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An Assessment of Flood Risk Perception and Response in Jalingo Metropolis, Taraba State, Nigeria

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Abstract

Flooding is now an annual occurring event in Jalingo metropolis especially after heavy rainstorm which is further worsened by the nature of topography of the area. The study area consist of undulating plain interrupted in places by low rising hills as well as poor/inadequate drainage network. The knowledge of the public flood risk perception is considered a crucial aspect in modern flood risk management as it steers the development of effective and efficient flood mitigation strategies. This study examines the level of individual flood risk perception and behavioral response in Jalingo Metropolis. The survey design method was employed in this study. This involves interviewing people living in the study area using structured questionnaires. 252 respondents were randomly selected from three of the most affected areas in the Metropolis. These include Mallam Gabdo, Mafindi and Low cost areas. In each ward/unit, 84 structured questionnaires were administered. Descriptive statistics were used to analyze the data. The result of the findings shows that 23.7% of the respondents were aware that the area was prone to flooding, while 76.3% were not aware. Also about 67.6% of the respondents said that they have evacuated their houses and shops to flooding in the area while 32.4% have never evacuated their houses or shops to flood problems in the area. This study recommends the need to educate the people living in the flood plain on the dangers of continuous occupation of the area.

Key words: Assessment, Flood, Perception, Response, Risk

Introduction

Risk perception refers to the intuitive risk judgments of individuals and social groups in the context of limited and uncertain information (Slovic, 1987). These judgments vary between individuals due to different levels of information and uncertainty, different intuitive behavior, specific power constellations and positions of interest (Messner and Meyer, 2004). Thus the individuals of a community may assess the risk of being flooded differently, because they do not have the same information about the probability of flood hazard events in their region, about flood mitigation measures and their effectiveness. Perhaps also, they may have different background regarding the experience of living in a floodplain and of being flooded (Messner and Meyer, 2004). Flood risk perception has recently become an important topic of discourse to policy makers concerned with risk management and safety issues. The knowledge of the public risk perception is considered a crucial aspect in modern flood risk management as it steers the development of effective and efficient flood mitigation strategies (Kellens *et al*, 2011).

Two schools of thought have emerged, which vary in their opinion on the causes of flood. The first school of thought championed by Ward (1967), argues that humans are largely the causes of the severity of floods in recent times, while the second school thought led by Langbein (1978), and supported by Waltham (1978), insist that of all the factors responsible for flooding, humans are the least. They contended that flood will always occur with or without the presence of man. Ologunorisa (2006) observed that flood may also be caused by the encroachment of hydraulic structures and cities on flood plains and by blocking of water

channels and drainage networks. Maigari (2002) on the other hand observed that flooding is initiated by four major causes, namely; meteorological factors, tectonic movement, mass movement and anthropogenic factors. According to him, these activities in one way or the other, render streams or river channels incapable to accommodate fast running water from their catchment areas thereby leading to flood. He cited the case of August 1994 Flood in Maiduguri, which resulted from the inability of Alau reservoir to accommodate the discharge from the diverted flow of Gombole/Sambisa swamp dyke on River Yedzaram. Flood risk studies provide insight into individual perception of flood risk that is potentially useful to policy makers and water managers. Flood risk perceptions are important factors which causes individuals to take precautionary measures and give support to policies that aim to limit flood risk. Research on flood risk perceptions in Nigeria is still scanty and considerable research efforts are needed to provide the much needed insights to policy makers.

Flooding has become an annual occurring event in Jalingo metropolis especially after heavy rainstorm. The recent floods break all the records of the past. Part of the problem is the nature of topography of the area, which is an undulating plain interrupted in places by low rising hills as well as the poor/inadequate drainage network. Flooding is usually associated with loss of lives and properties depending on the intensity of flood. Hence, in order to reduce large-scale damage and losses arising from flooding in Jalingo metropolis, the need for an assessment of flood risk perception and response in the study area becomes very imperative. The aim of this study is to examine individual flood risk perception and response in Jalingo Metropolis. This aim will be achieved through the following specific objectives:

i. To examine the level of perception and behavioral responses of the residents of the study area to the risk of flooding.
ii. To examine government, NGOs and individuals response to the risk of flooding in the study area.
iii. To examine the possible risk management strategies for the study area.

The following research questions are set out to serve as a guide to this study. They are:

i. What are the people's perceptions of flood risk in the study area?
ii. What is the nature of behavioral responses of the residents to the risk of flooding in the study area?
iii. What are government response to the problem of flooding in the study area
iv. What are the effective flood risk management techniques that can be adopted in the study area?

Description of Study Area

Jalingo LGA is roughly located between latitudes $8^{o}47'$ to $9^{o}01'$N and longitudes $11^{o}09'$ to $11^{o}30'$E. It is bounded to the North by Lau Local Government Area, to the East by Yorro Local Government Area, to the south and West by Ardo Kola Local Government Area (Figure 1). It has a total land area of about 195km^2. Jalingo LGA has a population of 139,845 people according to the 2006 population census, with a projected growth rate of 3% (Shuwabolo *et al*, 2009). Presently, it has a projected population (2009) of 153,774 based on the 2006 population census. The relief of Jalingo LGA consists of undulating plain interspersed with mountain ranges. Between Kwaji-Mika to the east and Kona to the west, stretching to Kassa-

Gongon to the south exist this compact massifs of rock outcrops. The mountain ranges run from Kona area through the border between Jalingo and Lau LGAs down to Yorro and Ardo Kola LGAs in a circular form to Gongon area, thus given a periscopic semi-circle shape that is almost like a shield to Jalingo town.

Jalingo metropolis is drained by two rivers (Figure 1), Mayogwoi and Lamurde which emptied there content into the Benue river system at Tau village. The valleys of these rivers are dotted with ox-bow lakes which are as a result of depositional activities. Jalingo LGA has tropical continental type of climate characterized by well marked wet and dry season. The wet season usually begins around April and ends in October. The dry season begins in November and ends in March. The dry season is characterized by the prevalence of the northeast trade winds popularly known as the harmattan wind which is usually dry and dusty. Jalingo has a mean annual rainfall of about 1,200mm and annual mean temperature of about 29^{o}C. Relative humidity ranges between 60 – 70 per cent during the wet season to about 35 – 45 per cent in the dry season. Jalingo is located within the northern guinea savanna zone characterized by grasses interspersed with tall trees and shrubs. Some of the trees include locust bean, sheabutter, eucalyptus, baobab and silk cotton tree. The major ethnic groups of Jalingo LGA are the Fulani, Jibu Kona and Mumuye, while other ethnic groups such as Hausa, Jenjo, Wurkum and Nyandang are also found. Hausa language is widely spoken as a medium of communication for social and economic interactions.

Definition of Operational Concept

Flood Perception

The perception of flood hazards varies from one society to another depending on cultural, economic and technological development. In most traditional societies of the world, especially in parts of Africa, Asia and Latin America, hazards are seen as an act of punishment for wrong doing or act (by the living generation) from the gods or past ancestors (Maigari, 2002). In modern societies, flood hazards are viewed from two main perspectives. The first, as a natural phenomenon or processes fundamental for the formation and modification of landforms on the earth surface generally referred to as catastrophes. While the second are the consequences of man's misuse of his entire biophysical environment, broadly referred to as man-made hazards (both induced and assisted) (Maigari, 2002).

Response to Flood

Flood disaster response is an attempt to minimize the effects from just one specific flood disaster. Response to flood hazards takes several forms. This manifest itself in the various adjustment measures taken after flood incidence which may include relief and rehabilitation, insurance, warning systems, technological aids and land use management (Maigari, 2002). Mitchell (1989) further simplified the main responses that people can make in the face of any hazard into five ways, namely, dealing with the cause of the hazard, modifying the hazard adjusting methods to minimize hazard losses, advanced planning to minimize losses and bearing the losses. Some of the human adjustments to flood hazards are quite many; the choice of these options is greatly influenced by five factors. These are;

i. People's perception of the flood hazard itself.

ii. People's perceptions of the choice of adjustment open to the affected society.
iii. Perceived linkages with other people.
iv. Economic efficiency and;
v. Command of technology.

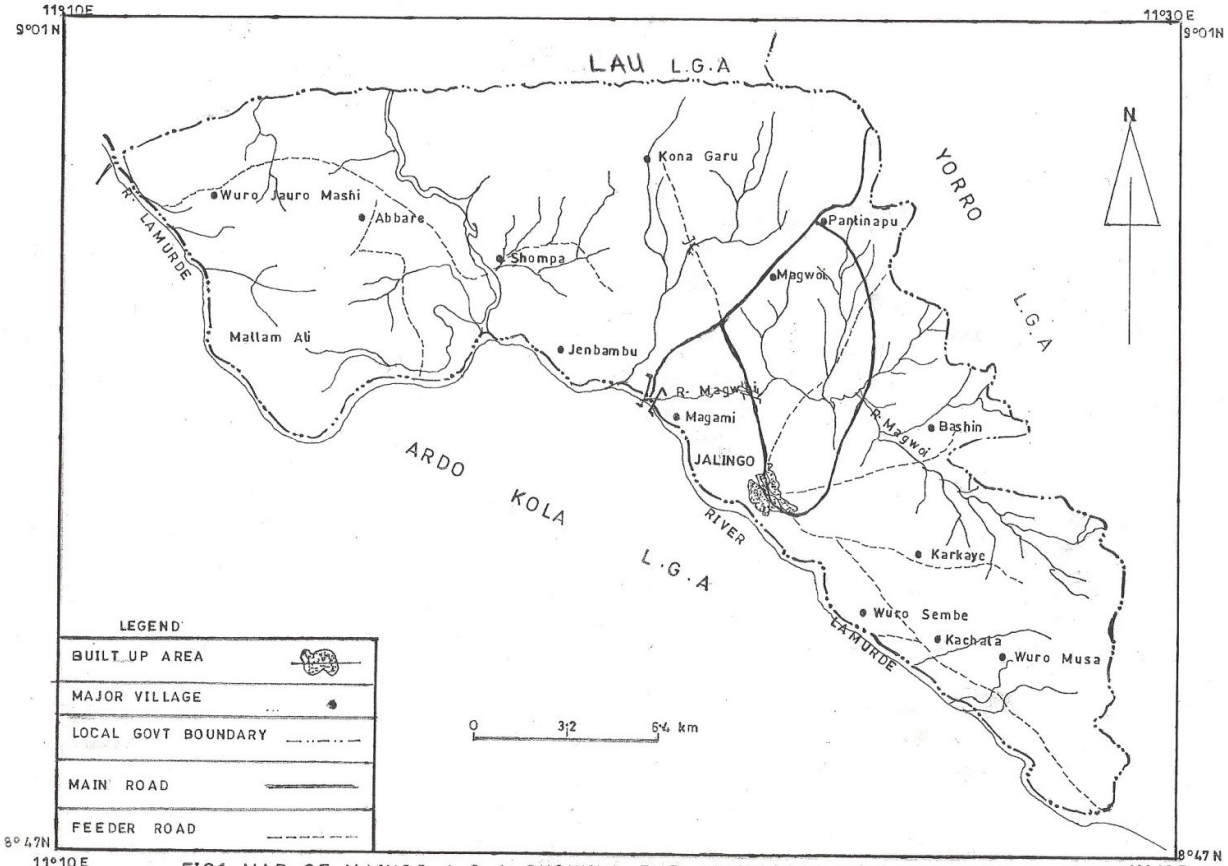

FIG1 MAP OF JALINGO L G A SHOWING THE DRAINAGE SYSTEM

Flood preparedness planning is about putting in place a set of appropriate arrangements in advance for an effective response to floods. The key to flood preparedness planning is to have a clarity and agreement on the roles and responsibilities of relevant stakeholders such as the State Emergency Management Agency (SEMA), Red Cross, voluntary groups as well as community members. A flood preparedness plan (FPP) which is an integral component of the multi-hazard disaster management plan, is an action oriented document detailing specific actions to be undertaken prior to floods, which set the ground for effective execution of emergency response and recovery activities during and after floods.

Materials and Methods

There is a wide range of methods usually employed in the assessment of perception of natural risks and environmental quality aspects which include those based on psychological approaches or on cognitive processes associated to risk acceptance (Nascimento *et al*, 2012). The research method employed in this study consisted of interviewing people living in the study area employing structured questionnaires. This was administered to about 250

respondents in the flood affected parts of the study area. These include Mallam Gabdo, Mafindi and Low cost areas. Thus, in each ward/unit, 84 structured questionnaires were administered. Both primary and secondary data were used in this study. The primary data include data on behavioral responses especially the perception and adjustments of the flood plain dwellers to the risk of flooding. This primary data were collected directly from the field through the use of questionnaire, and direct field observation and measurement. The secondary data on the other hand include data from the reports of consultants, Newspapers, Journals and other relevant textbooks, land use and topographical maps etc.
Questions was asked on the bio data of the head of household, his perception of the flood hazard prior to moving to the selected area and at the time of interview, the nature of adjustments made either in anticipation of floods and reasons why the households continues to remain in the study area despite perceived flood risk. Heads of households were asked series of questions relating to the flood magnitudes and frequency, the causes of flooding; and the risk of future floods in other to gain an insight to their level of perception as at the time of interview. They were also asked whether they were aware of any flood alleviation schemes undertaken or planned by the land lords or the community, or asked on the nature of adjustment made by the heads of households with respect to evacuation during floods, and the nature and types of assistance received. The extent of the respondent's mental adjustment to the perceived flood risk were assessed by asking whether he had ever considered moving to another area because of the floods. The structured questionnaire was also be used to find out the relative location of households such as their elevation relative to the potential water level, proximity to a main river and the degree of protection by dike infrastructure.

Results and Discussion

The result of the findings on the general characteristics of the respondents reveals that 73.7% are males while 26.3% are females. 57.9% are between 24 – 30years, while 26.3% are between 31 – 40years and 15.8% are above 41years. Results also show that 31.6% are farmers, 26.3% are unemployed, 15.8% are civil servants, 20.1% are retired civil servants and 6.2% are artisans. Also about 40.5% of the respondents had no formal education, 20.5% have primary education, 23.1% have secondary education while 15.9% have tertiary education. In terms of tenure to land, 42.1% of the respondents were owners of the property they occupied while 57.9% are tenants.
The study findings show that 63.1% of the respondents have lived in the area they were interviewed for a period of about 3years, while 20.1% have lived in the area for a period of about 6 years as shown in Table 1.

Table 1: Duration of stay in the area

Duration (years)	Frequency	Percentage
1-3	153	61.2
4-6	50	20.0
7-9	26	10.4
10 and above	6	2.4
No response	15	6.0
Total	250	100

When the respondents were asked if they have ever experienced flooding in the study area, 57.8% responded in affirmative while 42.2% said that they have not. This question was asked to ascertain the validity of the information from the respondents on the perception and knowledge of range of adjustment sought by the study following the method adopted by Ologonorisa (2006).

In terms of knowledge of flood hazard before moving into the area of residence, 23.7% of the respondents were aware that the area was prone to flooding, while 76.3% were not aware. On the other hand, those who believed they occupy a flood prone area demonstrated a good knowledge about the main characteristics of local floods in the area which include low depths, short duration and high flow velocities. When asked why they still live in the area despite the awareness, many of them gave different reasons (Table 2).

Table 2: Reasons for continued stay in the study area despite the flood problem

Response	Frequency	Percentage
Accommodation problem	105	42
Nearness to place of work	26	10.4
Personal family reasons	00	00
Reasons not stated	26	10.4
Not applicable (born in the area)	93	37.2
Total	250	100

The results from Table 2 show that 42% of the respondents have accommodation problem, while 37.2% were born in the study area and as such have no alternative accommodation. On the causes of flooding, 19.3% of the respondents believed that the flooding was an act of God, while 51.4% insist that the causes of the flooding was river overflow from river Lamurde, 15.8% said that it is as a result of absence of drainage network, 7.3% blockage of drainage network and 6.2% dumping of refuse in the drainage channel as seen in Table 3.

Table 3: Causes of Flooding in the study area

Causes of Flooding	Frequency	Percentage
An act of God	49	19.6
River overflow	127	51.8
Absence of drainage network	40	16.0
Blockage of drainage network	18	7.2
Dumping of refuse in drainage network	16	6.4
Total	250	100

Much as some have taken the extreme view that the Jalingo flood must have been caused by volcanic eruption, others have insisted that the flood was as a result of lack of drainages in the inner quarters of the state capital. Sa'adu Abubakar, a Jalingo resident, was of the view that: "Apart from Barde Way, Market Road and Water Board Road, there is no street or road that has drainages in the whole of Jalingo town, therefore, when it rains there are no channels for the water to flow away, in the end it causes flood," (Barde, 2005). Similarly,

Malam Gambo Ibrahim, a driver with the Taraba State Independent National Electoral Commission, whose house was one of those destroyed by the flood confirmed this.

In terms of frequency of flood occurrence in the study area, 42% of the respondents believed that flood occurs annually in their area of residence, while 31.5% believed that flood occur in their areas once in 5years, 15.9% said once in 3years and 10.5% once in two years as shown in Table 4.

Table 4: Frequency of Flooding in the study area

Frequency of Flooding	Frequency	Percentage
Once a year	105	42.0
Once in two years	27	10.8
Once in three years	40	16.0
Once in 5 years	78	31.2
Total	250	100

Many of the respondents lacked any perception of the frequency of severe floods. Most people associate flood to the annual flash flood while others make reference to the 2005 flood disaster in the study area. In terms of the time taken for the flood to last, 43.3% of the respondents believed that flood last for less than 4 hours, 5.2% between 5-9hours, 10.4% between 15-19hours, 15.8% between 20-24hours, while 20.1% and 5.2% believed that flood last for 2-3days and over 4 days respectively. This result illustrates the difficulties of lay people on dealing with natural random processes. Also about 67.6% of the respondents said that they have evacuated their houses and shops to flooding in the area while 32.4% have never evacuated their houses or shops to flood problems in the area. When asked on the duration of evacuation, the respondents gave different opinion as shown in Table 5.

Table 5: Duration of Evacuation from Houses/Shops as a Result of Flooding in the Study Area

Duration of Evacuation	Frequency	Percentage
Less than 2 hours	67	26.8
1 – 2 days	50	20.0
3 – 4 days	13	5.2
5 – 6 days	13	5.2
7 days and above	26	10.4
Not Applicable	81	32.4
Total	250	100

Response to the Problem of Flood in the Study

The government of Taraba State responded to the problem of flooding in the study area by donating food relief items such as rice, beans, gari, vegetable oil, salt, and sugar which were procured and distributed to the most affected families in three internally displaced persons (IDPs') camps of Lowcost Primary School Magami, Mafindi Primary School and Lamurde Primary School, Lamurde. The sufferings of the beneficiaries were alleviated from the 30 day food distribution in all three IDPs camps. The Taraba State Government also gave the affected people in the three camps N10,000 to rent an apartment anywhere in the State pending the allocation of land to the IDPs for rehabilitation and resettlement. This was

because schools were about to resume normal academic session on 26th September, 2005. The state government also gave land compensation to the flood plain inhabitants to enable them relocate to other places. Unfortunately, many people refuse to relocate after collecting the compensation money/new land, while others collected the compensation money/land and relocated after selling their plots to unsuspecting members of the public.

The government of Taraba State responded to the problem of flooding in the study area by embarking on a number of activities through its Ministries and agencies. For example, the State Government through the ministry of Environment and Urban Development used the electronic media in the state such as the Nigerian Television Authority (NTA), Taraba Television (TTV) and Taraba State Broadcasting Service (TSBS) to create awareness on the dangers of dumping waste/refuse into drainages in the study area. Casual labourers were employed to evacuate the waste/refuse dumped into the drainages to allow for free flow of water. The government has also embarked on annual tree planting exercise and awareness campaign to mobilise the residents in the study area on the importance of tree planting in checking flood hazard.

Non government organizations such as the Red Cross Society also helped immensely in assisting the flood victims. Operationally, more than fifty (50) volunteers were mobilized before and during the relief food distribution including the non-food relief items supported by the British Red Cross Small Scale Disaster Relief Fund which was initially used to support some 200 of the most affected families affected by the Jalingo Flood Disaster in Taraba State.

Individuals in the study area find it difficult to imagine a flood really occurring. This means that there perception of the probability of flooding is low. This is reflected in low scores for personal risk, frequency of flooding and feelings of fear. For example, many residents of the areas where flooding has occurred may claimed that they have experienced a flood, even when not all of them have actually suffered from water near or inside their house. Research has shown that more intense personal experiences such as suffering damage, results in elevated perceptions of risk (Windham *et al*, 1977, Perry and Lindell, 1990; Norris *et al* 1999; Riad *et al* 1999).

Conclusion

This study has examined the flood risk perception and response in the study area. The study findings show that although many of the floodplain occupants were aware of flooding before moving into the area, some were not. The study shows that many have evacuated their residence and shops to flooding in the past. Thus despite the relatively high level of flood perception in the study, individual's response to flooding by way of flood preventive and mitigative measures were very poor. Thus, despite suffering loses and damages in the past, many are not ready to vacate the area. To avert damages from flood disaster of any type in the future, this study recommends the need to educate those people living on the flood plain who are vulnerable about risk and hazard associated with continuous occupation of the area.

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