

# A Breviloquent Review of the 2022 Flooding in Rivers State, Nigeria: Causes, Impact, and Panacea

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**Abstract:** *This article discusses floods in Rivers State, Nigeria, including their origins, effects, and potential solutions. Review of secondary data and in-depth content analysis comprised the methodology. The causes of flooding in Rivers State and many other areas worldwide include poor design, high or overly prolonged rainfall, human activity, and natural flooding through streams. Economic loss, illness breakout, tainted drinking water, difficulties with mental health, and settlement expansion are all effects of floods. The study discovered structural measures like check dams, levees, flood walls, and adequate drainage systems as well as non-structural measures like floodplain management, the banning of specific building types, elevating buildings in floodplains, routine drainage system inspection, sufficient public awareness, adherence to town planning regulations, and political intervention as the solution to flooding in Rivers State. According to the study's findings, flooding is a threat with a host of detrimental emotional, psychological, economic, and physiological effects and necessitates prompt human involvement to control, limit, and perhaps avoid its recurrence. The report suggested, among other things, that the Government at all levels should respond to the threat of flooding by becoming proactive rather than reactive.*

**Keywords:** 2022 Flooding, Rivers State, Nigeria

## Introduction

Rivers State was not exempted from the effects of the 2022 Nigerian floods in the nation. According to data from the Federal Government, the flood caused more than 1.4 million people to be relocated, killed over 603 people, and injured more than 2,400 people. In addition, 332,327 hectares of land have also been damaged, along with about 82,035 homes (Oguntola, 2022). Although regular flooding is expected in Nigeria, the current floods are the worst since the floods of 2012. (Maclean, 2022). The floods had totally or partially destroyed over 200,000 homes as of October. Seventy-six persons lost their lives on 7 October when a boat carrying evacuees from the floods crashed on the Niger River (The Guardian Newspaper, 2022). Heavy rains, climate change, and the 13 September start of the Lagdo Dam's water release in neighboring Cameroon all contributed to the flooding. Then, early in the summer of 2022, flooding started and persisted roughly until the second week of November.

Flooding is a natural occurrence brought on by rainwater entering a drainage basin. The amount of flooding varies according to precipitation and the drainage basin (Ward, 2018). Floods are typically categorized as natural disasters because they frequently result in severe property destruction, widespread homelessness, and, in many cases, fatalities. Excessive rainfall can result in rivers and canals overflowing their natural routes and spreading across the nearby area, which can result in floods. Additionally, storm-force winds pushing the ocean inland through low-lying areas can be the culprit (Robert, 2016). Calculate flood losses; they can be further broken down into tangible and intangible losses, further separated into direct and indirect losses (Smith & Ward, 2018). Floods result in immediate, measurable damages since they physically harm property. These losses are often most enormous in absolute terms on urban flood plains in more developed locations due to the comparatively high levels of investment per unit area of flood-prone territories. "Mortality" refers to the direct, measurable losses caused by floods and the heightened death rates brought on by such disasters. Drowning is the most frequent cause of flood mortality (Smith & Ward, 2018). The interruption of social and economic activities just after a flood, particularly in metropolitan areas, is the leading cause of indirect tangible flood losses. In this sense, they can be referred to as consequential losses, frequently viewed as affecting traffic patterns and industrial production and trade losses. The most challenging losses resulting from floods to quantify are intangible ones. Differentiating between primary and secondary impacts can be very challenging. This is partly because they are entangled with the conventional adaption techniques employed by those frequently exposed to flood dangers.

There are several alleged causes of floods, including structures built along flow routes, impervious urban areas, bad storm drains, garbage dumped in drainage channels, lack drainage channels, improper termination of drainage channels, and problems with land

use. It demonstrates how interacting with the environment as a human impact the state of low-lying places. Floods cause more human suffering than any other natural disaster, as evidenced by the continually growing population of those impacted.

Local Government Areas in Rivers State, including Ahoada East, Ahoada West, Ogba/Egbema/Ndoni, Akulga, and Obio/Akpor, were the worst affected, and many lives were adversely impacted by flooding. Many people were forced to live in shanties and were turned homeless. According to Jakubicka et al. (2010), floods kill thousands of people each year, displacing millions and seriously damaging infrastructure around the globe. According to Doocy et al. (2013), there is a considerable risk of catastrophic losses from floods, given deforestation, the encroachment of large populations near lakeshores, river basins, and coastal areas, and the acceleration of population increase. The health risks of living in a flooded environment without access to social facilities include dermatitis, asthma, arthritis, cholera, diarrhea, typhoid, gastrointestinal disease from malaria, and chest infections. The Federal and State Governments, charitable organizations, and private citizens all donated cash, food, clothing, medical supplies, and other consoling items during the Rivers State flood. These donations helped lessen the devastating flood's physical, emotional, and psychological effects on most physically displaced people in IDP camps throughout the affected Local Government Areas in the state. Many of those in the IDP camps had access to food, some level of medical care, a few items of clothing to wear, and other necessities during that time. That was heartwarming. Some of them seemed hypnotized by the reality they would face after that life at the IDP camp.

Notwithstanding, now that the waters have dried up across the affected coastal regions in the state and there are virtually no more palliatives, many have left the IDP camps to their homes to face the reality of life; many are yet to figure out where to go from the IDP camp as their houses have been swept off and there is no money to fix them. Farmlands are destroyed, and fishing, poultry, and other local businesses engaged by the residents of these coastal regions have been turned to naught, coupled with the ever-skyrocketing prices of goods and services, especially here in Rivers State. Many who have returned home are yet to figure out what to do with their lives, as they had finished their savings during the hit of the flood and are yet to revive their local businesses destroyed by the devastating flood. These and many more have increased hunger and other forms of hardship in the land. The negative impacts of the flood appear like the scorching sun, which has left the inquisitive mind of the researcher to want to dig deeper into the cause, impact, and panacea of the 2022 flood disaster.

### **Statement of Problem**

The blueprint of the Federal and State governments' plans is yet to be released on how to alleviate the sufferings of the flood-devastated people of Nigeria, especially those in Rivers State. The 2012 flood disaster was a rehearsal compared to the just-gone 2022 flood catastrophe. The flood came, and the people, especially those in the coastal areas of Rivers State, were helpless, as they had nothing to prevent or curb the situation. All they could do was save some of their properties, uproot their crops (mature and immature) as much as they could, and get their family members and loved ones to safe havens. Unfortunately, some lost their lives in the process, and who knows what will become the fate of the people if the Nigerian government does nothing quickly about the situation and flood comes again in the next few years, just like it came this year after the year 2012. Diverse health challenges also arose during and even after the waters dried up. Emphatically, the waters may have dried up, but the flood's aftermath lives on and will continue for years. According to the World Health Organization (2012), during the flood, there is an increased risk of infection of waterborne diseases contracted through direct contact with polluted waters, such as wound infections, dermatitis, conjunctivitis, and ear, nose, and throat infections. The government's lackadaisical attitude concerning post-flood response measures toward affected members and residents of Rivers State is most worrisome, and it calls for research attention.

The above studies looked at flood and its impact in Obio/Akpor and Ahoada East Local Government Area of Rivers State and Calabar municipality, Nigeria. Howbeit, none of these studies empirically or theoretically studies the impact and panacea of the 2022 flood in Rivers State.

### **The Concept of Flooding**

In the words of Jonkman and Kelman (2015), flooding is "the presence of water in locations that are typically dry." A flood is defined as a considerable increase in the water level in a stream, lake, reservoir, or coastal area by the Center for Research on the Epidemiology of Disasters (CRED) in 2019. Geoscience Australia (2013) defines flooding as an event that happens when a typically dry area of the earth's surface is submerged and covered in water as a result of heavy rain or a water body overflowing. Additionally, flooding was defined by Pagasa (2013) as a natural hydrological phenomenon that typically occurs as a result of metrological occurrences like earthquake activity. High tides co-occurring with heavy rains, the building of temporary dams, and the breakdown of hydraulic and other control structures are all astronomically influenced occurrences.

According to Jonkman (2015), Ashley and Ashley (2018), and other sources, the most prevalent types of flooding are riverine floods, which are brought on by the gradual buildup of heavy rainfall, and flash floods, which are distinguished by high-velocity flows and short warning intervals. However, Ahern et al. (2015) suggested that meals can be categorized based on nature and cause (heavy

rainfall, tidal solid movements, structural failure) (e.g., regularity, speed of onset, velocity, depth of water, spatial and temporal scale). Additionally, according to Dewan et al. (2014), there are other sorts of floods, including coastal floods brought on by storm surges, rain floods caused by inadequate drainage, monsoon floods in the flood plains of major rivers, and flash floods from overflowing mountainous rivers. Finally, Usman (2012) noted that despite not being the primary source of fatalities, river flooding affects and uproots more people than any other natural disaster.

According to Hunt (2015), weather elements like heavy or prolonged precipitation, snowmelt, or storm surges from cyclones, as well as significant human factors like a structural dam and levee failures, changes to absorbent land cover with impervious surfaces, and insufficient drainage systems can increase the intensity of floods. Although the consequences of floods vary in intensity and scope depending on the topography, the level of human activity, the amount of water present, and the stakeholders' level of preparedness, they are always incapacitating (Dalil et al., 2015). Flooding is perhaps the weather-related hazard with the most significant global reach (Doswell, 2015). It can happen almost everywhere. A flood is defined as water spilling onto normally dry terrain. Floods can occur in various ways that are not directly tied to current meteorological conditions, although they are frequently associated with heavy rainfall. So, to give a thorough account of floods, it is necessary to mention processes that may have little to no connection to climatic phenomena. However, it is evident that in the end, the water that causes floods has already fallen as precipitation at some point, possibly in the distant past. Therefore, no matter what specific event produces the floods, the primary cause of flooding ultimately stems from meteorological processes that produce precipitation.

Floods cause damage by depositing mud and debris after the floodwaters have finally subsided and by the tremendous force of the moving water. Those who have never been through a flood might not understand the perils of moving water. When the speed of the running water doubles, the energy associated with it multiplies by a ratio of four, increasing proportionately to the square of the speed. Flooding is frequently associated with water moving more quickly than usual, partly due to the weight of more water upstream, which causes an increase in the pressure gradient that drives the flow. Most often, the debris that the flood waters carry—trees, cars, rocks, and buildings increase the flood's potential for destruction. When the seas are moving quickly enough, they can wash away everything in their path and leave scenes of awful devastation in their wake.

Even if the movement of the water does not directly harm objects, the effect of the water itself can have a devastating impact on buildings and the things inside of them. For example, books, furniture, photographs, electronic devices, and other items can all be harmed just by submerging them in water. Additionally, floodwaters frequently include dissolved chemicals, possibly hazardous bacteria, and suspended sediment. This indicates that drinking water supplies are typically compromised by floods, leading to temporary shortages of potable water and additional long-term costs for restoring drinking water service to people in a flooded area. When floodwaters recede, mud and debris are left behind that can be expensive to clean up and pose a health risk, especially if drowned wild and domestic animals' remains are among the debris. Floods can sometimes push wild creatures (including invertebrates of many kinds) out of their natural habitats and into places that are nearby or already flooded. This can cause several issues, especially if the species are venomous or hostile.

Flooding is one of the natural processes that shape the earth, despite its significant detrimental effects on people. One of the most fruitful places on earth is the floodplains that line rivers and streams. For this reason, most of the so-called "cradles of civilization" are located within floodplains (e.g., the Nile River and the Tigris–Euphrates River, among others). Therefore, ever since humans have been in the path of these natural disasters, they have been positively and negatively affected by flooding.

### Causes of Flooding

However, flooding is not entirely natural and threatens the ecosystem. Furthermore, due to man's propensity towards coastal areas and flood plains, flooding frequently has an unfavorable impact on human activities and poses a risk when it does. Agbonkhese et al. (2014) elaborated on the causes of flood disasters around the world, including:

**Human Interaction with His Environment:** As was already established, human contact with the environment through industrialization, technological advancement, urbanization, deforestation, fossil fuel burning, and agricultural activities significantly contribute to flooding. Undoubtedly, human activities are becoming a more significant factor in flooding. Natural surfaces are being replaced as urbanization grows, which prevents water from easily percolating into the ground. The result is that a significant amount of rainfall that would often soak into the ground or be deflected by vegetation, delaying surface run-off into streams and rivers and causing them to flood, is instead immediately available.

**Bad Planning:** Floods are also the product of poor design, and when humans have tried to control the water resources available to them by building dams and other water control structures, they have also failed, leading to floods. The 1988 Bagauda Dam collapse near Kano had disastrous environmental effects; the widespread drainage system failures throughout Nigeria, the encroachment of

buildings on the flood plains of streams and rivers running through towns and cities, and the deposition of waste materials in their courses are all excellent examples.

**Heavy/Excessively Prolonged Rainfall:** Floods are typically brought on by prolonged or excessively heavy rain, or perhaps by both. Flooding can occur along sea coasts as a result of tropical typhoons and hurricane-related wind-driven storm surges, and rain-swollen streams. Additionally, the shorelines of sizable inland lakes may flood. Flooding is also significantly influenced by climate change, a problem affecting every country's economic, social, cultural, and physical environments. It is a crucial environmental component that shapes and reshapes a society's diverse human activities. Climate change is defined by the United Nations Framework Convention on Climate Change (UNFCCC) as a change in climate caused by human activity that modifies the global atmosphere and adds to natural climate variability seen over comparable periods.

**Human Activities:** Climate change is primarily caused by human activity, including industrialization, technological advancement, urbanization, deforestation, burning of fossil fuels, and agricultural activities, as well as by natural factors like solar radiation quantity and quality and the earth's astronomical position. Weather is becoming less predictable due to climate change, particularly in developing nations like Nigeria, where there are insufficient resources for forecasting and managing weather. Recent changes in rainfall patterns have made the rainy season extraordinarily difficult. In addition, climate change indirectly worsens flooding by changing the pattern of floods in flood-prone locations. However, there is no denying that climate change and its effects, such as sea level rise, directly impact urban and coastal flooding. It has also consistently disrupted the social structure of cities and worsened poverty, especially in most developing nations, including Nigeria. As the urban population grows and the impoverished are forced into weak, flood-prone areas, people become more susceptible.

**Natural Flooding through Streams:** The most frequent or typical flooding in Nigeria occurs naturally through streams and is usually brought on by heavy downpours. Water in the stream or river will inevitably spill across its border and into surrounding settlements as a result of this. Floods happen for several reasons, but climatological factors are the most significant. Smaller amounts of rainfall may also cause flooding in a region already submerged. Additionally, in Nigeria, other causes of which climatologically factors are only parts or indirectly responsible include:

- i. Heavy rainfall synchronizing with spills of rivers;
- ii. Main rivers backing up the water in their tributaries;
- iii. Peak floods occur at the same time in the main river and its tributaries;
- iv. Inadequate and inefficient drainage of low-lying and flat areas to the overflow;
- v. Flooding of low-lying coasts by excessively high tides associated with storm-surge effect;
- vi. Rivers and tributaries carrying water floors very much over their transporting capacities due to the concentration of run-off;
- vii. Ponding back of stream flow by rising tides, particularly during spring tide conditions;

### **Impact of Flooding**

Obinna et al. (2014) classify flood damage into direct and indirect, followed by tangible and intangible. When floodwater comes into direct physical contact with people, property, or the environment, harm is produced. In contrast, indirect flood damage refers to businesses losing production due to the flood (Obinna et al., 2014). Substantial damages are those that are quantifiable in money, whereas intangible damages are those that are not quantifiable in money (Obinna et al., 2014). However, the impact of flood can be discussed using the following subheadings, as mentioned by Obinna et al. (2018):

**Economic Damage:** Obinna et al. (2018) noted in their article on the effects of flooding among residents living along Taylor Creek in the Orashi region of Rivers state, Nigeria, that the area's ongoing flooding has an impact on residents' social and economic environments because it destroys agricultural farmland and seeds stored for replanting, which leads to a decline in food production and income loss for many in the affected communities. Many assume that unpleasant effects will inevitably result once flooding is mentioned. Flooding has both beneficial and harmful effects. Some authors have talked about the detrimental effects, while others have talked about the beneficial ones. According to Barinweni et al. (2012), flooding seriously harms local biodiversity, public health, and property. Rapid run-off that results in soil erosion and the destruction of aquatic life's reproductive habitats is a common component of flooding. When a severe flood lasts for a very long period, it impairs agricultural activities. It causes traffic congestion in areas with low-raised routes, endangering the safety of the nation's food supply. Floods can affect different land uses and drainage systems. Flooding damages urban and rural infrastructure, including public buildings and hydroelectric/thermal power plants, which results in enormous financial losses and disruption and exacerbates the already difficult security situation. Flooding can cause loss of livelihood, production, and other long-term economic effects that can force the afflicted population to relocate or be displaced, as stated by Ekanem et al. (2014).



**Disease Outbreak:** In the just experienced 2022 flood disaster, for example, the people of Rivers State suffered and are continuing to suffer the scorching negative impact of it. For instance, mosquitoes reproduce in or near stagnant or slowly flowing water and spread some severe illnesses. El-Sayed et al. (2017) found an association between increases in mosquito-borne transmission and the accumulation of stagnant water caused by floodwaters obstructing drains. Waterborne illnesses, including typhoid fever, cholera, leptospirosis, and vector-borne illnesses like malaria, dengue, and dengue hemorrhagic fever, can spread due to flooding's harmful effects on physical health. Waterborne illnesses are illnesses brought on by drinking contaminated water. Most often, pollutants like sewage, human and animal waste, pesticides and insecticides, fertilizers, oil, asbestos, and rusted building materials pollute floodwater (Public Health Laboratory Service, 2000). Waterborne illnesses are illnesses brought on by drinking contaminated water. Examples include, but are not limited to, typhoid fever, cholera, diarrhea, dermatitis, conjunctivitis, and wound infections. According to reports, the study population experienced an increase in the cholera outbreak following the flood. In a routine data study on typhoid and paratyphoid fever risk factors by Vollaard et al. (2014), it was found that flooding increased the outbreak of typhoid and paratyphoid among responders.

On health, flooding has had a negative impact. In a case-control study by Sur et al. (2018) on a severe cholera outbreak following floods, it was revealed that the study population had an increase in cholera outbreaks following the flood. In a surveillance study by Ogden et al. (2016) on Emergency health surveillance after severe flooding in Louisiana, Pre-hospital and Disaster Medicine, it was discovered that respondents reported musculoskeletal injuries, lacerations, motor vehicle injuries, and falls. A total of 124 households were sampled at random for the study.

**Contamination of Potable Water:** Flooding destroys sanitary restrooms and contaminates clean water sources. Waterborne illnesses and life-threatening infectious diseases are caused by direct and indirect contact with the contaminants, whether by direct food intakes, vector insects like flies, dirty hands, dirty plates, or other utensils. Additionally, the pollutants can seep into groundwater and sanitary sewer lines through the ground. Additionally, due to flooding, sewage treatment facilities backed up into homes and low-lying areas, and malfunctioning equipment may be overburdened with filthy run-off waters and sewage. Private sewage disposal systems can become a source of infection and illness when they break or overflow. Private wells can also be severely contaminated or ruined by floodwaters (Centers for Disease Control and Prevention, 2005). In this way, diseases like cholera, typhoid, and dysentery, which can be deadly, can spread due to unclean drinking and washing water, poor sanitation, and poor sewage treatment. Basic hygiene, or having access to clean, safe water and toilets, is essential to preventing a health catastrophe.

**Mental Health Challenge:** Insomnia, anxiety, sadness, stress, post-traumatic stress disorder, and suicidal thoughts are some of the mental health effects of floods. The effects of flooding and its aftermath on people's mental health can be very diverse. Reacher et al. (2014) conducted a case-control study on the health effects of flooding, comparing the reported gastrointestinal and other illnesses and mental health in flooded and non-flooded households through telephone interviews with 227 cases (house flooded) and 240 controls (non-matched) using interview guide for data collection and analysis were done using descriptive statistics. They discovered that adults whose homes were flooded experienced mental distress four times more frequently than those whose homes were not flooded. The World Health Organization (WHO) acknowledges that individuals involved in disaster preparedness or service delivery have not thoroughly addressed the psychosocial effects of floods; however, the primary evidence is related to common mental illness, post-traumatic stress disorder, and suicidal ideation (World Health Organization, 2011).

Stanke et al. (2012) further stated that flooding is exceptionally stressful and that the tension lasts long after the water has subsided. Numerous epidemiological research revealed that flooding could cause common mental problems (such as anxiety and depression), post-traumatic stress disorder (PTSD), and suicide, according to a review by Ahern et al. (2015). Additionally, the Pitt Review (2007) discovered that tension, anxiety, and depression are the most typical associations with flooding. According to Gray's (2016) research on the long-term impacts of experiencing floods, the main effects on participants included continuous uneasiness, a lack of security, anxiety, and a sense of loss of home, as well as loss of social contact and strain on personal relationships. Additionally, the overleaf pictures depict some of the negative impacts of the 2022 flood in some areas of Rivers State.



Figure 1: 2022 flooding in Akinima, Headquarters of Ahoada West LGA of Rivers



Fig. 2: Some homes ravaged in Ahoada West LGA by the 2022 flood



Figure 3: *Cooking inside a boat as caused by the 2022 flood*



Figure 4:

*2022 Flood victims making an effort to relocate to safe havens*





Figure 5: One among the numerous IDP camps in Rivers State during the 2022 flood.

**Growth of Settlements:** On the flip side, flooding appears to have some positive impacts. According to Backinsal (2016) and Chisolm (2019), floods can cause settlements to grow, and in most situations, the settlements start along the river. According to Robinson (2019), flooding has improved the existence and growth of agricultural settlements and cities' development since antiquity. Robinson (2019) adds that city life spread from ancient Egypt and Mesopotamia through the Mediterranean Sea, with the flooding of associated rivers very helpful. The earliest towns appear to have grown up in the great river low lands of the near and middle east, Robinson (2019) says. Observable morphological features, such as those found between Aboh and Samabiri in the lower Niger and those along the river Amazon and its tributaries, can equally occur due to flooding to develop settlements and support their inhabitants, according to Faniran and Jeje (2013). This is true even in non-deltaic environments. According to Oyebande (2014), floods are a natural occurrence that is a natural phenomenon that we should try our best to regulate. However, flood waters can be highly vital for many ecosystems if they are contained and appropriately managed.

### **Panacea to Flood Disaster**

Flood threats have gotten worse recently in Nigeria, especially in Rivers State. To reduce the threat of floods, proactive and preventive approaches combining structural and non-structural measures must be developed and implemented.

**Structural Measures:** In the places that are susceptible to flooding, structural solutions such as check dams, levees, flood walls, and adequate drainage systems will assist in limiting periodic inundation in the following ways (Agbonkhese et al., 2014):

- a. Adequate drainage systems will reduce peak flow stages of flood and divert excessive flow.
- b. In communities where the stormwater flow rate is high, embankments should be constructed to break down stormwater so as not to result in floods. These embankments could be permanent or temporary, such as sandbags placed when a flood is imminent.
- c. The construction of structures for irrigation and the use of excess run-off water for inter-basin transfer as an alternative to absorbing excess water from the Cameroons.
- d. Check dams will reduce peak flows.
- e. Levees and flood walls confines flow within predetermined channels.

**Non-Structural Measures:** However, as the Bagauda dam collapse in Kano amply shows, the adoption of structural measures alone may result in less-than-optimal development of the flood plain and may even invite higher losses when storms come that surpass the design limitations of the structures. Furthermore, structural methods are expensive, necessitating the deployment of non-structural



measures to control floodplain growth. The following non-structural solutions could be implemented; as a result to lessen the threat of flooding in Nigeria.

- i. Floodplain management is seen to be the best approach. In order to solve flooding using this method, the first step is to create a flood-frequency curve based on historical data and a vegetation analysis to ascertain how frequently an area experiences floods of a specific size on average. Although this method cannot predict when a flood will occur, it may estimate how frequently one would encounter one based on historical data. Then, using the data obtained, a strategy may be created and implemented to:
  - a. Prohibit certain types of buildings or activities in high-risk flood zones.
  - b. Elevate or floodproof buildings that are allowed on legally defined floodplains.
  - c. Construct a floodway that allows floods to flow through the community with minimal or no damage.
- ii. All roads should be constructed with adequate drainage facilities provided.
- iii. Drainage systems should be regularly inspected and monitored to note any failure to effect repairs. Also, sedimentation and littering of the drainage systems should be guided against while vegetation like trees whose rooting system tends to or are likely to distort, break or undermine the drainage system should be removed.
- iv. There should be adequate sensitization of people often affected by flood menace towards adopting environmental best practices.
- v. Concerted efforts must be geared towards adequate city planning, policy formulation, enhanced public enlightenment programs, integration of environmental planning and education to the curriculum of schools at all levels, and capacity building towards adaptation and mitigation of climate change.
- vi. Government at all levels should ensure proper and effective use of ecological funds and encourage the integration of environmental disaster insurance to take care of the fall out of flood menace.
- vii. The immediate downstream culverts, which help to ensure effective run-off discharge and hence effective self-cleaning of the drainage systems, should be designed and properly aligned.
- viii. The National Inland Waterways Authority (NIWA) of Nigeria should urgently design waterways and tributaries that are sited and taken over by shrubs to allow channels and easy flow of water to curb the ravaging flood in the coastal communities.
- ix. As is obtained in developed countries of the world, particularly in America and Europe, there is always a standing task force that is set up to deal with the problem of snow once winter is approaching. In the same way, the Nigerian government needs to be proactive by setting up a standing task force that will tackle the issue of flood once the rainy season approaches.
- x. Town planning regulations should be scrupulously upheld and adequately implemented as this would help to reduce the threat of flooding. To prevent the development of unplanned homes and cities, the Nigerian government should always prepare ahead of the population. Investigations have shown that many homes built today in Nigeria are built on natural drainage channels or courses, which are frequently first sand filled by land developers before erecting their structures. This is necessary because deviation from the original master plan by prospective town developers does facilitate the occurrence of floods. The result of this practice is that these natural drainage channels and courses have been plugged, preventing stormwater from flowing through them and flooding the nearby areas.
- xi. Dangerous political interventions in land use planning and management should be avoided to prevent avoidable flood menace and blaming of innocent professionals.
- xii. Nigerians must understand that “action and reaction are equal and opposite.” To this aim, people should properly dispose of their waste and refuses instead of disposing of it in drainage channels, as poorly disposed waste and refuse, such as shoes, clothing, and other items can equally clog drains, particularly at their narrow ends or points. This also causes the stormwater to overflow or pour into the sewers, which can cause flooding that can enter houses and farms and harm crops and other household goods.
- xiii. Streams and rivers should be channeled by deepening, widening, or straightening to allow rapid run-off.
- xiv. National disaster and emergency policies should be strengthened to facilitate effective disaster preparedness and response. This approach will not only save lives and livelihoods, but it will equally reduce vulnerability to flooding menace.
- xv. Excellent and long-term environmental and natural resource management practices can help reduce people’s risk and vulnerability in disaster-prone areas.
- xvi. Collaborations between local communities, NGOs, voluntary groups, and local and international donor organizations toward managing floods should be established.
- xvii. Within the realm of professional practice (good land use planning and management), professionals should undergo training and re-training programs in related fields (human capacity development) and uphold the ethics of their profession, particularly avoiding corrupt planning practices that can jeopardize the lives and properties of the people.

## Conclusion

Based on the theoretical review carried out by diverse scholars, the study concludes that flooding is a menace that rides with it a plethora of negative emotional, psychological, economic, and physiological impacts that requires swift human intervention to manage, minimize and possibly prevent its occurrence ever again. Flood menace has ravaged several towns in Nigeria for several decades, leaving in its wake the loss of thousands of lives and tens of billions of naira worth of properties damaged which calls for urgent holistic action on our part as individuals and that of the government. Flooding, a natural and human-made disaster, can be prevented if stringent measures are taken, especially by the government. The government of any nation, among its functions, is the duty to protect the lives and properties of its citizen. This implies that a lackadaisical attitude towards the flood menace is highly unacceptable from the government of any nation, of which the Nigerian government, from state to the Federal level, is not exempted. Therefore, rapid response to flood disasters from all angles is the key to managing, minimizing, and possibly ending flood disasters in Rivers State and Nigeria entirely.

## Recommendations

1. The Rivers State government should implement adequate community-based early warning for flood prevention, management, and control.
2. Government at all levels should shift from reactive to proactive in responding to flood menace.
3. The government and its agencies should fund and map out contingency and emergency preparedness plans to prevent flood outbreaks in Nigeria and Rivers state.
4. National Emergency Management Agency should embark on some measures such as dredging and re-dredging of drains, erosion passages, construction of embankments, channelizing some routes prone to flooding, and direct clearing of some existing drainages.
5. The governments should task the ministry of works and infrastructure to ensure free drainage channels and erosion passages. Furthermore, the ministry should enforce drainage clearing through a persuasive approach.
6. House management agencies and town planners should ensure that the building of houses and structures are supervised and well-planned in a way that will not precipitate flooding.

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