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# ASSESSMENT OF SEASONAL FLOOD IMPACT AND MANAGEMENT STRATEGIES IN OKITIPUPA, ONDO STATE, NIGERIA

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Flood is becoming the most environmental challenge menacing Okitipupa in Ondo State. Many parts of the metropolis experience flood regularly most especially during and after rains. This study assesses how Okitipupa have been affected by flood menace incidences as it takes a look at the devastating impacts, remedial and management strategies at curbing flooding in Okitipupa which has almost become a yearly occurrence. Data were collected through the use of structured questionnaire from the respondents. A total of two hundred (200) questionnaires were administered to the respondents in the study area. The questionnaires were distributed using the systematic random technique at interval of ten housing units. Data collected were analyzed through the use of descriptive statistical analysis and presented using pie chart. The study reveals that the major cause of flood in the study area was high intensity of rainfall (21.5%) followed by dumping of waste materials and refuse into drainage (21%). Also, blockage of natural and artificial waterways (18.5%) and building on floodplain (16.5%) have contributed to the regular occurrence of flood in the area. Poor drainage system (14%) and improper planning and poor land use (8.5%) also contributed to flood in the area. Flood remedial and management strategies adopted by respondents include proper use of drainage system, proper refuse disposal, construction of drainage where there is none, proper land use planning, use of sandbags and river channelization. The study recommends enforcement of environmental laws that will restrict dumping of waste into the water body and sponsoring of public awareness and educative programs on how man's activities has contributed to flood occurrence.

Keywords: causes, floods, impacts, remedial and management strategies

## INTRODUCTION

Flood is a body of water which overflow swathes of land not normally inundated (Duru et al., 2014). Flooding, according to Geo-science Australia (2013) can simply be described as "water where it is not wanted". It can also be conceptualized as a situation that results when a part of the earth surface that is usually dry is inundated and covered with water due to high amount of rainfall or the over flowing of a water body. Documental evidence showed that it all started with the Noachian deluge when the surface of the earth was submerged by water orchestrated by

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unabated torrential rainfall which led to the extermination of mankind with the sole exclusion of Noah's household (Olatona et al., 2017). The forgoing narrative thus suggest the necessity on the part of man to mitigate the effects of flooding in his environment by ensuring that all vulnerable landscape is identified and precautionary measures are put in place to tackle the impending challenge headlong.

The effects of floods are always debilitating, though their intensity and scope vary depending on terrain, intensity of human activities, quantum of water and the level of preparedness by the stakeholders. Flooding is a global phenomenon ravaging both the developed and developing nations with its deleterious effects sparking serious attention; which has become subject of research interest among climatologist, hydrologist, economist, urban planner and other professionals in the built environment. This is not unconnected to the fact that it is the most common and destructive of all natural hazards with wide reaching effects, wrecking havocs to the built and natural environments, as well as, endangering human health and material possessions (Saleh, 2014).

The complexity of anthropogenic activities of man without adequate attention to geological structure of most cities of developed and developing nations has undoubtedly contributed to reoccurrence of disaster and consequently poses threat to environmental sustainability in most of these nations (Oludare et al., 2012). This irrefutably has led or accumulated to unresolved challenges. Among the unresolved challenges being faced are vicious flood incidences experienced in the last four decades. The occurrence is stern in third world countries where there is intensity in land use, haphazard development, and unprecedented urbanization among others. Consequently, there has been unprecedented occurrence of floods and its associated negativities in most of the urban centers of developing countries (Montoya Morales, 2002). For instance, in Nigeria, reports have shown that devastating flood disaster had occurred in Ibadan (1985, 1987, 1990, and 2011), Osogbo (1992, 1996, 2002, and 2010), Yobe (2000), Akure (1996, 2000, 2002, 2004 and 2006) and the coastal cities of Lagos, Ogun, Port Harcourt, Calabar, Uyo, Warri among others (Olaniran, 1983). This claimed many lives and properties worth millions of Naira.

Several anthropogenic factors have contributed to the incidence of flood. Among these factors is the encroachment of development to flood prone areas. The incursion into such areas have being progressive until now because of unprecedented urbanization and industrialization which has undoubtedly resulted into large scale massive deforestation, loss of surface vegetation and farmlands. According to Okechuckwu (2008); "the incursion of unplanned and uncontrolled development into urban infrastructure facilities, violate the major objectives of physical planning and consequently result into misuse of land thereby creating disorderly arrangement of urban landscape and the occurrence flood that is mostly evident in cities of third world countries".

In Nigeria, the incidents of flood is becoming a reoccurring decimal in most urban area leading to colossal loss of properties and lives. For example in 1973, 1974 and 1976, cases of floods were recorded in Ilorin (Jimoh, 1999; Mordi, 2011 and Amaize, 2011) in 1973, 1980 and 2011 Ogunpa flood in Ibadan occurred. Floods in low-

lying coastal areas, such as Lagos, Port Harcourt, Warri, Sapele and Yenegoa, as well as the hinterland and arid semi arid places like Ondo, Ilorin, Makurdi, Kaduna, Minna, Borno and Gombe have formed Nigeria newspaper headlines. Concern over the incidents of floods, especially in urban areas, have attracted several studies focusing on different aspects (Akintola, 1978; Akintola, 1982; Odemerho, 1983; Ayoade and Akintola, 1980; Babatolu, 1997; Oriola, 2000; Ologunorisa, 2004; Ali, 2005; Ologunorisa and Tersoo, 2006; Aderogba, 2012 and Aderogba et al., 2012).

This research focuses on incidences of flooding in Okitipupa, its impacts and proffer a remedial and management for flood menace in Okitipupa, Ondo State, Nigeria.

## LITERATURE REVIEW

Flooding is a common phenomenon all over the world. It is more rampant and distressing in the developing countries like Nigeria (Andjelkovic,2001). According to Ajie and Frank (2019), it is regarded as the worst natural disaster across the globe responsible for one-third of all natural exigencies with grave impairments on infrastructure, the built environment and human life. It becomes a source of concern to all and sundry looking at the fact that, whether developed or developing, no nation is immune to incidents of flooding.

The European Union (EU) Floods directive (2007), defines a flood as a temporary covering by water of land that is not normally covered by water. Flooding is normally caused by natural weather events as heavy rainfall and thunderstorms over a short period, prolonged rainfall or extensive rainfall. It can also be caused by high tide combined with stormy conditions. Flood may also result from overflowing of a great body of water over land and extreme hydrological events or an unusual presence of water on land to a depth which affects normal activities (Olajuyigbe, 2012).

The social disruptions cause by flood can seriously undermine the quality of life of individuals and impression on the fabric of affected communities (Gordon,2004). Flood in more than 80 countries has killed millions of people and caused hardships for more than 17million worldwide since the beginning of 2002. The effects of flood on man cannot be overemphasized because it cut across all spheres of man's life. This includes man's physical environment, man's health and agriculture products. Flood, depending on its volume and velocity can damage any type of structure, including bridges, cars, buildings, sewerage systems, roadways, and canals. It can also result into contamination of water (Aliyu and Suleiman, 2016). The consequence of this is unhygienic condition in the affected areas making the victims vulnerable to water-borne diseases such as; cholera, dysentery, typhoid. Crops and food supplies are often affected and consequently resulting to shortage of food crops resulting from loss of entire harvest. Its effect is also obvious on trees thereby causing non-tolerant species to die from suffocation. It also affects transportation system by destroying transport links. Conversely, lowlands near rivers depend upon river silt deposited by floods to improve the nutritional value to the local soil ( Adebayo and Jegede, 2010).

# METHODOLOGY

## Study area:

The research was carried out in Okitipupa area of Ondo State. The present Okitipupa Local Government came into being after splitting Ikale Local Government into Irele and Okitipupa Local Governments in 1991. The Old Okitipupa Division is now split into Okitipupa, Irele, Ilaje and Ese-Odo Local Governments. The Local Government lies between Longitudes 4035' and 4050' East of Greenwich Meridian and latitudes 6015 ' and 6025' North of the Equator within the tropical rainforest zone of Nigeria. It has a population of about 233,565 as at 2006 census and covers a land area of about 803 km². It is bounded on the east by Irele and Ese-Odo Local Government while to its west lies Odigbo Local Government and part of Ogun State. To its north lies Odigbo Local Government while it is bounded in the south by Ilaje Local Government.

An udic soil moisture regime and isohyperthermic soil temperature regime prevail in the area with total annual rainfall often exceeding 2000mm while the soil temperature has a narrow range of 270 to 280C. the geological formation of the area is the Precambrian Basement Complex. Geomorphologically, the northern parts of the study area have strongly sloping to undulating landscapes of 8 to 12% slopes while the central and southern parts have nearly level to gently sloping landscapes of 0 to 4% slopes.




Figure 1: Map of Ondo State showing Okitipupa

## Data collection:

The sources of data employed for this research includes both secondary and primary data sources. The primary source of data were collected through the use of 200 questionnaire. The sampling technique adopted for this study is random sampling technique. The secondary data include information obtained from publications such as textbooks, journals, official documents, previous research works as well as newspapers on the various occurrences of flood disasters and pertinent issues relating to the subject.

The data collected for this study were analyzed using the simple percentage statistical method and presented using pie chart.

# RESULTS AND DISCUSSION

## Causes of flood in Okitipupa

Identification of the causes of flood is important in order to know the factors contributing to the loss of life, properties and resources which in turn influences the sustainability of life. Identification of the factors will help residents to take appropriate measures to halt them. The major causes of flooding in Nigeria urban areas include high intensity of rainfall, blockage of natural and artificial water ways, building on floodplains, improper planning and poor land use, poor drainage system and dumping of wastes into drainage. (Ologe, 2002; Oriola, 2000; Ali, 2005: Ologunorisa and Tersoo, 2006).

Considering the various factors that may have contributed to flooding as shown in Figure 2,the cause of flooding with the highest percentage of 21.5% is high intensity of rainfall as one of the causes of flooding while 21% indicated that dumping of waste materials and refuse into drainage is another cause of flooding. Poor waste management is one of the anthropogenic factors contributing to and worsening the already difficult flooding problem in Nigeria (Ojo and Adejugbagbe, 2017). The poor attitude of Nigerians to waste disposal has been widely discussed in various studies (Eneji et al., 2016; Ojo and Adejugbagbe, 2017; Olukanni, Adebayo and Terebe, 2014). Further analysis of causes of flood reveals that 18.5% perceived that blockage of natural and artificial waterways also causes flooding. Drainage blockages linked to poor sanitation practices are common in Nigeria. Roadside dumping, canal dumping and dumping in rains are commonly practiced among a large proportion of the population. This blockage results in flooding during the rainy season (Onwuemele, 2012). 16.5% of respondents considered building on floodplain as a cause of flooding in the area. The degree of built up area limits infiltration and increase runoff. This is consistent with findings from studies carried out by Anderson (1970), Akintola (1978) and Oriola (2000) in Virginia, Ibadan, Ilorin and Ondo towns respectively.

Poor drainage system is believed by 14% of the respondents to be another factor substantially aiding flooding in the study area. This is a major human-induced exacerbator of the flooding experienced in Nigeria (Ogundele and Jegede, 2011). Most residential areas in Nigeria have no drainage system and rely on natural drainage channels and it is common for buildings and other infrastructure to be constructed in a manner that actually obstructs these drainage channels which results in flooding during the rainy season (Nabegu, 2014) while 8% believed that improper planning and poor land use facilitated events of flooding in the area.

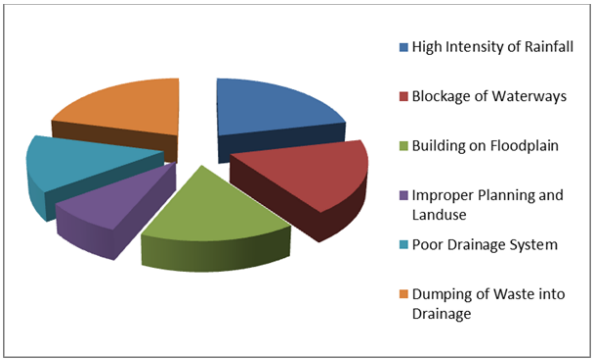



Figure 2: Causes of Flood in the Study Area

## Impact of flooding on residents

Flooding has the potential to have wide-ranging impacts within the community if affects causing significant disruption to day-to-day life, communications and to both local and potentially national economies (Douglas, 2017). Figure 3 shows the impact of flooding on residents of Okitipupa. The victims of flood in the area have always had to live with the consequences of the flood disaster. According to the result of the analysis, it has been realized that a larger percentage of the respondents (26.5%) reported that flood incidence in the past has been responsible for the destruction of properties. This can often bring serious hardship to residents in the aftermath of the flood due to inadequate or more often lack of insurance cover while 22.5% of the respondents have lost the properties to flooding. 24% of the respondents reported that flooding disrupt their day-to-day activities. In addition to the disruption, floods also damage public road surfaces through the creation of potholes that make water, transportation and ease of movement difficult. From Figure 2, 21.5% of the respondents have been displaced and forced to move out of their houses while 5.5% of the respondents classifies their loss to be the loss of relatives and loved ones.

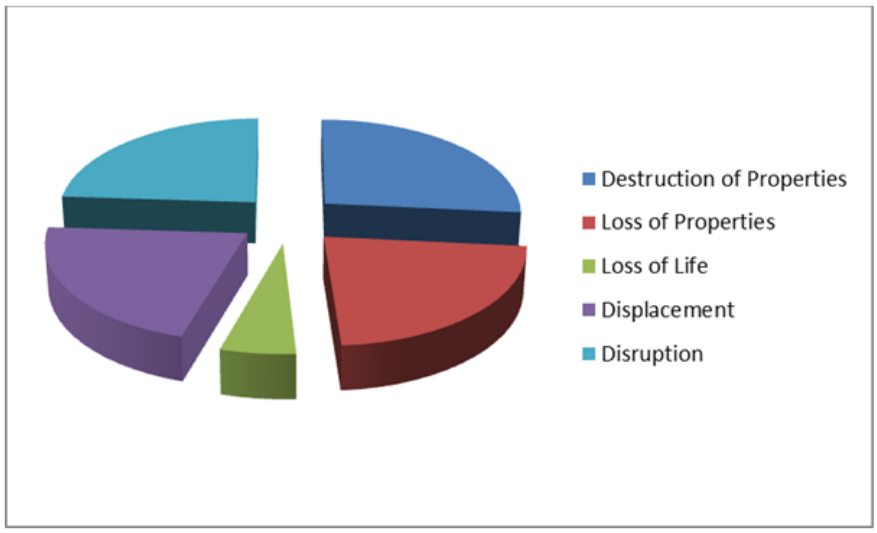



Figure 3: Impacts of Flooding in the Study Area

## Human response to flooding

Flooding control according to Bariweni, et al. (2012) refers to all methods used to reduce or prevent the detrimental effects of flood water. There are various measures that have been employed in the control of flood in the area. Among these measures are proper use of drainage system, proper refuse disposal, construction of drainage where there is none, proper land use planning, use of sandbags and river channelization. Figure 4 reveals that 21% of the respondents adopted the proper use of drainage system to control flood while 18% and 17.5% adopted the construction of drainage where there is none and river channelization and these was achieved through the assistance of the government. 16% adopted proper refuse disposal. According to the respondents, this method reduced the risk of flood because people do not dump their waste into the drainage system again. 14.5% adopted the proper land use planning while 13% adopted the use of sand bags.

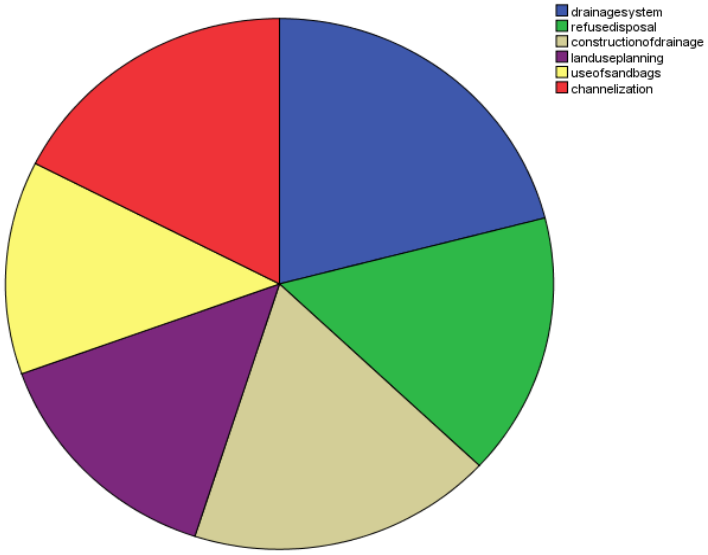



Figure 4: Human Response to Flooding

## Management Strategies of Flood Control

The consequences of flooding are detrimental and the basic consequences of flooding include loss of human lives, submerging of residences and streets, inflow to sewage, municipal pollution, damage to properties, health hazards, cleanup cost, disruption of services, traffic obstruction, aesthetic discolouring, economic loss and infrastructural damage. Thus, taking all measures to combat floods are more than necessary in any society. These measures will help control periodic inundation in the areas that are liable to flooding in the following ways:

1. A well planned drainage system which can accommodate the localized heavy rains in the metropolis should be put in place by both the state and local governments.

2. Flood zoning ordinances and land use control acts should be enacted by the state government. This will be to restrict future buildings in flood plains.

3. Repair and construction of these drainages where necessary should be embarked on to further ease the flow of storm water. Also, excavation of solid waste and other deposits which are present in the existing canal at Iju, within the local government.

4. Environmental sanitation program must be made compulsory and appropriate agency should be vested with the power to punish residents who fail to adhere to the rule of sanitation. There should be fines and penalties for people who fail to comply with the sanitation program.

5. Public enlightenment programmes should be organized to educate the public on the dangers of flood disaster and its causes as a result of the habit of throwing and dumping refuse in gutters, drainage paths and river channels. There is also need for government to set up various information programmes to educate the masses on how to respond to flood disaster.

6. The road network in the study area lacks drainage system to the extent that water overflow on the road during heavy rainfall. Thus, the state government

along with the local government should embark on the construction of wide and deep drainage system that can withstand heavy water flow.

## CONCLUSION

Water will always find it own path if not channelized by man. The need to research into the causes of flood and provide adequate flood management strategies is an aspect of environmental management that planners must pay ample attention to if they want to make the environment a haven. there is an urgent need for a collaborative effort of both government and stakeholders to support town planning, engineering and other professional agencies to combat flooding in Okitipupa to avoid long –range consequences. The improvement of roads and accessibility of cities, provision of funds and equipments for disaster management agencies is critical to abating disasters in the Nigerian urban environment and even in the rural areas too.

Although, studies conducted in different areas, have shown that, a hundred percent (100%) success may not always be achieved in eradication of flooding problems especially in urban environment yet, their damaging effects can be mitigated through management measures that are carefully designed by government or affected communities. These must be effectively and economically supervised and funded.

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