

Recent Severe Flooding in Calabar, Nigeria: Causes, Consequences and Possible Remedies

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Abstract: Recent flood incidents in Calabar, Nigeria have overprinted their rhythms in terms of recurrence time and intensity, prompting serious concerns from the scientific community, the government and the general populace. This paper discussed the emerging weather anomalies in Calabar, Nigeria. Serious effort was made to impress the reader with evidence on the onset of climate change in Nigeria. The paper observed that recent, severe, yearly flooding in Calabar was a sign of global climate change which portends more rainfall for coastal towns in Nigeria. Also, the massive, urban renewal and expansion programmes that have been undertaken in the city during the last ten years, together with poor attitude to waste management, were implicated in the nightmare flood occurrences that have been witnessed in Calabar in the past three years (2011-2013). A number of recommendations were made towards mitigating the impact of flooding on society and environment, including the need to create more green-spaces and redesign the drainage network.

1. Introduction

Significant changes in global climate are not strange in earth's history. However, the current climate change which started since the late 1960s as global warming is strange because of the alarming speed at which it is occurring, together with its intensity and physical impacts (whether in the form of frequent and intensified thunderstorms, incessant droughts, severe floods, destructive hurricanes, or monstrous tornadoes), which have adversely affected the lives of millions of people around the world. Recent examples of some of these devastating climatic events include: the July 23, 2011 floods in Calabar which produced over 200 mm of rainfall within one night. Equally, the 10th July 2011 rainfall in Lagos, which brought non-stop downpour for 14 hours, also produced some 231 mm of rainfall. These floods in Calabar, Lagos, Ibadan and other coastal towns destroyed property, killed and rendered many people homeless. In 2012 and 2013, floods also ravaged many coastal towns and even inland locations in Nigeria including Calabar, Lagos, Ibadan, Makurdi, Lokoja, and Yenogoa. Elsewhere, the historic Mississippi river floods of April/May 2011 (the likes of which has not been seen since 1937); the 2010 Pakistani floods which directly affected 20 million people through the destruction of property, livelihood and infrastructure, as well as, killing about 2,000 people. In north-western part of Nigeria, the 2010 Sokoto floods washed away 20 villages, displaced 130,000 people, killed 6 persons, destroyed the Goronyo Dam, devastated farmlands, collapsed the major bridge linking Usumanu Danfodio University to Sokoto town (Ekpoh, 2013).

Prior to the advent of the current climate change, historic climatic data for Calabar showed that these

kinds of severe flooding used to occur in cycles of 10, 20 or 30 years (Ekpoh, 1991; Ekpoh and Nsa, 2011; Adefolalu, 1986; Nicholson, 1999; Adelakan, 2011). Thus, the impacts were less painful as it allowed time for affected people and groups to recover. However, largely as a result of climate change, extreme rainfall events have become a yearly affair. It is important at this juncture to define the term flood. In general, flood is a situation in which water inundates temporarily areas which are usually not under water. Flood is an environmental hazard that brings misery to society, socio-economic systems, plants, animals and the physical environment. Floods can cause loss of life and property, destruction of farmlands, blockage of roads and disruption of transportation, disruption of electricity and water supplies, inundation of peoples' houses, drowning of livestock, displacement of settlements and general lull in business and social life. The recent floods, worldwide, are associated with climate change which is said to be responsible for recent historical and extreme rainfall events in different regions of the world. Mindless urbanization and abuse of earth's resources have also been implicated in instigating and aggravating recent flood events. The questions answered in this paper include: What is responsible for the recent yearly severe flooding in Calabar? Why is the impact of recent floods so devastating? What can be done to mitigate the impacts of these floods?

2. Causes of Flooding

In general, there are many conditions under which a flood can occur and they include:

- (a) High intensity rainfall for a short period of time
- (b) Prolonged rainfall for many days
- (c) Melting of ice caps



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- (d) Sea level rise
- (e) Earthquake at sea which triggers a Tsunami
- (f) Volcano at sea and in large lakes which triggers a Tsunami
- (g) A collapsed dam or other reservoirs
- (h) Siltation/blockage of rivers and other drainage channels
- (i) Absence of drainage channels
- (j) Slope and terrain characteristics of the landscape
- (k) Reduction of infiltration surfaces through preponderance of concretisation
- (l) Urban encroachment on flood-prone areas

3. Factors implicated in the recent severe flooding in Calabar

Three important factors are implicated in the recent yearly severe flooding in Calabar: Firstly, the level of infrastructural development within the metropolis of Calabar has witnessed massive expansion since the city became a state capital in the early 1970s and especially since the advent of the current political dispensation in 1999. This situation has increased the level of concretization and asphaltting of the land-surface leading to enhanced runoff from rainfall while diminishing the infiltration rate of the soil. The implication is that more water from rainfall is available on the surface of the earth to run as surface flow which we call flood. At the same time, the infiltration capacity of the soil is reduced due to the preponderance of urban infrastructure such as buildings, asphalted roads, concrete car parks and other paved surfaces. Moreover, recent surge in urbanization in Calabar has seen people building in places that are clearly flood reception zones or flood prone areas. Such enterprise that involves the erection of structures on flood plains will naturally suffer at the slightest sign of flooding. Of course, it is a common saying that “water finds its own level” and so, if construction infringes on a drainage channel, then the water will move elsewhere if it cannot uproot the obstruction on its path. This is the situation where some residents of Calabar claim not to have witnessed flooding in their neighbourhoods during the past 50 years.

Secondly, the familiar rainfall pattern of Nigeria is the one that accompanies the regular swings of the Inter-Tropical Convergence Zone (ITCZ). Nigeria’s locational factor (i.e. Nigeria lies between latitudes 4⁰N and 14⁰N; and longitudes 2⁰E and 14⁰E) suggests perennial humid conditions in the southern states with annual rainfall of 1000mm – 2500mm but exceeding 3000mm in parts of the Niger Delta and the southeast corner; the extreme drought-prone parts which may receive anything from 250mm to 700mm. Superimposed on this spatial diversity are the inter- and intra-seasonal variations which are common due to regular transient atmospheric flow patterns and

systems that are responsible for localized and regional variations exceeding 50 percent. However, the 21st Century climate change which is associated with global warming has created significant distortions to the local climate pattern in Calabar and elsewhere. For instance, intense afternoon thunderstorms that can generate over 200 millimeters of rain within a day or even shorter duration have become commonplace because global warming has provided the needed thermal energy for increased evaporation along the Atlantic Gulf of Guinea. A combination of enhanced thermal and cyclonic activities, therefore drive the massive rainfall regime that Calabar and other coastal locations in Nigeria have been experiencing lately. For instance, many coastal towns in Nigeria such as Lagos, Ibadan and Calabar have received excessive rainfalls recently which resulted in historic floods that caused substantial loss of lives and property (Adefolalu, 2007; Ekpoh and Nsa 2011). These recent severe floods in Calabar clearly qualify to be called “extreme climatic events” which should occur in cycles of 10, 20 or 30 years (but certainly not a yearly affair) based on historical records. Unfortunately, climate change has conditioned an “extreme climatic event” into an “annual event”.

Thirdly, a combination of high temperatures due to global warming and the high humidity of the humid tropical climate in Calabar mean that the level of chemical reaction has increased leading to intense, deep chemical weathering of the soil. This process ensures that silt, sand and clay are in abundance, especially during the rainy season, and they are implicated in the rapid silting of the gutters and natural drains. In addition to natural silting of the drains, most residents of the metropolis are still in the habit of disposing wastes into gutters and drains, leading to the clogging of both artificial and natural water channels.

4. Consequences of Recent Calabar Floods

Rapid urbanization of Calabar in recent years has seen structures and economic activities expanding into lands that may be classified as marginal and flood-prone. Accordingly, more structures and economic activities are impacted today than in the past. Moreover, climate-change-related floods are quite severe and ferocious, in comparison to normal floods, especially in terms of their impacts. In general, flooding in Calabar has created the following impacts:

- (a) Flooding do cause damage to farmlands, which often translates to crop failures, food shortages, inflation, hunger, malnutrition, starvation, dislocation, refugee situation, broken families, increased crime wave and societal restiveness.
- (b) Floods do inundate and destroy the city landscape, causing widespread flooding of

residential areas; inundation of buildings and destruction of lives and properties; flooding of urban roads and obstruction of traffic; loss of man-hours; loss of revenue; water-logging of playing fields and recreational parks; pollution and contamination of urban water sources; general environmental degradation, etc.

© Floods do trigger landslides, mudflows, slope wash, soil and gully erosion. Soil erosion often leads to nutrient leaching and soil impoverishment.

- (d) Destruction of Ecosystems and loss of Biodiversity through perennial inundation and ponding
- (e) Destruction of fish ponds through overflow and introduction of exotic species.
- (f) Mariner Beach flooding has often led to perennial loss of beauty at the beach resorts and fishing outposts/settlements.

5. **Flood Remedies**

In general, several strategies have been devised to lessen or eliminate the impacts of flooding on society and environment, and they include:

- (a) Construction of artificial levees along river banks which are vulnerable to flooding.
- (b) Periodic dredging of silted rivers.
- (c) De-silting of urban drainage channels (gutters).
- (d) Tree planting and cover-cropping of unstable slopes to reduce run-off coefficient, which in turn reduces slope wash, flooding and gully erosion.
- (e) Enforcement of Town Planning Laws to avoid building of structures on natural/artificial drainage channels
- (f) Rain water harvesting
- (g) Building of flood control dams and reservoirs
- (h) Canalisation/channelization
- (i) Provision of adequate and sizeable drainage network for effective evacuation of runoff after heavy rainfalls
- (j) Reduction in the amount of paved surfaces in urban and built up areas
- (k) Increase in urban open spaces (lawns and parks) to encourage infiltration

6. **What can be done to mitigate flood impacts in Calabar**

Contemporary catastrophic flood events are said to be the direct impacts of climate change. Accordingly, mitigating the incessant occurrence of historic floods that have catastrophic impacts on man, society and environment will involve the mitigation of climate change through reduced greenhouse gas emissions, which in itself is caused by insatiable fossil fuel consumption, increased industrial processes and deforestation. Nigeria needs to be an active member of the global effort to reduce greenhouse gas emissions. We can do this by pursuing more

vigorously the policy of zero gas flaring in the Niger Delta region where 100% of Nigeria's oil and gas is produced. We should also encourage serious tree planting and forest conservation programmes, so as to help in mopping existing carbon dioxide in the atmosphere. Other measures will include: Periodic dredging of silted rivers; regular de-silting of urban drainage channels, both artificial and natural; provision of adequate and sizeable drainage network for effective evacuation of runoff water after heavy rainfalls; embankment, terracing and cover-cropping of unstable slopes to reduce run-off coefficient, which in turn reduces slope wash, flooding and gully erosion; enforcement of Town Planning Laws to avoid the construction of structures on natural/artificial drainage channels; reduction in the amount of paved surfaces in urban and built up areas; increase in urban open spaces (lawns and parks) to encourage infiltration. Finally, dumping of refuse in gutters should be prohibited and severe penalty allotted to offenders.

7. **Conclusion**

Contemporary flood problems are largely the product of climate change which in itself is the consequence of human mismanagement of earth's resources. Therefore, the study concludes that, for current flood problems to be handled holistically, climate change must of necessity be reversed by reducing greenhouse gas emissions and re-appraising our use of earth's resources. Moreover, serious effort at re-appraising the drainage network in the city of Calabar must be made so as to keep pace with recent urban renewal and expansion programmes. We have only one planet which is habitable. It is of necessity that we re-order our use of available space on planet earth by meeting our needs in an environmentally friendly way, and not jeopardizing the needs of future generations. As the popular saying goes "a stitch in time saves nine".

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Flood Scene in a Nigerian City