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ASSESSMENT OF FLOOD INCIDENCE AND ITS SOCIO-ECONOMIC IMPLICATIONS IN DAMATURU YOBE STATE, NIGERIA

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ABSTRACT

This paper assesses flood incidences and their socio-economic implications in Damaturu. The study examined people's awareness of the flashflood, determined the frequency of the menace far year, read the causes, assessed the effects of the problem and identified the control measures that were put in place. The study utilizes both primary and secondary data. The primary includes observation, interview, use of camera and questionnaire. In contrast, the secondary used relevant journals to justify the necessary findings. The study revealed that most of the respondents were aware of the existence of the flood. The study also showed that the menace used to occur more than once a year. Moreover, the study found that the primary cause of the flood includes Encroachments posed by human activities, heavy rainfall and poor drainage system. On the other hand, the study revealed that the significant effects of floods in the study area include damage to their houses and farmland. Lastly, the study found out that very few in the study area are using sandbags to limit the destruction, so it concludes by identifying the reasons for the flash floods as both natural and human induces; so finally, the study recommends the establishment of the functional hydrological office in Damaturu to monitor the flow of floods, Proper mapping of flood-prone zones, law enforcement and finally Government needs to encourage enlightenment about the wrong side of violating environment and help the victims that are affected by the flooding in the study area.

Keywords: Damaturu, Flood, Socio-economic

INTRODUCTION

Floods are environmental hazards that occur annually in different parts of the world and are repeatedly in local and national news headlines. A flood happens when a river bursts its bank if it carries so much water that it cannot be confined to its usual course (Thompson, 1964). However, in the real sense, floods only become a hazard when they impinge unfavorable upon human activity. Flooding is also a common occurrence in many parts of Nigeria. According to Jaiyeoba (2002), flooding in Nigeria commonly occurs in the floodplains of large rivers during the rainy season and in many towns, most especially those located on flat or low lying terrain and where adequate provisions have not been made for surface drainages or where drainages have been blocked by municipal waste and eroded soil sediments. Daura *et al.* (1997) Observed that Nigeria reported cases of floods in recent years to appear more rampant in the relatively drier northern part of the country. The year 1994 is particularly noted to have recorded the most severe and widespread flood disasters in the dry belt of the country. Flood, on a general note, are the most frequent type of natural disaster which rise to overflow water onto normally dry land. Many floods cause damage to those who are most directly affected. However, some may result in significant disasters involving structural and erosional damage, disruptions of Socio-economic activities, transportation, Communication, loss of lives and property, displacement of people, destruction of agricultural land, and contamination of food, water and the environment in general (Nigerian Environmental Study/ Action Team-NEST, 2012). Floods occur within a few minutes or hours of excessive rainfall or in a river when the flow rate exceeds the capacity of the river channel, particularly at bends or meanders in the waterway. Some floods develop in just a few minutes, and without visible signs of rain, they can also be local, impacting a neighborhood or community. Their occurrence is common in flat or low-lying areas where the ground is saturated with water and flood is slow enough to enhance accumulation. Floods can also occur if water falls on an impermeable surface, such as concrete or frozen ground and cannot rapidly dissipate into the ground (Anie, 2009).

However, despite the harmful effects of the flood on man and the environment, flooding has been noted to benefit man and the environment (Anie, 2009). For example, in India and Bangladesh, agriculture production patterns depend upon water brought by significant rivers and the renewal of fertility through siltation (Anie, 2009). Floods are a common recurrent phenomenon in Nigeria. In some coastal and revering areas of the country, they occur every year, bringing in their wake much loss, hardship and suffering (NEST, 2012). This pattern is similar to the rest of the world, forcing millions of people out of their homes, destroying businesses, polluting water resources, and increasing disease risk (Akinyemi, 1990 Nwaubani, 1991).

The threats posed by floods to lives and properties in Nigeria are becoming annual phenomena in recent times (Kola wale *et al.*, 2011). A most severe episode is the recent 2012 flood event which cut across almost every part of the country, causing an un-quantified amount of damage and losses nationwide. However, flash floods are the most common type experienced in Damaturu and its environs. Flash floods are usually associated with rivers where sudden heavy rains can change them into destructive torrents within a short period of their occurrence (Etuonovbe, 2011) Flash flood is a flood that rises and falls quite rapidly with little or no warning, usually as a result of intense rainfall over a relatively small area. It can also be caused by sudden excessive rainfall and the failure of dams. There are many research studies conducted on the effects of floods in Nigeria. In addition Abdurasheed (2020) Assessed indigenous knowledge in flood disaster forecasting for flood disaster risk reduction in northern katsina

state.However, few to mention are studies by Joachim (2018) assessed Flood, Livelihood Displacement, and Poverty in Nigeria. Moreover, Yunusa (2019) examined flood vulnerability assessment in Gashua: Issues and perspective. However, Gana and Kabiru (2020) assessed the effects of the 2019 flood in Yobe State communities and possible mitigation approaches. In addition, Muktar et al., (2021) determined the causes and consequences of flooding in Gashua Town Bade Local Government Area, Yobe State. However, all these research mentioned were not done in the same study Area through the research conducted by Abdullahi and Kabiru is the same study area as this research. Still, their study touches the entire State, but they used secondary data for their research, and they do not put more emphasis on the Flood incidence in Damaturu. In this view, this research bridges a gap by assessing the people's awareness of the flood disaster, determining the causes of the menace, examining the effect on the community, and identifying the control measures to manage the menace.

MATERIAL AND METHOD

Study Area

Damaturu is located between latitude 11^0 39' 30'' – 11^0 47' 00'' N and longitude 11^0 54' 00'' – 12^0 02' 00'' E in Yobe State in Northeastern Nigeria. The town was made the capital of Yobe State in 1991. The population of Damaturu was 88,014 in 2006. The major tribes in the area are Fulani, and Kanuri others are the Hausas, Karai-Karai, Bade, Igbo and Yoruba. The principal occupation in the area is civil service and trading. The town lies in a plain region covered by savanna and supports crops of millets, sorghum (Guinea corn), and peanuts (groundnuts). However, the study area wed season is hot, oppressive, and mostly cloudy, and the dry season is sweltering, windy, and partly cloudy. Over the year, the temperature typically varies from 58^0F to 104^0F and is rarely below 52^0F or above 109^0F, the period of the rainy season in the town is 120 days, Annual rainfall ranges from 500mm – to 1000mm, and the rainy season is generally from May – September and sometimes up to October.

Table 1: Damaturu Total Annual Rainfall Data with Date (2015 -2021)

YEARS	2015	2016	2017	2018	2019	2020	2021
RAINFALL	202.4mm	441mm	302.7mm	570.8mm	498.8mm	315.4mm	618.1mm

Source: Desert Research Monitoring and Control Center Yobe State University Damaturu

Data Type and Variables

This study utilizes both primary and secondary data for this study. The primary source involves a field survey for the physical observations of the environment, interviews, cameras and the use of a structured questionnaire. The information collected included the socio-economic characteristics of the respondents, duration of their stay in the area, their awareness of flood hazards, the frequency of occurrence of the flood per year, the effects of the flood on them and the measures they have/are taking to manage the environmental problem. At the same time, the secondary data includes related literature and Journals to justify the findings were necessary.

Sampling Technique

Damaturu local government consists of 11 electorate wards (Census, 2006). Three areas, namely Maisandari Ward, Maisandari Sumsumma village and Moduri Gambir wards, were selected purposively by Damaturu local government. This is because they are the most affected areas by the flash flooding in the study area. Thus, gathering information from the people in the areas answers some of the study objectives. The population of Damaturu was 88,014 (Census, 2006) and the year 2022 projected population is 116,536. They used Krejcie and Morgans' (1970) formula with a 95% confidence level and a 5% margin of error 384 questionnaires were distributed. In addition, simple random sampling was adopted for this study. Therefore, a total of 384 questionnaires were administered proportionally. Moreover, equal numbers of the questionnaire were given to each area because there is an insignificant difference in the population size between the three areas. The data collected were analyzed using a statistical package for social sciences (SPSS), and the results obtained were subjected to simple descriptive statistics in the form of a percentage.

RESULTS AND DISCUSSION

Socio-economic characteristics of the Respondents

This session deals with analyzing and interpreting the information collected from respondents residing within the study area. However, the analysis was done based on the information gathered through the questionnaire. The analysis and interpretation of the findings are presented under sub–headings as being designed on the questionnaire.

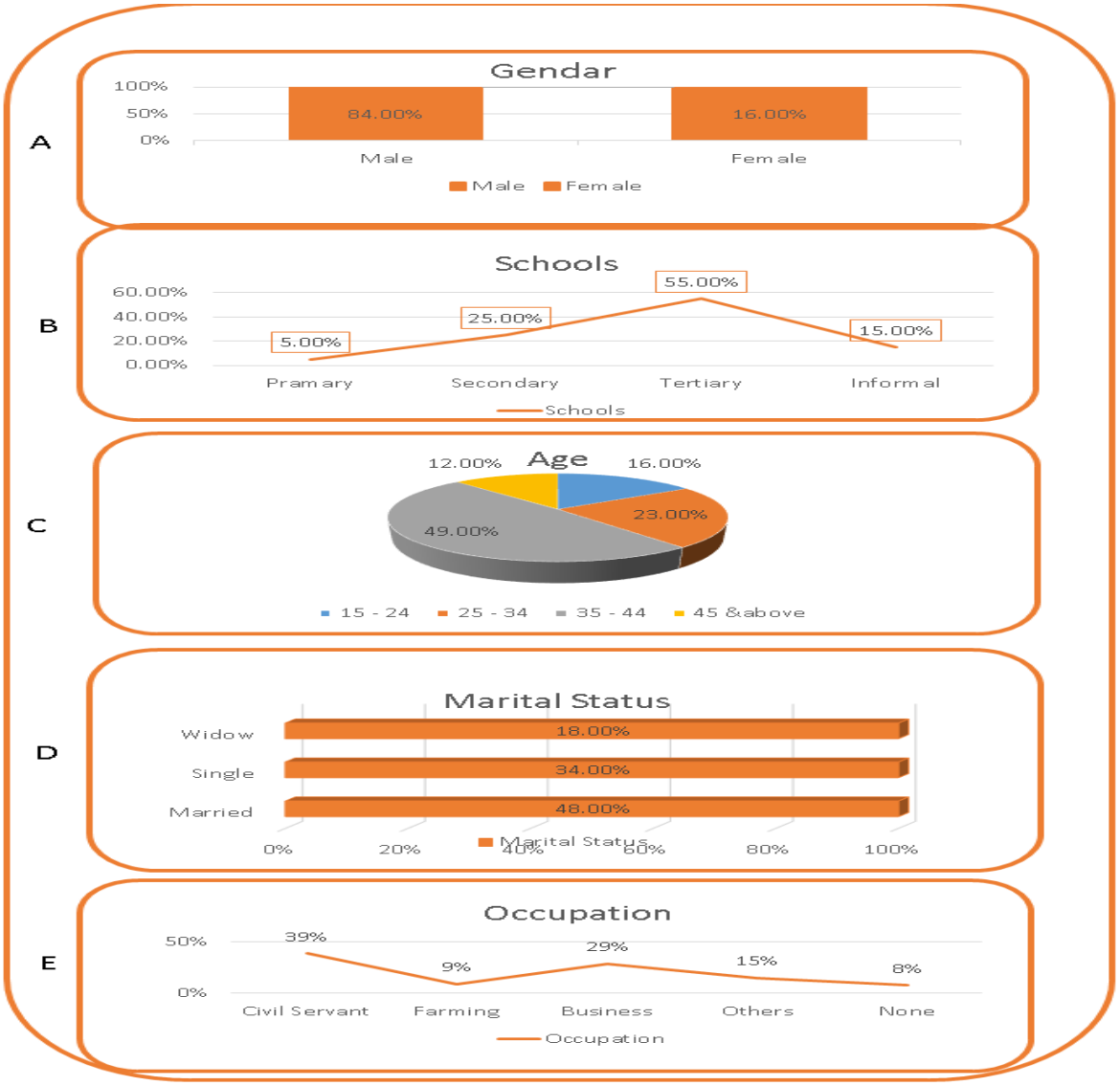

FIGURE 1 SHOWS:- DEMORGRAPHIC CHARACTERISTICS

Source:- Field work 2021

(A) Figure1: Shows the gender of the respondents, with 84% male and 16% female. This is because females in the Northern part of Nigeria are shy to participate in such kind of research due to the nature and culture of the environment. **(B)** Figure1 shows the literacy level of the respondent; the study revealed that the majority of the respondents were educated, with 55% going to tertiary institutions, followed by the secondary school with 25%, then 15 % for some under other informal education and lastly 5% that attended primary school. Furthermore **(C)** in figure1 showed the age of the respondents with 88% of the respondents were from age classes (15-44) years these are groups really engaged in various forms of occupation in the area and possibly the most hit by the flash flood occurrence in the area. Even though the age (45 years and above) constituted only about 12% of the respondent, the information they provided was also considered very relevant, especially in aspects of historical occurrence and the impact of floods in the area. Moreover, **(D)** showed the marital status of the respondents, with 48% married, 34% single and 18% widows. Lastly **(E)** in figure1 showed the respondent's occupations with 39% civil servants, 9% farmers, 29% businessmen, 15% doing other work that was not revealed and 8% doing nothing for a leaving. So this finding indicates that the majority of the respondents in the study area are doing something for a living in the study area

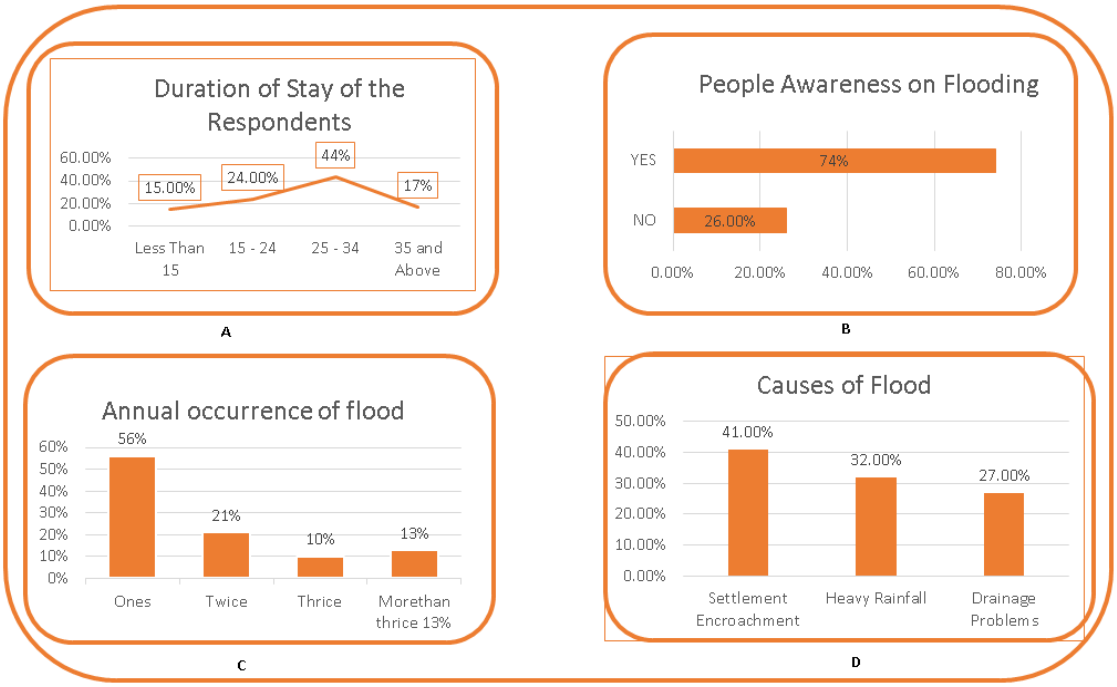

Figure 2, shows Duration of Stay, People Awareness of flood, Annual Occurrence and Courses of flood in the study Area
Source:- Fieldwork 2021.

However, **(A)** in figure2 showed that 85% of the respondents have stayed in the area for more than fifteen years and, as such knowledgeable enough of the flooding behavior of their immediate environment and conversant with the flash flood events of the area. While **(B)** showed that the majority of the respondents are aware of the occurrence of the flood in the study area with 74%, while **(C)** showed the frequency per year, the flood incidences in the area were categorized into yearly (annual) and the long term occurrences; it was observed from the survey area that flash floods occur at least more than once in a year. It was further obtained from the oral interview that flood events correspond with the annual rainfall pattern of the area, such that the incidences occur most often in the wet months of the year (August-September). On long occurrences, 56% of the respondents affirmed that severe flash floods are recorded at least once every five years in the area (fig. above shows). It was also gathered from the oral interview that the most severe events experienced in recent times were the August 2018, August 2019, August 2021 and September 2021 floods, which were all attributed to heavy rainfall incidences in the study area. The comparison of the flood incidences to the rainfall data of the area from 2015 to 2021 confirmed this assertion. The years mentioned earlier registered a higher amount of total rainfall (Above 490mm) than the remaining years in which total annual amounts were less than 490mm.

Causes of flooding In the Areas

On the other hand, **(D)** in figure2 showed that 41% of the respondents attributed the occurrence of Settlement Encroachment to floodable zones in the study area. The remaining 32% attributed the occurrence of floods in the area to Heavy Rainfall events. Poor drainage networks also aid the blockage of waterways in the study area. This agrees with Gana and Kabiru's (2020) work, asserting that heavy rainfall and poor drainage are among the criteria that aggravate flooding. However, the respondents also had varied views depending on experiences encountered in their various settlements. For instance, all the respondents in the study area attribute the causes of floods in the area to settlement Encroachment and Heavy Rainfall. They also consider the other factors as reasonable causes of flooding in the area. It also revealed that the poor drainage network within the settlement was not a decisive factor in flood influence in the areas. However, it was obtained from the survey that settlement encroachment into the floodable area influences flood occurrence in the study area to some considerable extent. The development of residential structures (buildings, roads) in the floodable area plays a significant role in the blockage of the main waterways, resulting in flood occurrences.

Socio- Economic Effect of Flooding In the Area

It is always obvious that floods become disasters when they negatively impact the social and economic aspects of affected residents. However, it is paramount to note that the impact may vary in magnitude and intensity from one flood event to another and from one location to another. It was gathered from field studies that flood disasters in the study area have more impacts on houses and farmlands than any other feature or activity in the area

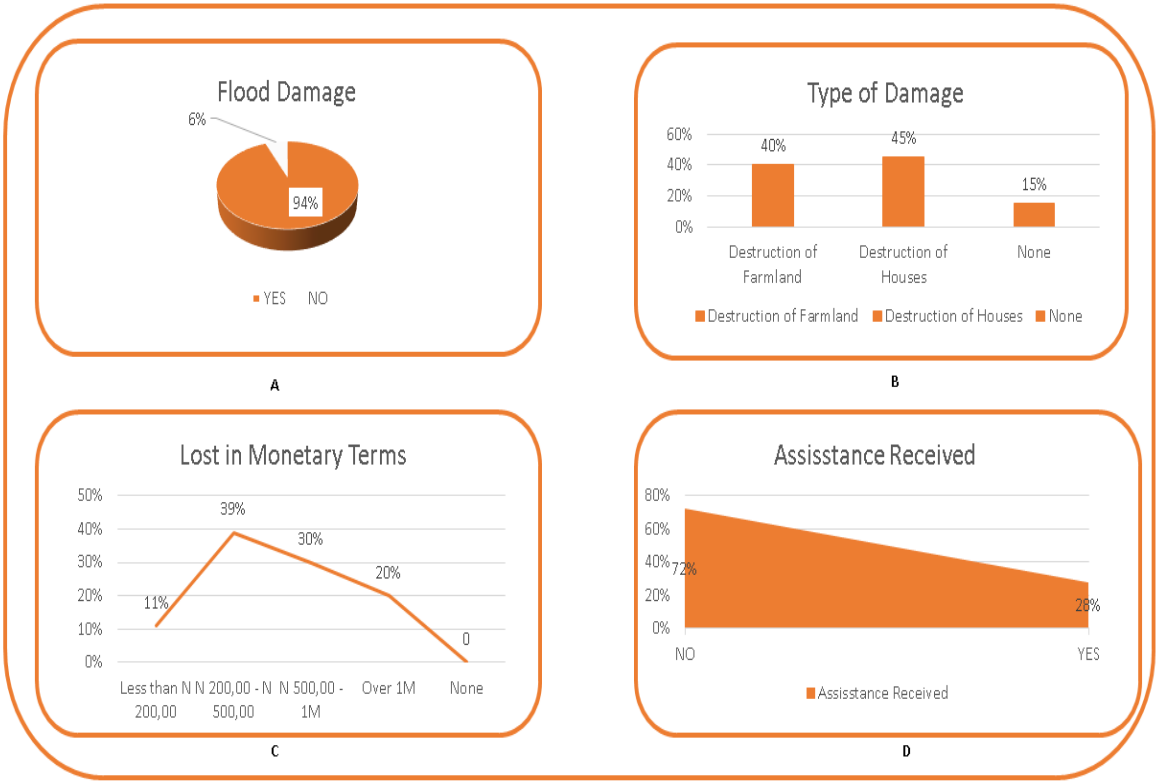

Figure 3, shows Flood Damage, Type of Damage, Lost in Monetary Terms and Assistance Received

Source:- Fieldwork 2021

(A) Figure 3 shows that the majority of people are affected by the flood with 72%. Furthermore, **(B)**showed that their houses and farmland are more affected by the menace in the study area with 45% and 42%, respectively. This outcome is similar to Gana and Kabir (2020) and Muktar *et al.* (2021). While **(C)** in figure 3 showed the loss in Monitory terms, Losses in monetary terms also varied, ranging from less than one million naira to over one million naira; the level of destruction, however, most of the losses was less than five Hundred thousand naira (N500,000). Lastly, **(D)** in figure 3 showed that very few people in the study area received support from the Government majority of the victims were left stranded without any support.

Plate 1:- Showed the Damaged Caused by Flood in the Study Area
Source:- Fieldwork 2021

Plate 1 showed the damage caused by the flood in the study area; the effects in Maisandari community; Maisandari Sumsum, and Moduri Gambir community were more on houses, and the farmlands survey shows that flood damage in the area was mainly along with the water ways channel where the overflow of the channel destroys building and farmlands. It was also observed from the field studies that high flow stages and water flooding pose severe effects on the stability of the channel banks. Studies also revealed that flood events usually result in weakening and failure of the channel and land areas and eventual widening of channel width at many sites. **(B)** in plate one agrees with the fundamental concepts of geomorphology presented by Thornbury (2002); the fourth concept stated that "geomorphic processes leave their distinctive imprint upon landforms, and each geomorphic process develops it's on characteristics assemblage of landforms" based on the stated concept, it was conceived that flood being a fluvial geomorphic process leave the scare of its effects on affected areas. It is on this notion that areas affected by the 2021 flood events were identified. Imprints and extends of the flood events were easily identified by field observations and complimented by the guide from affected residents.

Flood Control Measures / Types of Control Measures Used

(A) Figure 4 shows that most people do not carry out any flood control measures in the area, with only 44% out of 100% controlling the menace in the study area; this implies that victims are, in most cases, left at the mercy of flood events. However, **(B)** in figure 4 showed that 44% of the menace use sandbags to control the problem in the area. However, it was gathered by interviewing the respondents, who also noted that the measure's effectiveness is rated low to moderate. This is because it is only effective in instances of low flood events. Most of the respondents affirmed that using sandbag levees did not yield a positive result in the study area.

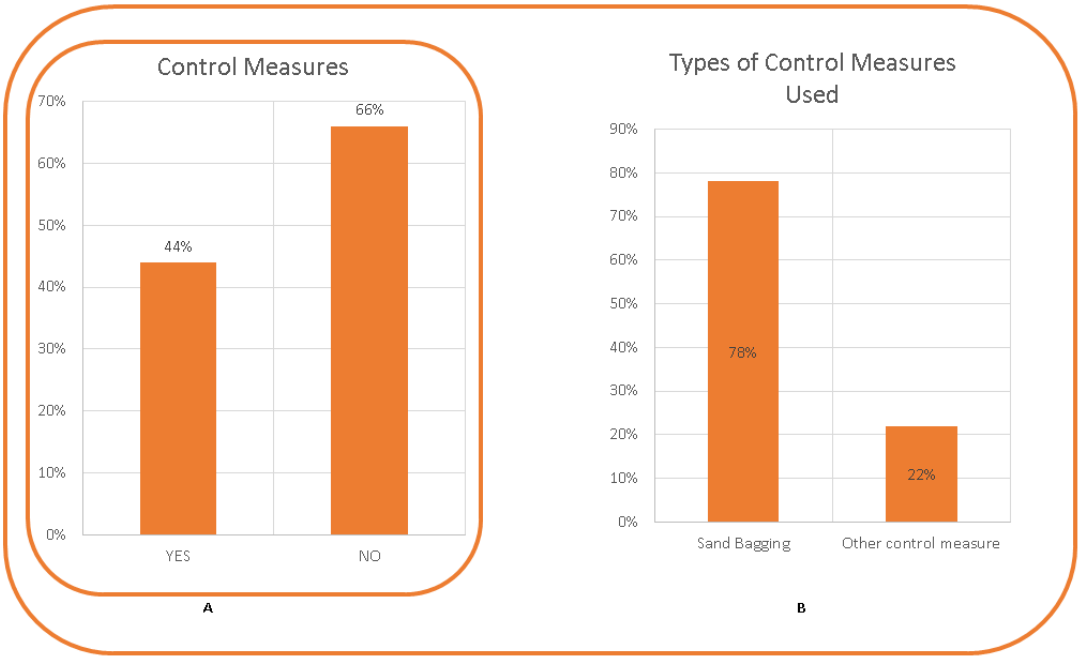

Figure 4, shows Control of Flood in the Study Area
Source:- Fieldwork 2021.

Plate 2:- Showed Surface runoff and flooding in the Study Area
Source:- Fieldwork 2021

Plate: - 2 showed the surface runoff and flooding from the study area. It can help wash down pollutants and contaminants deposited on land caused by the intensive use of pesticides and fertilizers. They also flush out accumulated organic substances brought by untreated drainage water from farmlands; stockyards, factories and domestic use and restore the ecological health of the area

CONCLUSION AND RECOMMENDATION

In Conclusion, the study found that the primary reason for the flash flood in the study area is natural and anthropogenic factors. Firstly the study showed that most people are aware of the flash flood in the study area. Secondly, The Study revealed that floods frequently happened, more than once annually. Thirdly the study found out that the major causes of

the flood in the study area include Encroachment of human dwellings in farming activities, heavy rainfall and poor drainage system that will enable the free flow of water. Fourthly the study revealed that houses and farmland are damaged by the menace. Lastly, the study found that most of the respondents are doing nothing to control the menace, but very few use sandbags to limit the problem. However, based on this, the following recommendations are made first, adequate records on flood incidences are required, considering the aspect of flood magnitudes and intensities. This should involve establishing a functional hydrological unit/office in Damaturu to monitor the flow of floods, Proper mapping of flood-prone zones in Damaturu and the state at large. If possible, the government should establish policies concerning resettlement and other land use activities within the flood-prone zones. Encroachment of human dwellings and farming activities into areas liable to flood should be discouraged. Besides, the populace of Damaturu town needs to be educated on the implication of drainage blockages by solid waste disposal. Moreover, Channel bank weakening and failure caused by high flow stages and floods have to be controlled by constructing embankments along the river channel.

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