing the national development challenge of climate change, as well as integrating environment and climate change management in socio-economic development activities of the country. The main development plans which set strategies and priorities that are related to the pursuit of climate-resilient and climate-compatible initiatives include:

(i) Economic Recovery and Growth Plan (ERGP) 2017 -2020; (ii) The Transformation Agenda (2011-2020); and (iii) Vision 20:2020. Other policies and strategies that have direct and indirect bearings on the climate change challenge include:

i. National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN) 2011

ii. National Renewable Energy and Energy Efficiency Policy (NREEEP) 2015;

iii. National Gas Policy (2017)

iv. National Biodiversity Strategy and Action Plan (NBSAP)2016;

v. National Forest Policy (NFP) 2010;

- vi. National Forestry Action Plan (NFAP)1996;
- vii. National Policy on Environmental 2016;
- viii. Nigeria Agricultural Policy 2001;
- ix. Agricultural Promotion Policy (APP) 2016 –2020;
- x. National Climate Change Policy and Respond Strategy (NCCPRS) 2012;
- xi. National Policy on Drought and Desertification (NPDD) 2007;
- xii. Great Green Wall for the Sahara and Sahel Initiative National Strategic Action Plan (GGWSAP) 2012;
- xiii. National Agricultural Resilience Framework (NARF) 2013;
- xiv. National Health Policy (2016);
- xv. National Water Policy (2012);
- xvi. National Transport Policy (2016)
- xvii. Nigeria Industrial Revolution Plan (2014)
- xviii. National Gender Policy (2006),
- xix. REDD+ Strategy, 2019

This policy review derives from three key parameters the Constitution of the Federal Republic of Nigeria, the need to make the policy realistic in the light of development trends and the potentially huge negative consequences of climate change. The Constitution of the Federal Republic of Nigeria specifically makes environmental protection a state objective and provides for it in the Chapter 2 on Fundamental Objectives and Directive Principle of State Policy. Its Section 20 expressly contains provision on environmental protection and states that the state shall protect and improve the environment and safeguard the water, air, land, forest and wild life in Nigeria. The main aim of the Section is to ensure a healthy environment (including an environment that is less vulnerable to climate change) for the Nigerian citizens. The protection of the environment is essential for the realization of the aim. Thus, safeguarding the air, water, land and plants and animals as stated in Section 20 would extend to making Nigeria's environment including its socio-economic profile, resilient and effective adaptation is critical to this.

National Response

The Government of Nigeria has initiated undertaken a number of measures steps to address the challenge of climate change. These actions are in the following areas:

- (i) climate change institutional framework;
- (ii) promoting enabling climate policies;
- (iii) NDC;
- (iv) climate change financing; and
- (v) donor-supported initiatives.

Institutional Framework: The Department of Climate Change (DCC) in the Federal Ministry of Environment drives the national response to climate change at the national and international levels. It is the nation's Focal Point to the UNFCCC and also the Designated National Authority (DNA) for the Clean Development Mechanism and works with other Ministries through the Inter-Ministerial Committee on Climate Change.

Enabling Climate Change Policies: A number of enabling policies and programmes that are related to climate change mitigation and adaptation have been adopted and include those that have been listed in Section 1.4. Three recent development policies that have clear implications for climate change adaptation include: (i) Vision 20:2020; (ii) the Transformation Agenda (2011 – 2015); and (iii) Economic Recovery and Growth Programme (ERGP) (2017–2020).

Nationally Determined Contribution (NDC): Nigeria developed its NDC in 2015 towards the ratification of the Paris Agreement on Climate Change. It intends to reduce its greenhouse gas (GHG) emissions intensity of GDP by 20% by 2030 relative to the emissions intensity of GDP in the base period 2010 to 2014 on an unconditional basis as well as a further 45% on a conditional basis consequent upon receiving climate finance, technology transfer and capacity building from the developed countries. If delivered upon, the NDC will improve standards of living, promote clean energy access and food and water security for all and make the country more resilient to climate impacts, as well as enable Nigeria to be able to contribute to the goal of keeping the global temperature increase to well below 20C.

Climate Change Financing: Nigeria recognizes that to respond effectively to climate change mitigation and adaptation challenges, the country will require a critical mass of financial resources beyond what governments at all levels can provide. To this end, the government of Nigeria has launched and issued Green Bonds as innovative means and alternative way of raising climate finance, and has released the guidelines for the Green Bonds that target about \$250 million in climate finance to support national projects in key areas that include environment, agriculture, power and energy efficiency-transportation. It will also continue to mobilize national, regional and global climate finance resources to tackle the challenge of climate change.

Global and Regional Cooperation: Nigeria is strongly committed to the achievement of an effective and equitable international agreement on climate change, it recognized its leadership role in Africa and sub-regional levels. Nigeria is meeting up to its obligations to the United

Nations Framework Convention on Climate Change (UNFCCC), and supporting the implementation of climate change initiatives of ECOWAS and African Union.

Research methodology

Study Area.

Calabar is the capital of Cross River State. For the purpose of administration, the city is divided into Calabar Municipal and Calabar South Local Governments Areas. It has an area of 274.429sq. km and with a population of 371,022 by the 2006 census), currently the city's population is estimated at 399, 761(Google Maps, 2013; National population Census, 2006. The city is bounded in the North, by Odukpani Local Government Area in the North-East by the great Kwa River. Calabar is generally affected by weather conditions due to its unique urban location and high rainfall associated with tropical rainforest regions. It is characterized by rainfall which starts from the month of April to October, reaching its climax in the month of June and September.

The remaining four month make up the dry season with the Harmattan wind blowing over the area. The rain falls averagely at 172mm with temperature of 290C at warmest and 170C at coldest (www.google.com Calabar weather report 2011). The vegetation of the study area is mainly riparian and fresh water swamp forests. Also, a few derived savanna vegetation, cultigens and ornamental/avenue tree/shrub species are present in the area. The dominant soil type is the clayey- loamy soils. The topography of the study area is the low lying coastal plain of the Calabar River and Great Kwa River. It is relatively undulating with a few hills and valleys running east-west wards. Several rivers/streams exist in the area and are basically drained by the aforementioned rivers. The Geology of the area is mainly sand stone.

Procedure for Data Collection

The data used in the study were acquired from computer simulations as described by Hulme et al. (2000). The baseline data is defined as that prevailing during the period 1961 to 1990 constructed specifically for MAGICC-SCENGEN (see Hulme et al., 2000, for a detailed description of the baseline data). The baseline period is selected based on the following criteria (IPCC, 2000):

- 1 representative of the present day or recent average climate in the study region
- 2 covering a period for which data on all major climatological variables are abundant, adequately distributed over space and readily available
- 3 including data of sufficiently high quality for use in evaluating impacts
- 4 consistent or readily comparable with baseline climatologies used in other impact assessments.

The observed climate data of 2010-2099 baseline was used in order to ensure the provision of more detailed and refined scenario. The data includes average monthly, seasonal and annual fields at a spatial resolution of 5° latitude by longitude for temperature and precipitation. For the projections, four time slices are used. These include: 2024–2039; 2040–2069 (Table 1). The data

are observed data and are the baseline from which projections are made to the other time slices. This baseline data set was downloaded from the IPCC Data Distribution Center. To project the climate of the coastal cities for the 21st century time slices, relative to the observed data for the larger cells in which the meteorological stations are located are used, the GIS interpolation technique was used.

Table 1 midyear and the periods they cover

Midyear.	Period cover
2024.	2010- 2039
2025.	2040-2069
2035.	2070-2099

A number of modelling experiments exist. Among them are the Hadley Unified Model 2 Transient Ensemble-mean (HADCM2), UK Meteorological Office/Hadley Centre Transient (UKTR), Commonwealth Scientific and Industrial Research Organization, Transient (Australia) (CSIRO-TR) and many more. Each has its peculiarities, that is, its strengths and weaknesses. However, MAGICC- SCENGEN model computer simulations of the climate incorporate the basic physics and dynamics of the climate systems and take into account the interactions between the different components of the climate systems (the atmosphere, oceans, land, ice and the biosphere) (IPCC, 2001). MAGICC-SCENGEN was run for the whole country (Figure 1), out of which full observation was carried out for the coastal region of the country. As earlier mentioned, MAGICC-SCENGEN provides climate change fields at 5° latitude/longitude resolution (a coarse one). In order to get a finer result, the downscaling technique becomes imperative. For instance, the result generated for Nigeria at resolution of 5°latitude/longitude is nearly useless because Nigeria as a country falls between longitude 2°45' and 14°30' and latitude 4° and 14°. Thus, the longitudinal difference between the two extremes of the country is 11°45' while latitudinal difference between the highest and the lowest latitudes is 10.

Results and discussion

Diurnal temperature range

With respect to the baseline period, diurnal temperature range is highest during the dry season from December to February, when it stands above 10°C. As the rainy season increases in intensity there is a fall from over 9°C in March to about 6°C in August. Projections indicate that this pattern will be maintained during the 21st century. However, average diurnal monthly temperature range will be from 0.1°C to 1.2°C lower towards the end of the century than it was during the baseline years of 2010-2099. Projections for Calabar are depicted on Table as an example of what is expected generally in the coastal cities in southern Nigeria.

Mean monthly minimum temperatures

In the tropics, the lowest temperature during each day, which is usually described as minimum temperature is experienced during the night. Mean minimum temperature, as an element in Calabar are lowest in January with about 21°C and highest in March or April at about 23°C. There is thus a correspondence between the period of low angle incidence of the solar radiation and the period of low minimum temperature. However, the period of high altitude sun does not correspond to the period of high minimum temperature. According to climate change projections,

this general pattern will be maintained as the climate changes during the 21st century. However, there are indications in the projections, as it is going to happen worldwide, that as the century progresses, the night will become significantly warmer. For example, in the Calabar example presented in Table 5, January minimum temperature is projected to rise from 21.4°C to 24.61°C towards the end of the century. In the same vein April minimum temperature is projected to rise from 23.1°C to 26.73°C.

Table 2 Calabar: changes in mean minimum temperature by month from 2010 to 2099 (in °C)

	JA	FE	MA	AP	MA	JU	JL	AU	SE	OC	NO	DE
2010–2039	22.48	23.78	24.11	24.36	24.26	23.88	23.62	23.73	23.62	23.54	23.65	22.80
2040–2069	23.48	24.74	25.13	25.42	25.22	24.68	24.56	24.56	24.52	24.51	24.70	23.81
2070–2099	24.61	25.82	26.34	26.73	26.40	25.91	25.55	25.67	25.52	25.54	25.81	25.02

Mean monthly maximum temperatures

Maximum temperatures are usually recorded during daytime. In Calabar show the highest monthly maximum temperatures are recorded during dry season, while the lowest monthly maximum temperatures are recorded during the wet months of June, July and August. In the Calabar example presented in Table, the highest monthly maximum temperatures are recorded during the dry month of February, while the lowest monthly maximum temperatures are recorded during the wet month of August. As it is well known, temperature in the coastal cities of Nigeria is determined by what proportion of incident solar radiation penetrates through the atmosphere to be converted to heat at the earth's surface (Ojo and Oni, 2001). Thus, it is the rainy season months with their thick cloud cover that record the lowest monthly maximum temperatures while the dry season months, despite the low angle of the sun, record the highest monthly maximum temperatures.

Conclusions

This study was designed to present a clearer understanding of what type of climate that Urban cities of Nigeria are to experience during the 21st century going by the current trends. The results indicate that the average surface temperature in urban cities of Nigeria will increase by 1.1°C–2.8°C by the year 2099. This change may lead to a number of potentially serious consequences in the coastal cities in Nigeria. There may be an increase in mortality rates as a result of heat stress and in potential transmission of many infectious diseases (Hulme et al., 2002). Moreover, sea level rise would increase the number of people whose lives and properties may be at risk from serious flooding or permanent inundation. The precipitation variability with increased temperature will have serious impacts on the social-economic state of the people living in the urban cities of Nigeria. The projected impact of this on environmental stability and life in the coastal urban settlements of Nigeria is better imagined than experienced. The above analysis clearly suggest that it will not only be economically beneficial for Nigeria to craft a climate change-response development strategy, but that factoring climate change abatement into the overall economic development plan is also crucial for its own self preservation. Therefore, there may be a need to have a coastal zone management plan to address the possible coastal zone problems indicated in this study.

Recommendations

(a) The Government of Cross River State should ensure that the Building Regulation of 1984 as amended in 1987 should be thoroughly enforced. This would ensure that developers follow the regulated standard of Building Development, which is sustainable with the environment. Furthermore, it would ensure the sustainable use of land resources in order to make sure that land is being used judiciously to avoid wastage. Also, the increase in built up environment on vegetation, has resulted in the increase in the Land Surface Temperature, hence creating phenomenal events like Urban Heating, Climate Change, Crop Withering, as a result of less moisture. This recent upsurge in this environmental deterioration is an indicator of an unplanned urbanization. As a result, government should allocate all necessary resources to effectively regularize the rate of urbanization especially in Calabar Metropolis.

(b) The residents in both Calabar Local Government Areas should be thoroughly sensitized on the deleterious effect of the increased in Built-up areas on the sustainability on the environment, because one of the reasons, for this increase in building, is that most of the residents are not aware of their impact on the environment. However, through sensitization programs, residents would be enlightened on the impact of their action on the environment.

(c) One of the major problems of urbanization is the unplanned increase in population. There is no form of urbanization that does not lead to an increase in population, but when this increase is unplanned the problem of land scarcity sets in because the threshold of the carrying capacity of the land has been compromised. And when this happens the problem of uncontrolled urban expansion sets in. However, with the collaboration of the Governments, NGO's, Community people, in putting up a conservation plan, like that of Primac 1998, this would lead to the provision of protected areas like Urban Biosphere Reserve, vegetation sanctuaries, city parks, Urban Wilderness, etc, which would result to an intensive preservation of sensitive Urban Vegetation eco-system, in order to ensure environmental sustainability.

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