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Causes and Effects of Flooding in Nigeria: A Review

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A B S T R A C T

Flooding is an environmental hazard that needs appropriate measures to be instituted to stem the tide of occurrence. The study relied on previous academic/scholarly articles in achieving the aim. It was noted in the study that flooding is caused by natural and human activities. For instance, excessive rainfall, terrain and nature of soils are natural causes of flooding. Furthermore, poor environmental planning/monitoring, housing development in flood prone areas, deforestation, haphazard developments resulting in the blockage of drains, poor waste disposal practices, negligence by government in designing and implementing policies at various levels as well as poor environmental planning and weak enforcement of policies contribute to flood occurrence. To this end, the present study suggested that government should ensure that environmental management policies are properly enforced in the country. Equally, development control activities should be taken seriously to avoid erecting developments on flood plains and flood prone areas. Finally, regular environmental education should be given priority in the society.

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INTRODUCTION

Generally, flood is an overflowing or eruption of a great body of water over land not usually submerged (Daniel and Udo, 2019). It is an extreme weather event naturally caused by rising global temperature which results in heavy down pour, thermal expansion of the ocean and glacier melt, which in turn result in rise in sea level, thereby causing water to inundate coastal lands. Flooding causes inundation and harm to plants and animals, including man, buildings and infrastructure (Ujene and Oguike, 2020). However, flooding is a global natural hazard that has affected lives, led to the loss of properties and extinction of species in the environment. In fact, flooding is a threat that affects the quality of the environment. Given the issues relating to flooding, it is regarded as a factor that is used in defining environmental quality of residential neighbourhoods. Other environment hazards include drought, desert encroachment, soil erosion and tsunamis.

From the foregoing, it is clear why flooding is regarded as a regular global occurrence. Due to the global nature of flooding and it relative negative implications, there have been numerous attempts by world governing organizations to manage the situation. For instance, the World Bank Group, (2016) showed that flooding has affected several countries of the world. They specified that flooding is among the most frequent and destructive disasters that is causing significant damages and further disrupting livelihoods throughout the world. Flooding occurs more in developing countries due to poor environmental management options. The weak management options and enforcement in relation to flooding is occasioned by weak institutional and legislative framework in the development control process in developing countries. For instance, developers build haphazardly without considering zones of flood plains and areas that are susceptible to flooding. There is also poor funding from relevant organizations in order to facilitate the creation of drainage distribution channels among other management options that can lead to the mitigation of flooding in the environment.

In Nigeria, flooding has remained a prevalent environmental problem. Available studies have shown that there is frequent occurrence of flooding (Ishaya *et al.,* 2009; Kolawole*et al.*, 2011; Olajuyigbe *et al.,* 2012; Ejenma *et al.,* 2014; Komolafe *et al.,* 2015; Nkwunonwo, 2016; Yesufu, 2016; Sule *et al.,* 2016; Adetuji and Oleyele, 2018 and Onwuemele, 2018; Bamidele and Badiora, 2019). The studies pointed to the fact that flooding has negative implications on the survival of livelihoods, social and economic activities. Basically, in recent decades, flooding has led to the loss of thousands of lives and properties. According to available studies, flooding in Nigeria is caused by weak implementation of planning policies, streams and channel obstruction due to indiscriminate waste disposal habits and human activities in flood plains (Ituen*et al.,* 2014; Ekpoh, 2015; Udoh, 2015 and Evan *et al.,* 2017; Abraham *et al.,* 2021). Specifically, flooding has affected the lives, properties and sustainability of the environment as noted in available studies. Notably, flooding being a natural hazard have negative implications not only on the environment but also from the economic point of view. For instance, flooding affect housing, roads and other physical structures

making such areas not to be attractive to residents. In spite of the foregoing, literature that are aimed at analyzing the causes and implications of flooding are inadequate. Against this backdrop, this paper seek to appraise flooding with specific reference to it causes and effects based on existing studies.

THEORETICAL REVIEW

The causes of flooding across the world differ. Correia *et al.,* (1998) assessed flood hazard and management. Their study focused mainly on evaluating the understanding of people and their responses to natural hazards in Setubal, Portugal. They sought to device how the knowledge can be integrated in the planning and management of flooding. Their study relied on extensive interviews for data collection. They observed that the willingness of the public to participate in flood management plays an intricate role in the flood management process. For instance, when people are ready to be involved in flood management, approaches that will bring about management will be promoted. This may come in the form of community participation in the development of drainages and adherence to appropriate development control regulations and provisions.

According to Tabiri (2015), the four main causes of floods in Accra metropolis, Ghana are negligence/ignorance or sheer megalomania, poor planning of the city, building on waterways and indiscriminate disposal of waste material. Tabiri observed that Accra is exposed to the challenges of flooding and that urgent measures need to be put in place in order to minimize the challenges of flooding in Accra. Among such include the development of good drainage channels to facilitate surface run-offs and the appropriate disposal of waste by relevant agencies.

Komolafe *et al*., (2015) reviewed flood risk in Nigeria. They noted that there have been diverse flood events in Nigeria. Their study basically obtained data through past scholarly works and other secondary sources. They observed that flooding in Nigeria is caused by high level of vulnerability and lack of coping capacity of residents in Nigeria coupled with fast occurrence of extreme events resulting from climate change. Their study also revealed that flooding is increasing sporadically in the country due to poor urban planning and management. They warned that many lives and properties are at risk of experiencing flooding. They concluded that there is need to explore effective use of state of the art flood models and integrate all hydrological processes for more accurate prediction and mapping of flood and its associated risks in Nigeria. They also suggested that further studies on environmental and health impact of flood be carried out.

Nkwunonwo *et al.,* (2015) assessed flooding and flood risk reduction in Nigeria with a view to determining the cardinal gaps. Their study observed that flooding has become a frequent hazard in Nigeria. They noted that factors such as rapid population growth, urbanization, poor urban planning and climate change especially increased frequency and intensity of rainfall had resulted in flooding in major parts of Nigeria. Specifically, they showed that between 1985 and 2014, flooding in Nigeria has affected 11 million lives resulting in 1100 deaths

and properties being damaged to exceed US$17 billion. According to them, Lagos State has recorded the largest percentage of flooding in Nigeria while Niger, Adamawa, Oyo, Kano and Jigawa states are also experiencing flooding. They argued that in spite of the growing scenarios of flooding and its potentials to affect lives and properties, little is done to stem the tide of flood occurence in Nigeria. They suggested that more robust and scientific approaches to flood risk reduction such as flood modeling and vulnerability assessment be employed in flood management in Nigeria.

Magami *et al.,* (2014) assessed the causes and consequences of flooding in Nigeria. They revealed that flooding in Nigeria is caused by dam failure, over flowing of major rivers, coastal storms, ignorance of warning from Nigeria meteorological agency, delay in evaluation of flood victims and settlement of people at flood prone areas such as riverine areas and sea coast. Other causes of flooding that they observed were climate change, extraordinary heavy rains and continued release of excess water from artificial reservoirs. They also pointed out that poor maintenance of drainage channels coupled with indiscriminate waste disposal result in flooding in Nigeria.

In a similar study, Nwigwe and Embergo (2014) assessed the causes and effects of flood in Nigeria. Their findings showed that the development of illegal structures on or across drainage channels, land reclamation or encroachment, poor physical planning, inadequate drainage channels, blockage of canals and drains, collapsed damns and nature of terrain were the primary causes of flooding in major cities and towns in Nigeria.

Olajuyigbe *et al.,* (2012) assessed flood hazard in Lagos, Nigeria. Their study showed that flooding in Lagos results from high river levels, concentration of overland flow due to heavy rainfall, limited capacity of drainage systems as well as blockage of waterways and drainage channels that are developed to facilitate surface run-offs. They also noted that narrow river channels and construction of housing units and other developments along flood prone area contribute significantly to flood occurrence. They further observed that flooding in Lagos has constituted become a menace and has socio-economic and environmental consequences. Their study recommended that provisions for sufficient setbacks to streams and rivers be made. They also suggested that there should be construction of roads with good drainage system, adequate channelization and building of more dams to avoid excess loading of the existing dam in Lagos State.

Evans *et al.,* (2017) analysed the relative contributions of climatic elements and environmental variables to flood disaster in Uyo, Akwa Ibom State, Nigeria. They carried out an environmental inventory which was helpful in determining the number of flood channels used for dumping of refuse, number of roads without drainage channel, number of flood channels blocked by houses and other civil constructions, number of urban pavements constructed within the period and number of natural flood channels in Uyo from 2005-2016. They further obtained temperature and rainfall data from NiMET office in Uyo for the period under consideration and computed flood water discharge quantity per year, which represented the volume of flood water. With the above data, they

used multiple regression method in carrying out analysis. The results from their analysis showed that rainfall and roads without good drainage channel exact significant influence on flooding in Uyo. They also identified other causes of flooding to include blocked flood channels by refuse buildings. Specifically, they observed that the highest contributor to flooding in Uyo is rainfall. They also indicated that flooding has negative implications on environmental sustainability. They therefore recommended that roads be constructed along with drainage channels to enable rain water drain to the nearest streams and rivers as this could mitigate flood occurrence.

Saleem *et al.,* (2013) explored the impacts of flood on livelihood and food security of rural communities in Pakistan. He used District Muzaffargah because it is a major flood affected area in Punjab. Their findings revealed that agriculture which is the major income sources of the residents Punjab was largely affected by flooding. This occur in the form of land submerging revealing in food shortage. Flooding also lead to water contamination, destruction of properties and even loss of lives in Pakistan.

Rufa'i (2020) assessed household preparedness to flood risk hazard in Nigeria. He noted that climate change which triggers severe rainfall results in flooding. While flooding is increasing in terms of occurrences in Nigeria, the preparedness of households have not been given attention. He based his study on review of existing literature which point to the fact that households are losing properties, lives and other valuables to flooding.

In Oyo State, Nigeria, incidences of flooding were reported by Okeleye *et al.,* (2016). They obtained data using interview, structured questionnaires, focused group discussions and portable GPS. Their analysis were operationalized using descriptive and inferential statistics. Their study revealed that farmland's close proximity to river/stream, limited drainage system, frequent heavy rainfall, limited supports from external bodies during flooding are some of the factors that make the farmers vulnerable to flood disasters. They equally observed that flooding has huge impact on their farmlands and limited impact on their houses. Furthermore, their study found that the farmers have very low coping mechanisms as most of them do not have access to insurance facilities and do lack timely and precise flood early warning systems, flood local signs and community flood management committees. Furthermore, their result showed a significant relationship between farmers' vulnerabilities and their livelihoods. They recommended that the government and relevant agencies should provide adequate drainage system, weather forecast, insurance facilities, and timely and precise flood early warning systems to reduce farmers' vulnerabilities to flood disasters and enhance their livelihoods.

Ani *et al*., (2020) showed that flood affect the economic lives of people, the environment as well as animals and people. Nnodim and Ezekiel (2020) examined the perceived impact of perennial flooding on livelihood activities of rural dwellers of Orashi Region of Rivers State. They adopted the descriptive survey design and collected data from rural dwellers in Orashi region. They used simple random sampling in selecting 150 rural dwellers in flood affected communities. Their findings revealed that the causes of flooding in rural areas of

Orashi region were prolonged rainfall, overflow of rivers, continued release of excess water from artificial reservoirs, climate change amongst others. They also revealed that flooding submerge farmlands, destroy crops, destroy irrigation facilities, destroy harvested produce while also affecting fish farming through the spread of infection that causes diseases in fishes. Flooding also causes pollution of rivers and streams and destroy fishes and other aquatic animals. They recommended that planning agencies should enforce regulations on flood prevention.

Flooding has also been identified as having negative impact on the livelihood activities of man due to its devastating nature. Ojikpong *et al.* (2016) noted that flooding leads to the destruction of lives, properties and socio-economic activities. However, the level of loss and destruction caused by flood depends on factors such as season and timing of floods, location, damages on the embankment and walking roads, location of river encroachment, status and condition of the drainage system, and prior experience of flood and flood management strategies. Flooding therefore affect the livelihood activities of the residents in both rural and urban areas in so many ways. For instance, flooding can cause collapse of buildings and bridges, submerge farmlands and market places, while crops are destroyed or sometimes washed away.

Agbonkhase *et al.* (2014) classified the effects of flooding based on human resource, natural resources, physical resource, monthly income and monetary asset-based. Their study showed that flooding has negative returns on investment as it can lead to massive destruction. Oruonye *et al.* (2017) examined the effect of flood disaster on rural livelihood and coping mechanism in Lau Local Government Areas of Taraba State in Nigeria. Their findings revealed that flood have negative effects on the socio-economic status and livelihood of the people in the Local Government Area. They identified that flood incidents had seriously devastated the economy of the rural communities within Taraba. For instance, they noted that farmlands were submerged and agricultural products were destroyed which have affected the environment by causing serious gully erosion.

Ojikpong *et al.,* (2016) carried out a flood risk assessment of residential neighbourhoods in Calabar Metropolis, Cross River State, Nigeria. Their aim was to examine the vulnerability of some residential neighbourhoods in Calabar to the menace of flooding with a view to determining residential areas of high, medium and low flood risk. They obtained data through metric measurement of the coverage of flood and the assessment of the numerical value of the residential buildings considered to be vulnerable to flood. They obtained data on flooded buildings and displaced persons from the State Emergency Management Agency (SEMA), Calabar. They carried out analysis using descriptive statistics and tested the hypotheses that were formulated using the regression coefficient of the least square method and scatter grams for prediction. Their finding showed that the magnitude of flood determined the vulnerability of some residential neighbourhoods. For instance, they found vulnerability to be higher in low lying residential neighbourhoods. They therefore called for planned and autonomous adaptation responses, flood plain zoning to urban agriculture, landscaping and

recreational uses. They equally suggested proper channelization of Calabar urban drainage system, stringent flood control legislation, and development control measures that will play positive roles in mitigating the challenges of flooding.

Ekpoh (2015) assessed climate change and recent severe flooding in Uyo, Akwa Ibom State. He designed a detailed rainfall analysis for Uyo using statistical distributions commonly deployed to describe climate states, such as the mean, the running mean, the standard deviation, coefficient of variability, skewness, and kurtosis. Parametric statistics such as Kruskal-Wallis test and ANOVA were also used in operationalizing the analysis. His findings noted that rainfall amounts and patterns in Uyo were out of step with long-term mean conditions. He specifically mentioned that between 2005 and 2014 mean rainfall was 22% above the 30-year mean from 1985 to 2014. The rainfall Skewness and Kurtosis showed significant swings in the central tendency and confirmed the establishment of a new mean and a new standard deviation in the 2005-2014 decade. He confirmed the trends to be statistically significant by Post Hoc Test at 0.05 level. He explained that rainfall is adding more water to surface runoff, leading to incessant and severe flood conditions. However, the challenges associated with flooding include economic losses, loss of properties, environmental degradation and associated human sufferings and even death. He commented that a lot more needs to be done in terms of provision of infiltration surfaces (green areas) through sustainable urban renewal programmes in order to contain the challenges of flooding. He also suggested the reduction in gas flaring, bush burning, and fossil fuel combustion.

Flood hazards unfold adverse consequences on the environment, affect human lives while further having negative effects on human health, cultural heritage and economic activity. Therefore, flood hazard/management plans involve three phases; preparedness, prevention and the mitigation phases (Ani *et al.,* 2020). Ani *et al.,* argued that the above stages in flood hazard/risk management are very important to policy makers across the national and international levels while the strategies also provide policy makers with decisions making guide. According to them, the preparedness phase in managing flooding involve predicting and identifying zones or areas that have high risk and mapping of such vulnerable areas long before the flooding event occurs. Furthermore, the prevention phase include forecasting, early warning, observation and monitoring, and putting in place contingency plans in case of flood occurrence while the mitigation and response/reaction phase include activities that are carried out after the flooding has occurred. Such activities include damage assessment and relief management.

Hansson *et al.,* (2008) designed a framework for the evaluation of flood management strategies. They contend that flood management has remained a problem mostly in developing countries, due to weak economies. However, they argued that governments in developing countries lack adequate institutional system for applying cost effective and reliable technologies for disaster prevention, early warnings, and mitigation. They therefore opined that modelling events analyses and strategy models is a way of planning ahead, but

these models have so far not been linked together. They designed the framework drawing from existing literature on flood risk hazard management. They asserted that for flood to be effectively managed, there is need for insurance of elements at risk need to be instituted. Their study took northern Vietnam as an example of a developing region for the assessment. They observed that for flood hazards to be effectively managed, they is need for incorporation of stakeholders and effective environmental monitoring by experts in the built environment.

Okoye (2019) assessed perennial flooding and integrated flood risk management strategy in Nigeria. He observed that the need to manage flood hazards stem from the observation that flooding in Nigeria has resulted in loss of lives, sources of livelihoods, property and socio-economic infrastructure. In other to manage flood hazard, he engaged in a discourse with the aim of identifying strategies and prospective solutions for controlling flooding. He observed that there is need for development of appropriate channelization to facilitate run-offs. He also suggested that water be used for productive purposes such as farmland irrigation, transportation, hydro-electric power generation, mineral mining, recreation and tourism.

Emeribeole (2015) in a similar study focused on managing flood disasters in Nigerian Cities: with emphasis on deducing issues and strategies towards meeting the challenges in the modern world. He observed that flooding in Owerri metropolis has claimed lives and has led to property damage. His study specifically showed that atleast 20 per cent of the population of Owerri metropolis is at risk of flooding. His study showed that sovereign states and national governments mostly adopt remedial reaction that come in the form of post-disaster reaction where relief materials are supplied to the affected victims. Therefore, flood management options that supposed to be focused on addressing issues of inadequate channelization and poor distribution of drainage channels are only addressed through the supply of relief materials. He called for adequate and appropriate measures to be put on ground to ensure flood management. He opined that the discouragement of developments and housing units on flood plains will go a long way in handling the issues of flooding together with the development of drainage channels for stormwater distribution will also help in managing flooding.

Yaode *et al.,* (2020) carried out a vulnerability analysis of flood disaster in Ibadan, Nigeria. He obtained data through personal observations and questionnaire. They sampled respondents that have been affected by flooding in time past. They analyzed data using appropriate descriptive and inferential statistics. Their findings observed that rainfall is the highest cause of flooding. They also pointed out that terrain of the area is the least cause of flooding. Since rainfall account for most flood occurrences, they called for adequate channelization. This will help in reducing the hazards of flooding and it negative consequences on the residents of Ibadan.

The concept of vulnerability is at the centre of discourse in environmental risk, climate change and environmental degradation. Vulnerability measure the level/extent to which a natural or social system is susceptible to sustain damage from climate change, environmental degradation and environmental risk

(Ojikpong *et al.,* 2016). Vulnerability is largely determined by the development context which has a strong influence on households' income, education and access to information on people's exposure to environmental hazards in their homes and work places on the quality and extent of provision for infrastructure and services.

Furthermore, vulnerability describes the potential for loss due to a particular hazard. Vulnerability also reveal the elements at risk (Njoku *et al*., 2020). With this thinking, flood vulnerability explains the degree/extent to which a person, people or place are at risk of flooding and its adverse effects. Flood vulnerability may explain the likelihood of an area to be submerged by water and the elements that are at risk to be affected. In most cases, flooding affect housing units and agricultural lands further resulting in economic problems. There are three different perspectives to vulnerability. The first perspective measures vulnerability in terms of exposure to hazardous events and the influence that such events have on people and structures. The second perspective characterizes vulnerability as it affects human relationship while the third perspective views vulnerability as both physical events and the underlying causal characteristic of population that lead to risk exposure and limited capacity of communities to respond (Ojikpong *et al.,* 2016).

Basically the integrated vulnerability approach is useful in cities and towns where inherent susceptibilities and resiliencies of both biophysical and social environments interact to result in observed vulnerability. Obviously, areas that are vulnerable to flooding abound in cities and towns especially in developing countries. The reason for increasing number of flood vulnerable areas include poor planning/enforcements by relevant development control, excessive and perennial rainfall and inadequate provision of drainage channels in cities to facilitate surface run-offs (Udoh, 2015). The concept of vulnerability is adopted in this study to assess the extent of damage to natural and social systems that is occasioned by flooding.

Risk basically predicts the likelihood that a hazard would occur. Risk therefore measure the probability of occurrence of hazards (Njoku *et al.,* 2020). Risk is the possibility of loss that depends on elements such as hazard, vulnerability and exposure. Basically, there is a relationship between hazard and vulnerability. However, hazard is an event that has the potentials of causing harm while vulnerability is the level of susceptibility to the risk. Flood-risk likelihood is a derivative of natural and anthropogenic factors (Danumah, *et al*., 2016). The natural factors are excessive rainfall, topography and soil management strategies (Njoku *et al*., 2020). Anthropogenic factors that have the probability of causing flood risk include intentional sprawl to the riverbanks, deforestation, housing development on flood prone areas and indiscriminate waste disposal. Ojikpong *et al.,* (2016) observed that the management of risk comprises three steps. In the first step, there is need for identification of hazard that is likely to result in disaster while the second step require an estimation of the risk of such event and the third step require an evaluation of the social consequences of the derived risk.

The concept of risk therefore consider flooding as a hazard that require application of appropriate techniques in order for flooding to be arrested. Regarding flooding as a hazard will help in bringing about measures for mitigating the impact of flooding. This suggest that hazards associated with flooding can be addressed at the pre-occurrence stages and this will help in saving time, cost and energy while preserving the properties and elements that are likely to be at risks in the occurrences of flooding.

METHODOLOGY

The study relied on past previous studies carried out by scholars. The studies that are related to flooding, its causes and effects among other conceptual terms related to flooding were assessed. The major focus of the present study is on Nigeria hence, a considerable percentage of the literature that were assessed discussed the Nigerian experience.

RESULTS

They further obtained temperature and rainfall data from NiMET office in Uyo for the period under consideration and computed flood water discharge quantity per year, which represented the volume of flood water. With the above data, they used multiple regression method in carrying out analysis. The results from their analysis showed that rainfall and roads without good drainage channel exact significant influence on flooding in Uyo. They also identified other causes of flooding to include blocked flood channels by refuse buildings. Specifically, they observed that the highest contributor to flooding in Uyo is rainfall. They also indicated that flooding has negative implications on environmental sustainability. They therefore recommended that roads be constructed along with drainage channels to enable rain water drain to the nearest streams and rivers as this could mitigate flood occurrence.

Parametric statistics such as Kruskal-Wallis test and ANOVA were also used in operationalizing the analysis. His findings noted that rainfall amounts and patterns in Uyo were out of step with long-term mean conditions. He specifically mentioned that between 2005 and 2014 mean rainfall was 22% above the 30-year mean from 1985 to 2014. The rainfall Skewness and Kurtosis showed significant swings in the central tendency and confirmed the establishment of a new mean and a new standard deviation in the 2005-2014 decade. He confirmed the trends to be statistically significant by Post Hoc Test at 0.05 level. He explained that rainfall is adding more water to surface runoff, leading to incessant and severe flood conditions. However, the challenges associated with flooding include economic losses, loss of properties, environmental degradation and associated human sufferings and even death. He commented that a lot more needs to be done in terms of provision of infiltration surfaces (green areas) through sustainable urban renewal programmes in order to contain the challenges of flooding. He also suggested the reduction in gas flaring, bush burning, and fossil fuel combustion.

His study specifically showed that atleast 20 per cent of the population of Owerri metropolis is at risk of flooding. His study showed that sovereign states and national governments mostly adopt remedial reaction that come in the form

of post-disaster reaction where relief materials are supplied to the affected victims. Therefore, flood management options that supposed to be focused on addressing issues of inadequate channelization and poor distribution of drainage channels are only addressed through the supply of relief materials. He called for adequate and appropriate measures to be put on ground to ensure flood management. He opined that the discouragement of developments and housing units on flood plains will go a long way in handling the issues of flooding together with the development of drainage channels for stormwater distribution will also help in managing flooding.

Furthermore, vulnerability describes the potential for loss due to a particular hazard. Vulnerability also reveal the elements at risk (Njoku *et al*., 2020). With this thinking, flood vulnerability explains the degree/extent to which a person, people or place are at risk of flooding and its adverse effects. Flood vulnerability may explain the likelihood of an area to be submerged by water and the elements that are at risk to be affected. In most cases, flooding affect housing units and agricultural lands further resulting in economic problems.

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DISCUSSIONS

Based on the findings as presented in past scholarly articles, it is obvious that flooding is caused by several factors. Broadly, literature agreed that the causes of flooding can be classified into natural and human activities. The leading cause of flooding from the natural perspective is excessive rainfall which has become difficult to predict due to the forces of climate change. Terrain and soil management practices are other natural causatives of flooding. Studies showed that in spite of increasing rainfall due to climate change, there is poor environmental planning by institutions concerned with the management of the environment in Nigeria. It was noted in studies that most developers in Nigeria embark on housing construction even in flood prone areas thereby putting such physical developments at risk. Equally, studies showed that human activities such as deforestation, haphazard developments resulting in the blockage of drains and water ways also contribute to flooding. Furthermore, due to population growth especially in urban areas, studies showed that developers embark on housing development in water-logged areas and in most cases, flooding is inevitable in such areas. Negligence by government to design and implement policies at various levels also contribute to flooding together with poor environmental planning.

The effects associated with flood hazards have been investigated by scholars. Their findings observed that flooding has resulted in the submerging of farm lands mainly in rural areas where agriculture is the main employer of

labour. The studies show that this have negative effects on crop yield while it damages plant and animal species. Flooding also affect built-up areas through the destruction of properties and it may even result in loss of lives. In all, flooding has resulted in economic and social losses. It also lead to environmental degradation and overall environmental deterioration.

The strategies for the management of flooding in cities largely centre on the development of drainage channels. Governments also donate relief materials to victims of flooding. The flood management strategies in most cities are largely ineffective and as such, it is difficult to contain the challenges of flooding. Studies also showed that governments are not really serious about enforcing legislations that will ensure orderly development and discourage people from embarking on deforestation and also developing on flood prone areas.

CONCLUSIONS AND RECOMMENDATIONS

As observed in the study flooding being a disaster is unavoidable but can be managed if appropriate measures are instituted. Notably, it was observed in the study that flooding is caused by excessive rainfall, poor environmental planning and management and weak policy implementation by institutions concerned with flood management. Flooding is also caused by increasing deforestation and inability of developers to adhere to physical development plans and schemes. However, flooding has negative implication on the environment, economy and social lives. As noted in the study, flooding affect physical developments such as houses, roads and other structures. In cases of serious flooding, lives can be lost in the process. With the observation that flooding is a serious environmental threat, it was suggested that appropriate measures be put on ground to stem the level of it occurrence in Nigeria. Specifically, the government should ensure that environmental management policies are properly enforced in the country. Development control activities should be taken seriously to avoid the erection of developments on flood plains and flood prone areas. Finally, regular environmental education should be given priority in the society.

FURTHER STUDY

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