



Evaluating the Impacts of Flooding On Socio-Economic Activities in Okitipupa, Ondo State

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Abstract

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 evaluates the impacts of flooding on the socio-economic activities in Okitipupa. 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: Evaluation, Floods, Causes, Impacts, socio-economic

Received 25 June, 2022; Revised 05 July, 2022; Accepted 07 July, 2022 © The author(s) 2022.
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I. Introduction

Flood is a body of water which overflow swathes of land not normally inundated [1]. Flooding is a significant rise of water level in a stream, lake or coastal system that overflows the bank [2]. It can also be defined as a situation where the intensity of rainfall exceeds the infiltration capacity. According to Geo-Science Australia [3], floods can be described as water where it is not wanted. In general, it can be conceptualized as a situation when a part of the dry earth surface is flooded and covered with water. Documental evidence showed that it all started with the Noachian deluge when the surface of the earth was submerged by water orchestrated by unabated torrential rainfall which led to the extermination of mankind with the sole exclusion of Noah's household [4]. The forgoing narratives thus suggest the necessity on the part of man to alleviate the influence of floods in the environment by guarantee that the entire vulnerable landscape is identified and headlong.

Flooding is one of the most common environmental hazards in Nigeria [5]. Flood is one of the many danger generated in the human environment but its impact is important in terms of discomfort, destruction of life, property and pollution [2]. The effects of floods are always weakened but their strength and range depends on the strength of the field, human activities, and the amount of water and the level of preparation by 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. It is the most common and most destructive, wide ranking influence, destroying the constructed natural environment as well as human and health materials [6].

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 [7]. This is accompanied by a rebuttal that leads or accumulates unresolved issues. Among the unresolved challenges being faced are vicious flood incidences experienced in the last four decades. The occurrence is serious in third world countries where there is intensity in land use, random 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 [8]. 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 [9]. This claimed many lives and properties worth millions of Naira.

Several anthropogenic factors have contributed to the incidence of flood. Of these factors, there is infringement of development in areas subject to floods. The invasion of such areas has been advanced because of the unprecedented urbanization and industrialization which has definitely led to large scale destruction, loss of ground vegetation and farmland. According to the author in [10], “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 case of floods becomes a decimal of repetition in most urban areas resulting in a large loss of properties and lives. For example in 1973, 1974 and 1976, cases of floods were recorded in Ilorin [11, 12 and 13] 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 [14, 15,16, 17, 18, 19, 20, 21, 22, 23 and 24].

A crucial part of the concept of flooding is the interface between flooding and people. Flooding not only damage properties and endanger the lives of human and animals but have other effects such as soil erosion and sediment deposition problem downstream. Spawning grounds for fish and other wildlife habitat are often destroyed by flooding. Prolonged high flooding delay traffic and interfere with economic uses of lands. Bridges may collapse, structures within flood ways are damaged and navigation and hydroelectric power are often impaired. Flooding and its impacts have been a major concern to farmers, economists, among others thereby forming headlines in the world and Nigeria dailies [2].

This research therefore evaluates the impacts of flooding on the socio-economic activities in Okitipupa.

II. Literature Review

Flooding is a common phenomenon all over the world. It is more rampant and distressing in the developing countries like Nigeria [25]. According to the authors in [26], it is considered to be the worst natural disaster in the world 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 [27], 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. In addition, 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 [28].

The social disruptions cause by flood can seriously undermine the quality of life of individuals and impression on the fabric of affected communities [29]. Floods have caused hardship for more than 17 million people 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 [30]. 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 [31].

Impact of Flooding

The effects of flood can be classified as positive and negative effects. The negative effects are categorized into primary and secondary impacts and are also known as tangible and intangible losses respectively [32].

According to the author in [32], tangible losses caused by flooding are damages which can be quantified in monetary terms, and include: loss of cattle and livestock, destruction of personal property, loss of earnings and services, loss of growing and pre-harvest crops in agricultural fields, reduction in property values, collapsing of bridges, buildings, roads, communication, infrastructures, destruction of schools, hospitals, loss incurred in flood-fighting measures, relief, evacuation and rehabilitation of flood victims and other social amenities in the area affected that were destroyed. Some major important effects of flooding in Nigeria were recorded by Johnson [33] for the International Committee of the Fourth International (ICFI). He indicated that more than 500 homes and 100 vehicles were damaged. In the northwestern part of Nigeria, up to 13 villages were destroyed in Sokoto. More than 100 houses were destroyed by flooding from an opened barrage in neighbouring Zamfara State. According to reports, about 114 families were influenced by the flood in Yobe state. In the previously serene city of Calabar in the South of Nigeria, properties worth millions of naira were destroyed by flooding in the month of June 2001[33]. In Lagos, the situation were complicated by the fact that mean sea level were higher during the months of September and October (based on historical analysis of tidal data from 1992 – 1996). In addition, Askew [34] reiterated that flooding caused about one third of all deaths, one third of all injuries and one third of all damages from natural disasters in the world. In [35] studied, he identified specific social, economic and cultural effects of the Kolo Creek floods in Bayelsa State. He stated that 99.4 percent respondents had lost their livelihood during the flood. Losses suffered include farm produce, collapse of buildings, bridges and no access road. He further emphasized that school system were disrupted as communication and personal mobility proved difficult.

[32] believes that intangible losses are the most important and cannot be evaluated by financial value and include: losses of human life, anxiety and general social distress, snake bites and physical ailments and economic hardship, insecurity, and so on. Flooding is the leading cause of natural disaster deaths worldwide and were responsible for 6.8 million deaths in 20th century [36].

[37] revealed that about 5,650 people in Nigeria were displaced by flooding, with 34 deaths reported. Also, in Ibadan (1995, 1987, 1990), Oshogbo (1992, 1996, 2003), Yobe (2000), Akure (1996, 2000, 2002, 2004, 2006) and the coastal cities of Lagos, Port Harcourt, Calabar, Uyo and Warri, flooding claimed many lives [38]. Flooding also claimed 14 lives between 1999 and 2010 in Benin City [39]. Moreso, in Nigeria, flooding affected 7.7 million people, damaged 600,000 houses and claimed 363 lives in 2012 [40]. According to the authors in [41], flooding has long-term, “hidden” effects, in the form of stress and trauma during and after the flooding event. Increased flooding activities and challenges during disasters have aggravated the epidemiological effects and increased psychological and physical stress [42]. Also, mental health issues have been known to increase in populations that have experienced flooding, most commonly anxiety, depression and stress [43]. Similarly, during flooding waters are contaminated and clean drinking water becomes scarce. Unhygienic conditions and spread of water-borne diseases resulted

Authors in [28] observed that flooding events are usually not limited to destruction of physical structures but are also accompanied with prevalence of diarrhea and other water-borne diseases as most sources of water are polluted. In addition, authors in [44] stated in their work, “Floods of Fury in Nigerian Cities” that flooding in cities contaminates water supplies and intensify the spread of epidemics diseases, such as diarrhea, typhoid, scabies, cholera, malaria, dysentery and other water-borne diseases.

Although flooding generally is a bane to most people, flooding is quite beneficial. Actually, nature benefits more from natural floods than not having them at all [45]. What makes natural flooding a disaster is when flood waters occur in areas populated by humans and in areas of significant human development. Otherwise, when left in its natural state, the benefits of flooding outweigh the adverse effects [46]. For instance; deposited alluvium material during flooding nourished the soil. Moreso, farmers generate more income from farm during flooding. Authors in [47] noted that people lived and worked by the water to seek sustenance and capitalize on the gains of cheap and easy travel and commerce by being near water. Indeed, the fact that humans continue to inhabit areas threatened by flood damage is evidence that perceived value of living near the water exceeds the cost of repeated periodic flooding.

Author in [48] revealed that, farmers that cultivate crops along rivers should not feel threatened by yearly flooding, because flooding gives farm lands better soil consistencies and keep land more fertile resulting in better harvests each year. He added that instead of preventing the natural flow of river flooding, it is beneficial in the long run to allow the flood waters to encroach into farmlands. In addition, great example of how river flooding benefits humans was observed in the Nile River and the Mississippi Delta. It has been noted that farmers in Egypt have

long equated river flooding to high harvest rates. Conversely, the higher the flood waters from the river, the better the harvest for that year [49, 50].

Also, flood waters were used to grow rice, so natural flooding replaced the requirement of artificial irrigation which is time consuming and costly to build. Furthermore, salt deposited on fields through liming were removed during flooding, preventing the land from becoming infertile. In addition, Egyptian agriculturalists enjoyed not only a productive system, but also a sustainable one [51].

Author in [52] has observed that farmers have settled in floodplains since ancient times because flooding streams deposit fine sediment over the lands flooded, replenishing nutrients in the soil and thus making the soil especially fertile. He added that some countries with lateritic soil achieve agricultural success only because frequent floods deposit fresh, nutrient-rich soil over the depleted laterite.

III. 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 $4^{\circ}35'$ and $4^{\circ}50'$ East of Greenwich Meridian and latitudes $6^{\circ}15'$ and $6^{\circ}25'$ 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 27° to 28° C. 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.

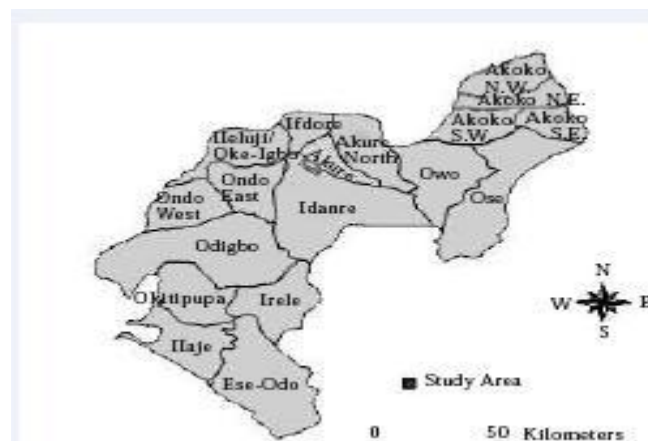


Figure 1: Map of Ondo State showing Okitipupa

Data Collection: The sources of data employed for this research includes both secondary and primary data sources. The primary source of data was 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.

IV. 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. [53, 19, 21, 22].

Considering the various factors that may have contributed to flooding as shown in Figure 2. Flooding in Okitipupa usually occurs during the rainy season, although there are a number of factors that can exacerbate the likelihood of a flood occurring in a particular area. The majority of respondents (21.5%) attributed the cause of flooding to episodes of heavy rainfall. This brings with it the issue of seasonality and therefore a usually clearly defined time during the year when the risk of flooding will be at its greatest. Although rainfall was the main cause of flooding, direct human activity also played a role. 21% of respondents 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 [54]. The poor attitude of Nigerians to waste disposal has been widely discussed in various studies [54, 55, and 56]. 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 [57].

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 [58]. 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 [59] while 8.5% believed that improper planning and poor land use facilitated events of flooding in the area.

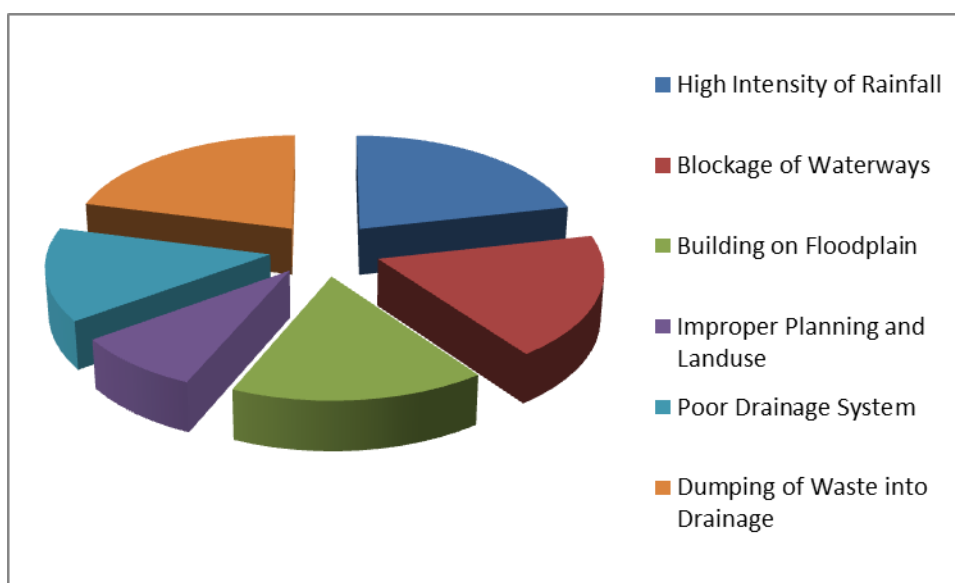


Figure 2: Causes of Flood in the Study Area

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 [60]. 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 (24.5%) reported that flood incidence in the past was been responsible for the destruction of properties (Plate 1). This can often bring serious hardship to residents in the aftermath of the flood due to inadequate or more often lack of insurance cover. Some of the respondents indicated that their houses collapsed due to excessive impacts of floods while some have their houses submerged. 20% of the respondents have lost the properties to flooding. 22% 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 (Plate 2 and Plate 3). The study revealed that flooding usually cause delay in travelling time because it makes it impossible for people to come outside. People could not go about their normal activities because it is impossible for them to go their places of work, market shops for some days since access roads were blocked and submerged for days by flooding while some are forced to take another route to their place of work which always lead to increase in transportation cost. When flooding occurs, there is usually an increase in transportation fare. Similarly the school system is also affected. School infrastructure was damaged due to floods in one way or another. School going children experienced disruption due to floods. The disruption was attributed to various reasons such as

road being impassable and school being submerged. This study is in agreement with study conducted by [35], on “Kolo Creek Floods in Bayelsa State”, which revealed that flooding disrupted school system as communication and personal mobility proved difficult. From Figure 3, 16.5% of the respondents have been displaced and forced to move out of their houses. Households whose houses were impacted by floods were forced to relocate to other alternative areas while some continued to stay within their home states. The study also reveals that there is an increase in cost of commodities at the market due to increase in cost of transportation during flooding and difficulty in bringing farm products to the markets. 11.5% of the respondents indicated that flooding caused increase in food items. Flooding usually cause the residents in the study area to be cut off from other neighbouring towns and villages. This leads to reduction in supply of food items and increase in price of essential food. 5.5% of the respondents classify their loss to be the loss of relatives and loved ones.

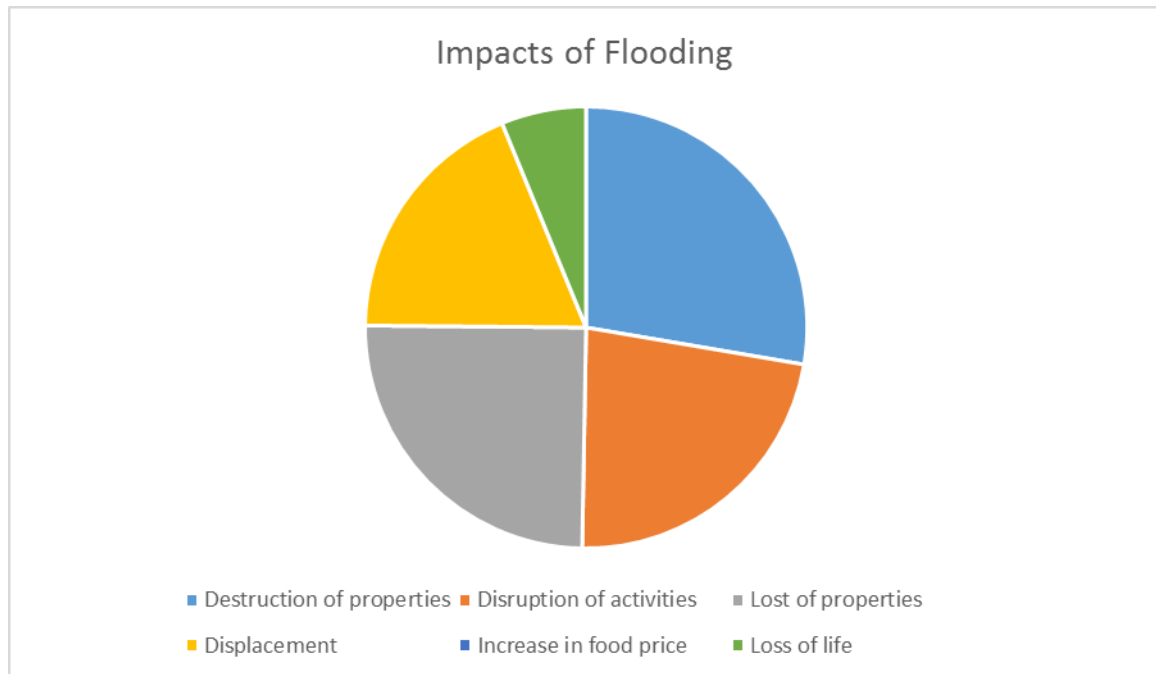


Figure 3: Impacts of Flooding in the Study Area



Plate 1: Building submerged by flood



Plate 2: Area covered by flood



Plate 3: Petrol filling station covered by flood

Human Response to Flooding

Flooding control according to authors in [50] 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.

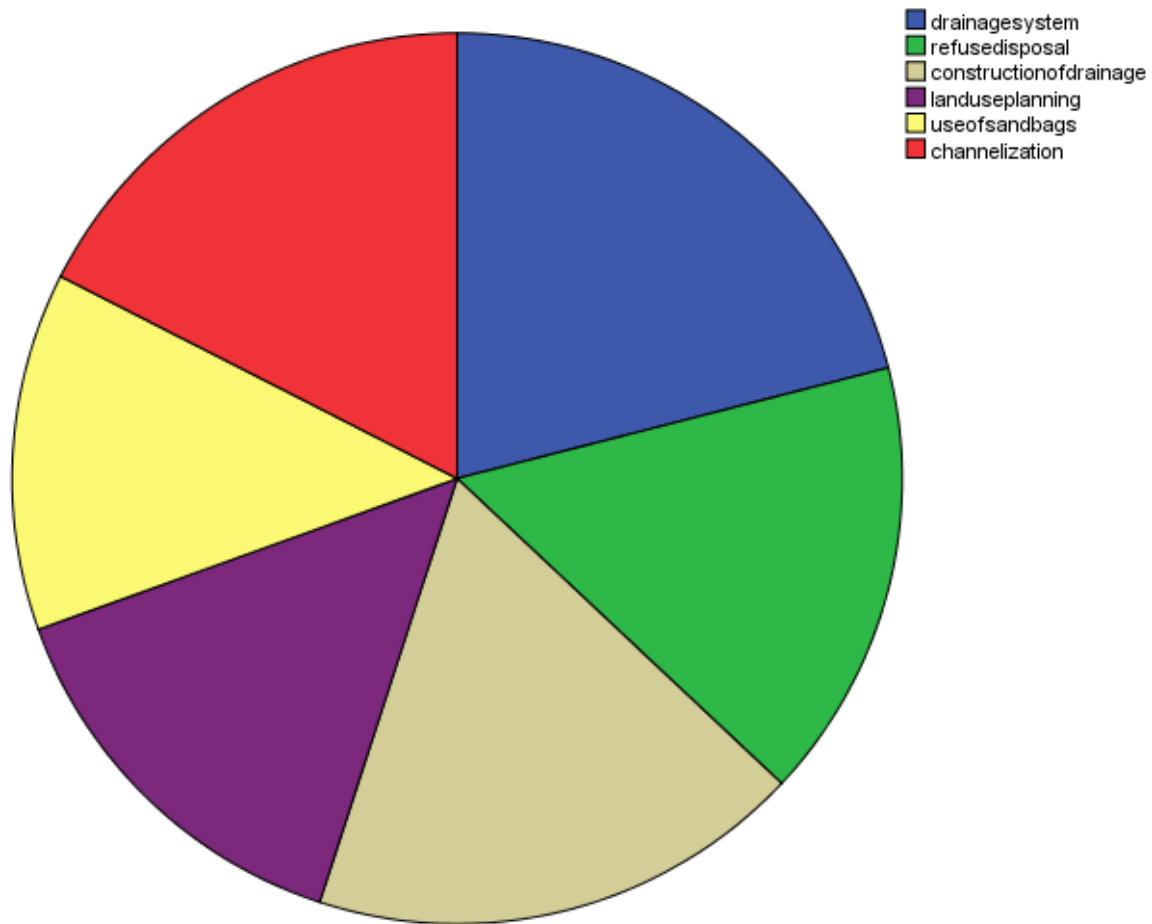


Figure 4: Human Response to Flooding

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.

V. Conclusion

Water will always find its 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 equipment 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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