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Evaluation of the Impacts of Flooding On Socio-Economic Activities in Oleh, Isoko South Local Government Area, Delta State

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ABSTRACT
The study aimed at evaluating the impacts of flooding on socio-economic activities in Oleh, Isoko South Local Government Area of Delta State. The study employed questionnaires, oral interviews, and personal observations. The data obtained from questionnaires and oral interviews were presented and interpreted using percentages, averages, bar graphs and pie charts. The hypothesis was formulated and tested. The statistical technique used in testing the hypothesis was Pearson Product Moment Correlation. Thus, the hypothesis reveals that flooding has significant relationship with socio-economic activities in Oleh. In addition, loss of portable water and agricultural products were revealed as some of the negative impacts of flooding in the study area. Furthermore, the researcher recommends provision of improved varieties of crops that are highly water resistant to farmers. Also, individual, corporate bodies and government should allocate adequate fund to disaster management bodies for proper planning of the area. In addition, community-based flood warning system should be developed. This will go a long way in creating awareness and preparedness of the inhabitants of Oleh against severe flooding.
Keywords: Evaluation, impacts, flooding, socio-economic, activities

INTRODUCTION

Flooding as an environmental problem is an age-old phenomenon. Flooding is a significant rise of water level in a stream, lake, reservoir or coastal system that overflows the banks. The National Erosion and Flood Control Action Plan Committee (2005) defined flooding as a condition which exists when discharge of a river or stream cannot be accommodated within the margin of its normal channels so that waters spread over adjoining land. Also, flooding is a situation in which water from a river or from rain covers large areas of land (Macmillan, 2009).

Flooding is one of the most common environmental hazard in Nigeria (Etuonovbe, 2011).There is increasing vulnerability of populations and infrastructure to flooding and flood related hazards. Although flooding is one of many hazards occurring in human environment, its effects are significant both in terms of discomfort, destruction of lives, properties and pollution. The severity of flooding has been reckoned with, by the level of damage done (Williams, 1998).

There are various types of flooding, and different causes of flooding have been identified – some natural, others man-made. Ologunorisa (2004) and Efe (2007) distinguished between river flooding, coastal flooding and urban flooding as the major types of flooding. River flooding occurs where a river bursts or overtops its banks and inundates the areas around it. It is more common than coastal flooding. Coastal flooding results when heavy storms or extreme weather conditions combined with high tides cause sea levels to rise above normal, force sea water to the land and cause coastal flooding. Urban flooding happens in a relatively short period of time and can inundate an area with several metres of water. As areas become "urbanized" or go through the process of urbanization, there are increased flood risks that result due to human activities such as deforestation, building without plan and so on. The main problem with urban flooding is the fact that they occur in highly populated areas.

A crucial part of the concept of flooding is the interface between flooding and people. Flooding not only damage property and endanger the lives of humans and animals, but have other effects as well. Flooding caused soil erosion as well as 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 floodways damaged, and navigation and hydroelectric power are often impaired.

Flooding and its impacts have been a major concern to farmers, engineers, economists, among others thus, forming headlines in the world and Nigerian dailies. Flooding has a wide range of influence on the interactions between man and his social, economic environment. Similarly, the Nile River was regarded due to its annual cycle of flooding, and farming was of great significance to many early farming cultures in Egypt. Flooding, which deposits rich fertile alluvium on agricultural areas, also replenish irrigation channels.

The growing increase in population, human activities, coupled with flooding in the Niger Delta region have increased the need to evaluate the impacts of flooding on socio-economic activities in Oleh community.

1.2 STATEMENT OF THE RESEARCH PROBLEM

Flooding is a wide spread phenomenon on the earth surface, which has been defined by many scholars and organizations. Flooding has caused a great setback to mankind, although these setbacks are only restricted to those areas or places of low terrain especially in the coastal regions of the world (Chorley, 1977).

Doocy, Daniels, Murray and Kirsch (2013) stated that, the causes of flooding are not only by natural processes but also by human activities. Natural processes include excessive moisture through heavy rainfall, snow melt in the spring combined with rain while human activities refers to the way mankind alters the hydrological cycle of the river and drainage system, the altering of dams, deforestation, land reclamation, improper soil management and so forth.

Several years back, farmers in Nigeria were experiencing seasonal flooding problems which resulted to low crop yield and low income. For example, in Oleh, 54 percent of the total maize cultivated was lost to flooding, while more than half of the yield from plantain was also lost to flooding in 2011 and 2012 (Ojeh and Orivoh, 2014). Flooding, which has been a perennial problem in Oleh, has caused much havocs and difficulties to the inhabitants of Oleh community, such as destruction of farmlands, destruction of buildings, lives and properties. Roads are flooded thereby making them unmotorable and so restricting the movement of people in the area; also, drastic reduction of human activities such as farming, fishing which are the major activities of the people.

Flooding affects numerous aspects of man's environment. These include his economic activities; settlements and lifestyle. Several threats to livelihoods ranging from the physical threats to social and economic threats exists, while affected persons suffer some psychological effects. Flooding also causes land pollution which leads to epidemics and infections. Flooding has been seriously affecting Oleh community. A lot of social and emotional costs were involved in flooded areas. These costs include: displacement from homes, the loss of personal valuables and the ongoing fear and insecurity caused by the experience. Portable water supplies were contaminated and lost during periods of flood. Furthermore, flooding in Oleh made people to suffer untold hardships in the process of trying to make new buildings to withstand flooding.

Also, the school system was disrupted as communication and personal mobility proved difficult. Although, most people complained of the adverse impact caused by flooding, some people rejoiced during flooding and prayed because of the gains usually made from the affected persons. For instance, marketers sold items such as oil palm, meat double of its normal price. Transporters also make more income by increasing transport fare.

Perennial flooding in Oleh has forced the inhabitants to make canals, raise foundation of houses, sand fill compounds, cultivate water tolerant crops and prematurely harvest their crops. Pre-mature harvesting is seen as the people's commonest and most assured way in which they can locally reduce the effects of flooding in their production and food supplies.

Over the years, governments and non-governmental organizations have attempted to provide drainage system, fund, and policy with a view to reducing flood damage. Notwithstanding all coping strategies, most people in Oleh cannot cope at all and were forced to relocate their dwelling units during flooding to the camp provided by the government. Regrettably, on November 24, 2012, flood victims in Nigeria and Oleh in particular were forced out of camps, which exposed government's inadequacy in handling flood situations.

Although there are a lot of published works on flooding, unfortunately, until now, adequate work has not been done on the impacts of flooding on socio-economic activities in Oleh. For example, Ojeh and Orivoh (2014) who worked on flooding in Oleh only focused on the impacts of flooding on crop yields, neglecting other socio-economic activities. Furthermore, researchers such as Odermerho (1988), Sada and Odermerho (1988), Efe (2007), Aderogba (2012c), and others, at various times have written on the devastating nature of flooding but not in Oleh. Despite the frequency and magnitude of flooding in Oleh, no comprehensive study on impacts of flooding on socio-economic activities of the people has been undertaken. Based on the aforementioned problem and research gap, the researcher was motivated to carry out this study. Filling this gap in knowledge is the main purpose of this research.

1.3 AIM AND OBJECTIVES OF THE RESEARCH

The aim of this study is to evaluate the impacts of flooding on socio-economic activities in Oleh. The specific objectives are set to:

i) identify the impacts of flooding in Oleh community.
ii) evaluate the adverse and beneficial impacts of flooding on socio-economic activities of the people in Oleh community.
iii) know the number of fish lost in ponds per household in Oleh community.

HYPOTHESIS

H_O: There is no significant relationship between flooding and socio-economic activities in Oleh.

THE STUDY AREA

1.1 LOCATION

Oleh lies roughly to the South-East of Delta State. It is located between latitudes 5^0 14'N and 5^0 33' N, and longitudes 6^0 07' E and 6^0 25' E. Oleh is bounded on the North by Ozoro and Owhe town respectively, on the South by Olomoro/Emede town, and on the East by Irri town while on the West by Emevor town (see figures 1.1)

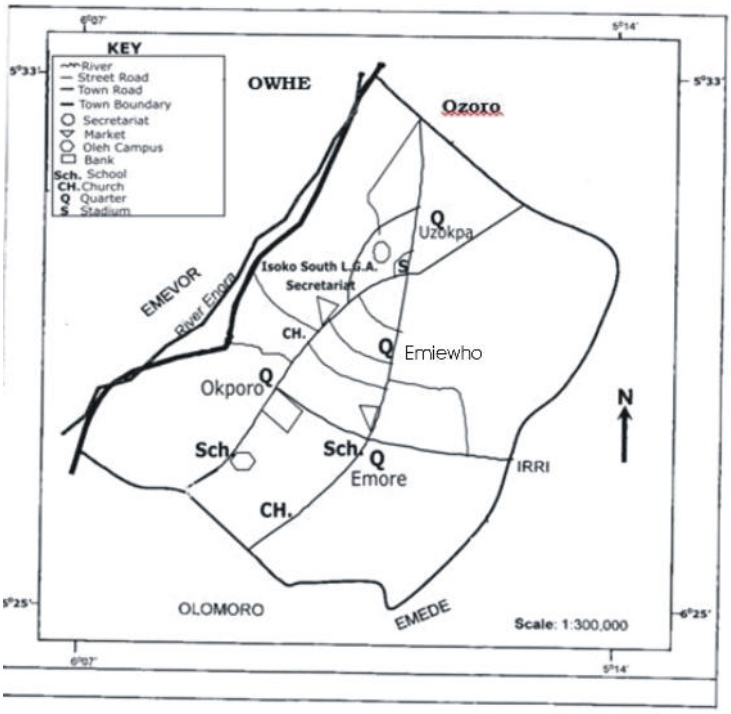

Fig. 1.1: MAP OF OLEH SHOWING STUDY AREA
(Source: Otomofa (2015)).

LITERATURE REVIEW

The review of literature was done in the following sub-headings which include: socio-economic impacts of flooding- primary impacts; secondary impacts- casualties, ill-health and general social distress, economic and positive impacts of flooding.

SOCIO-ECONOMIC IMPACTS OF FLOODING

Globally, and in Nigeria in particular, wide spread flooding progressively cause devastating ecological havocs by destroying lives, properties, agricultural lands and social infrastructures (Fubara, 1987).Generally, the impacts of flooding are of two types-positive and negative effects. The negative impacts are categorized into two broad categories: these are the primary impacts and the secondary impacts and they are also known as tangible and intangible losses respectively (Garg, 2010).

2.1 Primary Impacts of Flooding

He noted that 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.

In Nigeria, some major tangible effects of flooding were recorded by Johnson (2001) for the International Committee of the Fourth International (ICFI). He reported that over 500 homes and 100 vehicles were damaged. In North West Nigeria, up to 13 villages were destroyed in Sokoto State. More than 100 houses were destroyed by flooding from an opened barrage in neighbouring Zamfara State. Around 114 families were reportedly affected by flooding 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, (Johnson, 2001). 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). Furthermore, storm surges are experienced during the months of April to May and August to September, when surge heights exceed 4 metres above low water levels, also resulted to flooding that destroyed properties worth billions of naira (Johnson, 2001).

Lawal and Nagya (1999) revealed the effect of the Kainji flooding at Mokwa, Rabba and its environs between 1994 and 1998 destroyed properties worth over five hundred million naira and submerged several houses, farmlands and disrupted social services. In addition, Askew (1999) 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 Eli's (2002) studied, he identified specific social, economic and cultural effects of the Kolo Creek floods in Bayelsa State. He stated that 99.4 percent respondents suffered loss of livelihood during flooding months. Losses suffered include farm produce, collapse of buildings, bridges and no access road. He further stressed that school system were disrupted as communication and personal mobility proved difficult.

In a study conducted by Efe (2007), he stated that the abundance of rainwater often thrown most towns and rural settlements in Delta South and Central Senatorial District into flooding soon after every rain events. Whenever that occurred, socio-economic activities are almost brought to a haut or paralyzed in the area. He expressed further that heavy rain that occurred between July and September 2000 and 2002 rendered many people homeless and properties worth billion of naira were destroyed in Warri, Burutu, Bomadi, Agbaro, Sapele, Effurun, Patani, Ughelli, etc.

Keller (2005) revealed that 70 houses were destroyed by flooding which resulted from two tributaries of Ohio River, Wegee and Pipe Creeks. Furthermore, Efe (2007b) stated that torrential down pour and associated heavy flooding caused automobile accidents, vehicular traffic jam, delays and frustration. He stressed further that all these cripple the daily socio-economic activities of a city or a village, business thus comes to a standstill. He also claimed that flooding reduces the amenity value and aesthetic quality of residential areas, thereby forcing rents to drop in areas affected; consequently, loss of income to landlords. In line with Pere (2013), who stated that many rental occupants were sent away by flooding in Nigeria, 2012. Also, many farms were covered by flooding, a total of N30 million damage of crops resulted due to flooding in Bayelsa state in 2012 (Pere, 2013). Moreso, many communities in the Niger Delta region, several houses were abandoned by the owners due to

flooding resulted from heavy rainfall. In addition, top soils were removed, roads were destroyed and fresh water resources were also affected (Uyigue, 2007).

Etuonovbe (2011) revealed that flooding affected 4000 people in Awka-Ibom. The same disaster affected Edo State, 560 houses were destroyed and 820 people affected. While in Bayelsa State, houses, schools and farmlands were submerged during 1999 and 2001 flooding. Also, two third of the population were affected by flooding. Similarly, flooding displaced 200,000 people in 1999 and 2000 in Niger State. Furthermore, in Taraba, Zamfara and Kogi State, flooding submerged buildings, farmlands were extensively destroyed. In Zamfara State, 12,398 persons were affected, while in Taraba State, 50,000 people were displaced and 80 houses were swept off. In addition, Delta State was seriously affected by flooding in 1999 and 2001. Houses, schools, markets and farmlands were affected; half of the population in Delta State 1999 and 2001 were affected by flooding (Etuonovbe, 2011).

Moreso, flooding caused damages to infrastructure at the University of Ibadan 2011. The university lost properties estimated at N10 billion to flooding. These included many large buildings, laboratories, and expensive equipments destroyed by flooding (Agbola, Ajayi, Taiwo and Wahab, 2012). In Nigeria thousands of houses, 20 health clinics and 5 hospitals, as well as dozens of schools, churches and government buildings were destroyed in Delta State by flooding (Integrated Regional Information Networks, 2012)

2.2 Secondary Impacts or Intangible Losses of Flooding

Garg, (2010) regarded these losses as most important, and cannot be evaluated in monetary values, and include: losses of human life, anxiety and general social distress, snake bites and physical ailments and economic hardship, insecurity, and so on.

Casualties

Flooding is the leading cause of natural disaster deaths worldwide and were responsible for 6.8 million deaths in 20th century (Doocy, Daniels, Murray & Kirsch, 2013). Spectacular and devastating examples of widespread flooding in 2012, affected 3 million people in West and Central Africa, especially in Nigeria, Niger, Chad and Senegal (UN Office for the Coordination of Humanitarian Affairs, 2012a).

Ujah (2007) 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 (Eludoyin, Akinbode and Okuko, 2007). Flooding also claimed 14 lives between 1999 and 2010 in Benin City (Odjugo, 2012). Moreso, in Nigeria, flooding affected 7.7 million people, damaged 600,000 houses and claimed 363 lives in 2012 (UN Office for the Coordination of Humanitarian Affairs, 2012).

Ill-Health and General Social Distress

There are also long term impacts which are generally not seen immediately after flooding. Studies such as Ahern et al., (2005) and Few and Matthies (2006) revealed that flooding have 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 (Reacher, 2004). Also, mental health issues have been known to increase in populations that have experienced flooding, most commonly anxiety, depression and stress (Torti, 2012). Similarly, during flooding waters are contaminated and clean drinking water becomes scarce. Unhygienic conditions and spread of water-borne diseases resulted (Adeloye and Rustum, 2011).

Olajuyigbe, Rotowa and Durojaye (2012) 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, Odufuwa, Adedeji, Oladesu and Bongwa (2012) 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.

Moreso, Eli (2002) revealed that flooding has impact on health which include high incidence of water borne diseases such as cholera and dysentery. He stressed further that as the people affected by flooding get their main water supply from polluted river; fever, malaria, pneumonia and stress resulted. Also, Ujah (2007) revealed that flooding contaminated unprotected water sources, exposing people to the risk of water-borne diseases.

Economic

Economic hardship due to: temporary decline in tourism, food shortage leading to price increase, rebuilding costs, and so on, results during and after flooding.

Moreso, at Bacita sugar cane fields downstream of Jebba dam in Nigeria, the cost of rehabilitation in 1994, 1998 and 1999 due to the effect of flooding at Bacita sugar irrigation field was about $10.8 million (Sule et al., 2009).Also, in Nigeria, the estimated amount to fix culverts and bridges damaged by flooding in 2011 totaled N2.1 billion (Oyo State Government, 2011).

Iroaganachi and Ufere (2012), in their study, "Flooding in Nigeria and Sustainable Land Development: Case of Delta State," concluded that aside loss of lives, properties, flooding affects crops, which generally unfit for agriculture leading to shortage of foodstuff and price increase. More so, some of the study areas form part of tourist attraction has experienced a remarkable decline in tourism.

In Nigeria, Yenagoa residents in Bayelsa State were cut off from all land routes by flooding in 2012, the situation caused food crisis and prices of essential food items skyrocketed followed reduced supply (Pere, 2013). His study revealed that N170 million were costs incurred by flood victims who moved from Bayelsa to other cities during flooding. The costs were attributed to packing and high transportation charges. Moreso, in Yenagoa 2012, flooding covered roads which paved way for high price of fuel sold at N150 and above per litre (Pere, 2013).

2.3Positive Impacts of Flooding

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 (Abowei and Sikoki, 2005). 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 (Bradshaw et al., 2007) For instance; deposited alluvium material during flooding nourished the soil. Moreso, farmers generate more income from farm during flooding.

David et al., (1981) 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.

Hill (1976) 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 (O'Connor and John, 2004; Bariweni, Tawari and Abowei, 2012).

Similarly, periodic flooding was essential to the well-being of ancient communities along the Tigris-Euphrates Rivers in Mesopotamia, Nile River in Egypt, and Yellow Rivers in China, among others. The communities around these rivers relied on annual flooding for their cultivation because floods make the soil more fertile and by providing nutrients to the soil. For example, before the construction of dams on the Nile, particularly the Aswan High Dam, the fertility of the Nile Valley was sustained by the water flow and the silt deposited by the annual flooding (Bariweni et al., 2012). 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 (Postel, 2000).

Montgomery (2008) 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.

Imogie, Udosen, Airede and Enonuya (2012), in their work, "Utilization of Niger Delta Basin Coastal Fresh Water Swamps for Meaning Agricultural Production" stated that flooding revives ground water, and flood waters absorb into the ground, infiltrates down through the rock to recharge the underground aquifers that supply natural springs, wells, rivers and lakes with fresh water. They further stated that, healthy wetlands promote healthy water supplies and improve the surrounding air quality. According to them, flooding contributes fresh water and waste to the wetlands, carries and deposits nutrient-rich sediments that support both plant and animal life of the wetlands. Similarly, flooding helps to recover natural fish stock, provide fresh water, waste, nutrients, and larva to the wetlands. As a result, the wetlands get chance to renew its environment. This in turn helps to recover the natural fish stock and increase the population of fishes. Niger Delta region is suitable for agricultural work due to flooding that nourished the soil. Also, Queensland Government (2014) report has noted some environmental benefits of flooding, such as, increased fish production, recharge of groundwater resources and maintenance of recreational environments.

Eli (2002), in his study, "Community response to flooding of the kolo creek in the Niger Delta" noted that, timber logging is the only economic activity not severely affected by flooding. He further observed that flooding actually ease transportation of timber from the forests. Furthermore, the good thing about river overflows is the fact that as flood waters flow into the banks, sand, silt and debris are deposited into the surrounding land. After the river water subsided and returned to its normal flow, the deposited materials make the land richer or more fertile. In addition, the organic materials and minerals deposited by the river water keep the soil fertile and productive (Abowei and Sikoki, 2005).

METHODOLOGY

SAMPLE/SAMPLING FRAMEWORK

To have proper coverage, samples for the study were collected in a systematic random sampling form from the four quarters in Oleh which have statistical population of 30,438 persons.

To get a true representative sample of the target population, the Yamane (1964) formula for sample size determination was used thus;

$$S = \frac{N}{1 + N(e)^2}$$

Where: S= Sample Size

1 = Constant

N = Population size

e = Margin of Error, usually 5% (0.05)

In applying the formula, these figures were obtained as follows:

$$S = \frac{30438}{1+30438(0.05)^2}$$

Therefore, the sample size is 395. However, for the purpose of convenience, 400 questionnaires were designed and 100 questionnaires were administered in each of the identified quarters. Also, one questionnaire was administered to each of the selected household heads. A situation where more than one household heads resides in a particular housing unit, only one household was given.

METHOD OF DATA COLLECTION

During the process of carrying out this research work, three major methods/procedures were used to collect the required data, they include: field questionnaire, qualitative oral interview andpersonalobservation**.** Simple percentage, bar graph, pie chart and table were used in analyzing the data to achieve the research objectives. The hypothesis was tested with the statistical technique known as Pearson Product Moment Correlation (PPMC). This tool was used to determine the degree of relationship between impacts of flooding and socio-economic activitiesin Oleh. Copies of the questionnaire administered to the respondents were 400, while 371 were returned, which were used for the analysis.

ANALYSIS AND DISCUSSION OF RESULT

The study identifies and evaluates the impacts of flooding on socio-economic activities in Oleh community. This section outlines the impacts of flooding on travel delays, school system, transportation fare, food prices, and loss of portable water supply and so forth.

The impact of flooding on travel delays was analyzed in table 3.1.

Table 3.1: Analysis of Flooding on Travel Delays

Options	**Number of respondents**	**Percentage**
Strongly Agreed	213	57.4
Agreed	153	41.3
Strongly Disagreed	0	0
Disagreed	5	1.3
Others Specified	0	0
Total	**371**	**100**

The study revealed that high percentage of respondents strongly agreed on the ground that flooding delayed time of traveling in the study area. It is evident that the percentage of respondents that strongly agreed and agreed that flooding delayed time of travelling are 57.4 percent and 41.3 percent respectively. While no respondent strongly disagreed rather 1.3 percent of the respondents disagreed that flooding delayed time of travelling (see table 3.1). Also, at community level, interview revealed that most people in the study area could not go to their places of work some days since access roads were blocked and submerged for days by flooding. Similarly, the school system was not spared (see figure 3.1).

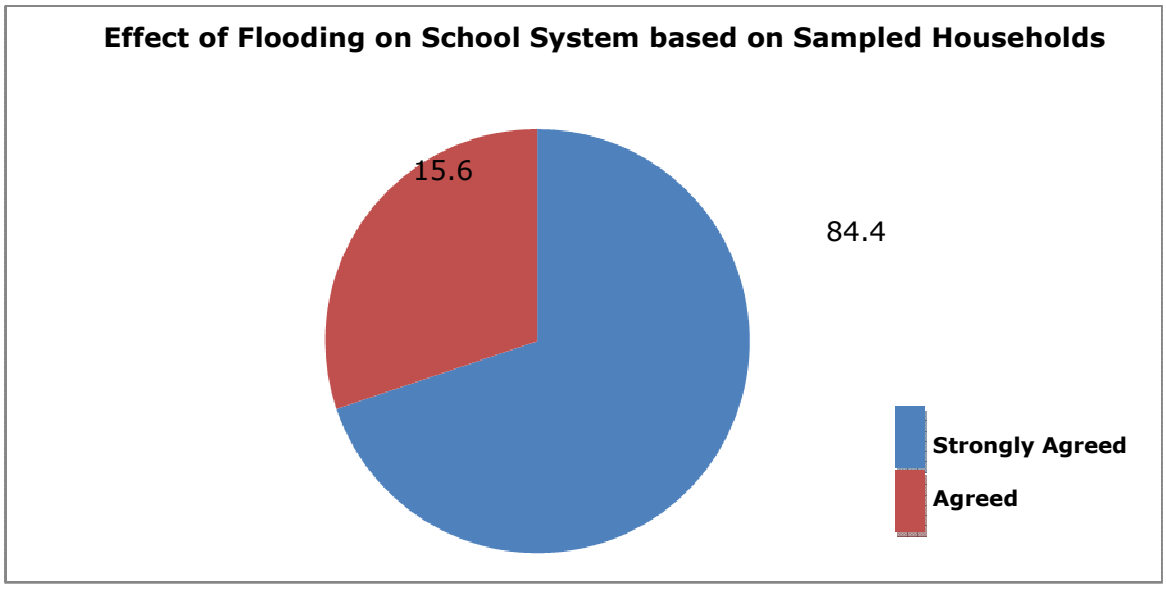

Figure 3.1: Pie Chart of the Effect of Flooding on School System based on Sampled Households

It is clearly seen that high percentage of the sampled households responded that flooding obstructed school system in the study area. That is, 84.4 percent and 15.6 percent of the sampled households strongly agreed and agreed respectively that flooding obstructed the school system (see figure 3.1). It indicated that during flooding school system was halt. At community level, during discussion, the study indicated that school infrastructure was damaged due to flooding in one way or another. Study also revealed that flooding impacts prevented school children from going to school. The disruption was attributed to various reasons such as road being impassible and school being submerged. This study is in agreement with study conducted by Eli (2002), on "kolo creek floods in Bayelsa State", which revealed that flooding disrupted school system as communication and personal mobility proved difficult.

Table 3.2: Perception of Flooding Impact on Transportation Fare

Options	**Number of respondents**	**Percentage**
Strongly Agreed	216	58.2
Agreed	133	35.9
Strongly Disagreed	9	2.4
Disagreed	13	3.5
Total	**371**	**100**

From table 3.2, it is obvious that high percentage of sampled households strongly agreed that flooding affected transportation fare. This was revealed with 58.2 percent. Furthermore, 35.9 percent of sampled households also agreed that flooding affected transportation fare. Little percent of the respondents strongly disagreed and disagreed that flooding affected transportation fare representing 2.4 percent and 3.5 percent respectively (see table 3.2). The minimal percentage that strongly disagreed and disagreed is an indication that in the study area, there are those who do not travel, therefore, they have no connection with transportation fare, whereas the high percentage of the sampled households strongly agreed and agreed indicated that flooding affected transportation charges. The study is out of agreement with David et al., (1981), who noted that people lived and worked by the water (flooding) to seek sustenance and capitalize on the gains of cheap and easy travel. While the study is in

conformity with Pere (2013), who revealed that flooding caused high transportation charges. Similarly, impact of flooding on food prices was analyzed (see figure 3.2).

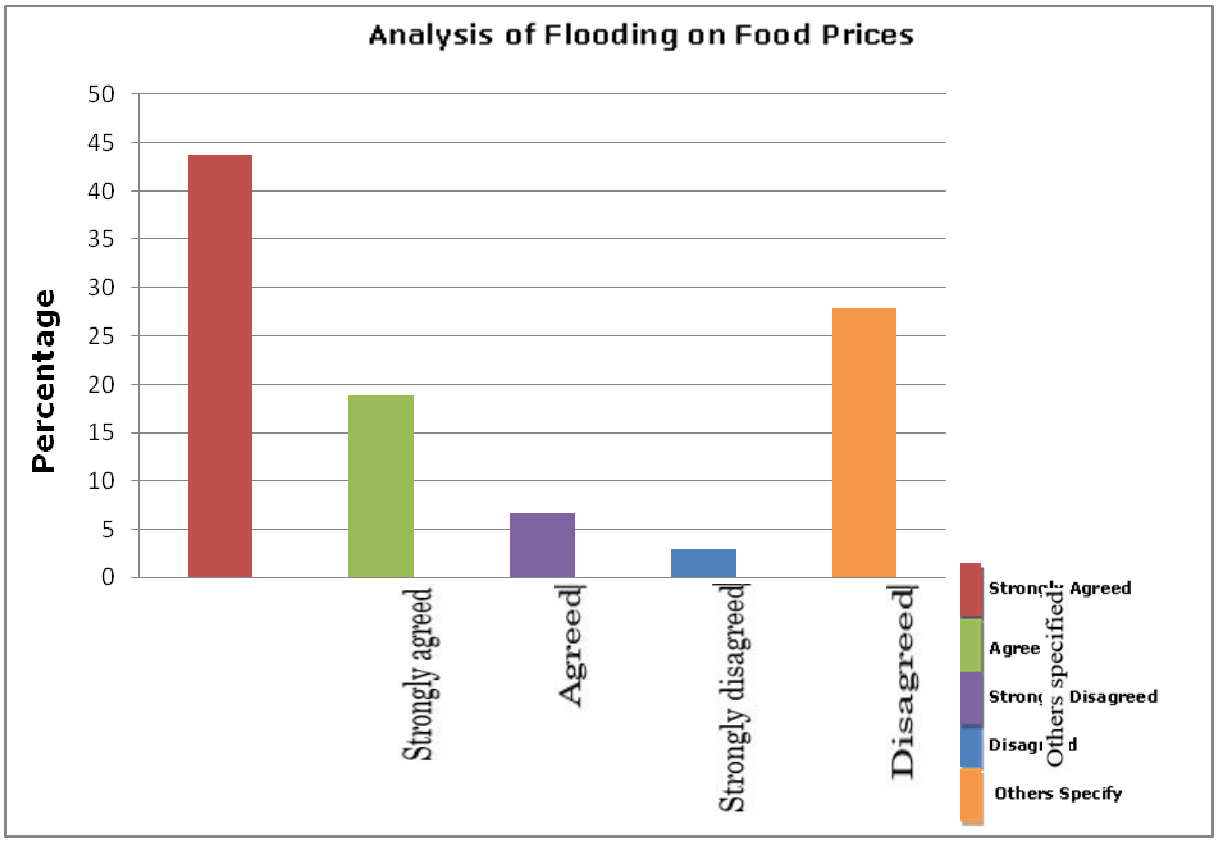

Figure 3.2: Bar Graph of the Effect of Flooding on Food Prices

It is clearly seen that high percentage of the respondents strongly agreed that flooding caused increase in food prices. The percentage of respondents that strongly agreed and agreed that flooding caused increase in food prices are 43.7 and 18.9 respectively. While few percentages of respondents strongly disagreed and disagreed that flooding caused increase in food prices representing 6.7 percent and 2.9 percent respectively (see figure 3.2). On the other hand, 27.8 percent of the respondents specified that although flooding caused increase in food prices, not all items were affected. This revealed the fact that some food items were produced by the people during flooding. Therefore, supply of such items was high, that is the reason why prices of all food items were not affected.

Moreso, increase in food prices by the respondents that strongly agreed and agreed revealed that flooding caused residents in the study area to be cut off from other neighbouring towns and villages. The situation caused reduced supply, therefore, food crisis and prices of essential food items increased. While few percentage of the respondents strongly disagreed and disagreed that flooding caused increase in food prices, representing 6.7 percent and 2.9 percent respectively. Also showed that some respondents during flooding they did not involve in buying or selling of any food item, therefore, they were not aware of increase of food prices.

The study also revealed at community level during interview that, there was increase of some food items which was attributed to the impacts of flooding on farming. Items such as oil palm, garri, plantain and others increased double during flooding. This is in line with study conducted by Pere (2013) in Bayelsa State which revealed that, flooding caused food crisis and prices of essential items increase rapidly.Furthermore, the impact of flooding on economic trees was revealed by households in figure 3.3.

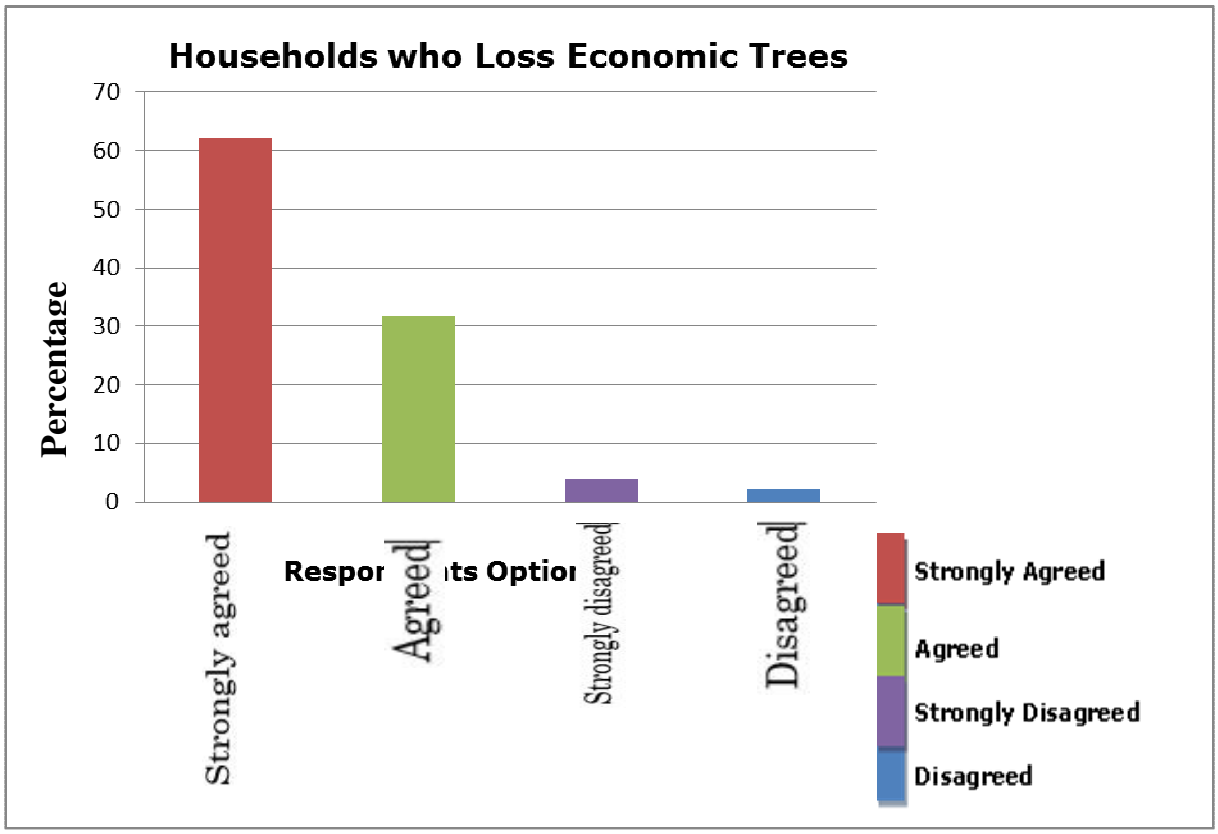

Figure 3.3: Bar Graph of Households Who Loss Economic Trees.

Among the three hundred and seventy one (371) sampled households, 62 percent and 31.8 percent strongly agreed and agreed respectively that there was loss of economic trees due to flooding in the study area. While very little percentage of the sampled households representing 4 percent and 2.2 percent, strongly disagreed and disagreed respectively that flooding does not cause loss of economic trees (see figure 3.3). Also, at community level, interview conducted revealed that due to the impacts of flooding in the past and recent years especially 2012, there was high loss of extensive cola plantation, pear and other valuable crops that resulted to shortage in supply, therefore, increased in prices of those fruits and crops. This finding revealed the negative impacts of flooding on socio-economic activities in the study area.Similarly, impact of flooding on fish stock in ponds loss by respondents was analyzed in table 3.3.

Table 3.3: Perception of the Impact of Flooding on Fish Stock in Ponds

Options	**Number of respondents**	**Percentage**
Strongly Agreed	247	66.6
Agreed	101	27.2
Strongly Disagreed	19	5.1
Disagreed	4	1.1
Total	**371**	**100**

More than 66 percent of the total respondents in the study area strongly agreed that flooding caused loss of fish stock in ponds. In addition, 27.2 percent of respondents also agreed while few respondents representing 5.1 percent and 1.1 percent strongly disagreed and disagreed respectively (see table 3.3). The high percentage of respondents strongly agreed indicated that there was high loss of fish stock in ponds due to flooding in the study area. Furthermore, table 3.4 also revealed the average number of fish stock loss per household in the study area.

Table 3.4: Average Fish Stock in Ponds lost per Household in Oleh

Species	**African Catfish (Claris gariepenus)**	**Hetro (heterobronchus longifiles)**
Total number of fish lost among households in the past and recent years i.e. from 2012-2014	63,000	22,500
Total number of households who lost fish stock in ponds	18	10
Average number of fish lost per household	3,500	2,250

(Source: Author's Fieldwork, 2014)

The study revealed 3,500 African catfish (Claris geriepenus) as average number of fish lost per household while 2,250 Hetro (heterobronchus longifiles) was indicated as average number of fish lost per household due to flooding in the past years. The lost of fish stock in ponds was attributed to overflow of fish ponds which resulted from river flooding due to heavy rainfall in the study area.

Similarly, impact of flooding on portable water was analyzed based on sampled households (see figure 3.3).

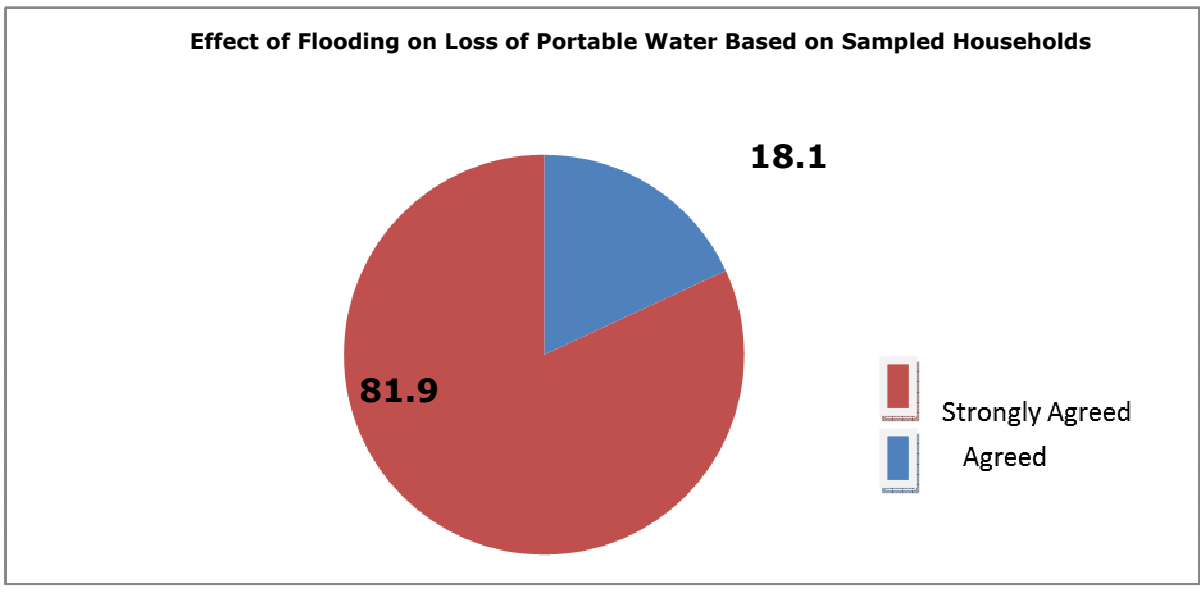

Figure 3.4: Pie Chart on the Effect of Flooding on Loss of Portable Water based on Sampled Households

The sampled households showed that flooding in the study area caused loss of portable water. Of the sampled households, 81.9 percent strongly agreed and 18.1 percent agreed (see figure 3.4). Whereas no household was able to identify that flooding cause no loss of portable water. This revealed that there was a total loss of portable water in the study area. This is a result of increased contamination that occurs during flooding. Despite borehole being the safest water source for drinking, analysis also revealed by NAFDAC that all the analyzed water

samples in flooded areas came short of the standard for safe water.Similarly, analysis of impact of flooding on volume of fish catch was done (see figure 3.5).

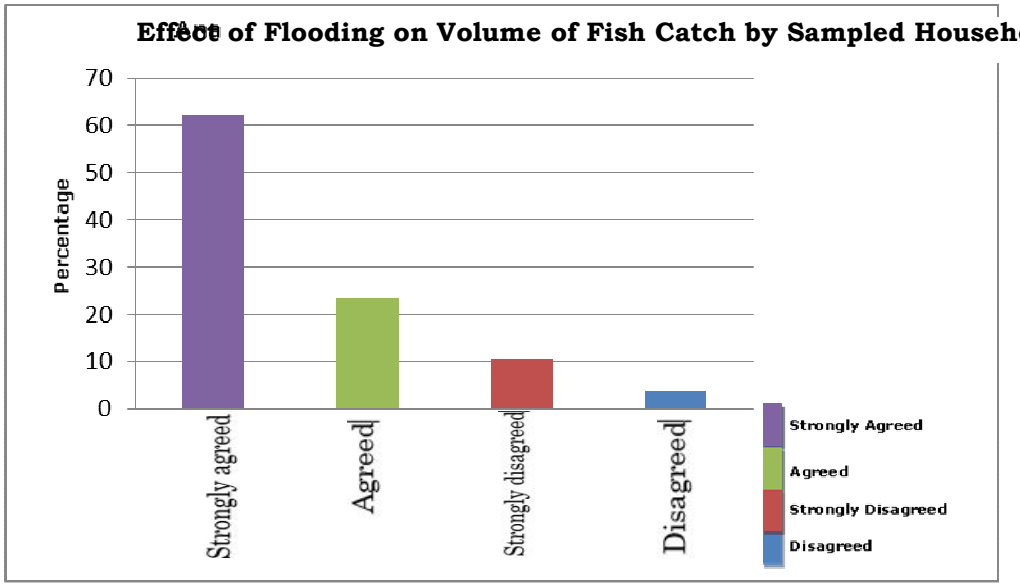

Figure 3.5: Bar Graph on the Effect of Flooding on Volume of Fish Catch by Sampled Households.

Two hundred and thirty one (62.2%) and eighty seven (23.5%) of sampled households strongly agreed and agreed respectively that the volume of fish catch during flooding was high. While few sampled households, that is, thirty nine (10.5%) and fourteen (3.8%) strongly disagreed and disagreed that the volume of fish catch during flooding was high (see figure 3.5). Furthermore, interview conducted revealed that during flooding, natural fish stock were recovered and population of fishes increased, this led to fish catch. The study indicated environmental benefit of flooding because high percentage of the respondents strongly agreed that the volume of fish catch was high during flooding.

Testing Hypothesis

In order to verify whether flooding and socio-economic activities has no significant relationship in Oleh, Pearson Product Moment Correlation is applied.

Thus:

H_o: There is no significant relationship between flooding and socio-economic activities in Oleh.

H_1: There is significant relationship between flooding and socio-economic activities in Oleh.

Table 3.5: Summary of Correlation of Area Covered by Flooding with Impacts on Socio-Economic Activities.

Location	**X**	**Y**	**X^2**	**Y^2**	**XY**
1	336	199	112896	39601	66864
2	534.6	208	285797.16	43264	111196.8
3	387.6	124	150233.76	15376	48062.4
4	395.2	289	156183.04	83521	114212.8
5	469	284	219961	80656	133196
6	341	179	116281	32041	61039
7	520	213	270400	45369	110760
8	324	313	104976	97969	101412
9	330	216	108900	46656	71280
10	667.8	162	445956.84	26244	108183.6
11	421.6	247	177746.56	61009	104135.2
12	598	304	357604	92416	181792
13	581	258	337561	66564	149898
14	838.2	109	702579.24	11881	91363.8
Total	$\sum X = 6744$	$\sum Y = 3105$	$\sum X^2 = 3547075.6$	$\sum y^2 = 742567$	$\sum XY = 1453395.6$

Solution:

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{[n(\sum X^2) - (\sum X)^2\,[(n[\sum Y^2) - (\sum Y)^2}}$$

The dependent variable is Area Covered by Flooding = X

The independent variable is Impact on Socio-economic activities =Y

Where:

r = -0.33368

The coefficient of determination is calculated by simply multiplying the calculated r value by 100. That is -0.33368 x 100 =- 33.36.

This shows that there is a high negative correlation between impacts of flooding and socio-economic activities in the study area.

t cal = 1.23

Decision Rules

Using degree of freedom (N – 2) which is 14 – 2 = 12 under level of significance .05, (two tailed test), the table value is 0.53. Since t calculated is greater than the table value (1.23 > 0.53), the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted.

This means that there is significant relationship between impacts of flooding and socio-economic activities in Oleh.

Summary of Findings

From the results of the analysis, it is clear that flooding has impacted on socio-economic activities and critical aspects namely: Agriculture, Education, Transportation, Water of people in Oleh, Isoko South Local Government Area of Delta State.

1. Flooding caused loss of economic trees and agricultural products in the study area which resulted to shortage in supply and led to high price of some food items.
2. The education sector was equally not spared. Learning was disrupted due to submerged schools and damaged infrastructure. Roads were submerged and damaged due to flooding, this affected transportation system that led to increase in fare. Also, travelling was delayed during flooding.
3. Regarding water, there was high loss of portable water. This happened as a result of increased contamination of water during flooding.
4. The study revealed that there was high loss of fish stock in ponds due to flooding in Oleh. In addition, 63000 African catfish (Claris gariepenus) and 22500 Hetro (Heterobronchus longifiles) were the total number of fishes lost among households between 2012 and 2014.
5. High volume of fish caught was revealed as positive impact of flooding in the study area.

RECOMMENDATIONS

1. Community based floods early warning system should be developed. Moreso, children should be educated regarding the risks involved in playing in flood water. This will go a long way in creating awareness and preparedness of the inhabitant of Oleh. Thus, the negative impacts such as loss of human lives, animals, plants and properties would be reduced.
2. Individuals and non-governmental organizations should provide improved varieties of crops that are highly water-resistant to farmers in the study area. This will help to minimize unnecessary premature harvesting of crops during flooding.
3. Individuals, corporate bodies and governments should provide adequate funding for disaster management bodies and agencies; this will go a long way in reducing dreadful experience from the study area.

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