

Residents Coping Measures in Flood Prone Areas of Makurdi Town, Benue State

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Abstract The problem of flooding has come to stay and as a result, urban dwellers are devising ways in which they can cope with it. This study assesses the coping measures adopted by dwellers living in flood prone areas of Makurdi town. Data for this study were obtained from residents of the town living in flood prone areas. With the help of a well designed questionnaire, photographs and personal observation, information were gathered on socio-demographic status, causes and effect of flooding, and measures adopted by residents. A total of 338 respondents were sampled across the area. The data collected was analyzed using descriptive statistics. The study reveals that, the major cause of flooding in the area was heavy rainfall (33.7%), silting up of available drainage channels (20.3%), blocking of drainage with solid waste (16.7%) and building structures on water channels. The study also shows that, the major effect of flooding was loss of personal property (41.6%). Coping measures adopted include: frequent sand removal of blocked drainages (36.3%), creation of water channels (32.7%) and the use of sand banks (18.7%). Although, 56% of the respondents indicated that coping strategies adopted were not very effective. The study recommends a close working relationship between local people and agencies saddled with the responsibility of tackling the problem of flooding in the area.

Keywords: *flooding, coping measures, climate change, Makurdi town*

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1. Introduction

Flood disasters in Nigeria have taken a new dimension in recent time. There is increasing vulnerability of populations and infrastructure to flooding and flood related hazards. More communities are now been affected in the country. Flooding is among the most devastating natural hazards in the country claiming more lives and causing damage to property and infrastructure than any other natural phenomena [1]. The rate of spread, number of internally displaced persons and magnitude of losses counted in flood affected areas have attracted the attention of both government and nongovernmental organization.

It is now generally acknowledged that the effects of climate change will unduly increase the vulnerability of the urban settlers compared to rural dwellers. Studies of flooding in physical and built environment highlight several common features of poor urban population under risk [2]. Risks arising from areas vulnerable to flood incidence is as a result of inadequate basics infrastructure.

Floodplain encroachment has serious flood risk and damage especially urban floods due to poor planning process for socio-economic development on these floodplains. Mwape [3] asserted that urban encroachment on to floodplain alters the integration of surface runoff

with the main channel, increased surface runoff as a result of paved surface and poor drainage system. It has caused floodplain management a major concern worldwide, especially in this current rising trend of urban flooding. The situation is even more critical in cities of developing countries where there is poor control of land use practices and institutional mechanism to implement floodplain ordinances.

The frequency of flood is more common than ever due to climate change and all efforts to avert the incidence is constantly yielding less result. The problem has come to stay and as a result, urban dwellers are devising ways in which they can cope with the problem [2]. Previous studies on flood incidence focused on causes of flood, the effect of flood incidence and government control measures [4], [3] and [5]. But less work have been done on how local people are adopting several measures to live with the problem. Understanding measures adopted by urban dwellers in averting the effects of flooding through traditional knowledge will help environmental disaster management agencies in reducing the effects of flooding in the area.

In the next few years, flooding is likely to become more common and more intense in many areas especially in low-lying sites or in zones that currently experience high rainfall [6]. However, prediction of precise location for increased risk resulting from climate change is not feasible.

This is because, flood risk dynamics have multiple, social, technical and environmental drivers.

Globally, the economic cost of extreme weather and flood catastrophes is severe and if it rises as a result of climate change, it will hit poorest nations the hardest. From 1971 – 1995, floods affected more than 1.5 billion people, out of which 318,000 people were killed and more than 81 million left homeless.

Flooding affects more people on an annual basis than any other form of natural disaster. A variety of climatic and non-climatic processes influence flooding, resulting in river floods, flash floods, urban floods, sewer floods, lake outburst and coastal floods. Floods depend on precipitation intensity, volume, timing, drainage basin. It is an extreme naturally occurring event that results in an overflowing of large amount of surface water over land that is not always inundated. It is considered to be the worst natural disaster in the world and it is responsible for a third of all natural problem and half of damages on facilities around the globe. It has become one of the most frequent natural occurrences in the last few decades. Floods have cost damages to societies and the intensity/frequency of floods are increasing globally. It is gradually becoming a common phenomenon around the world, caused by increase in global temperatures that result in torrential rains and rise in sea level that overflowed their banks and flood surrounding lands [5]. In Nigeria, aside from droughts, floods cause almost 90 percent of damages resulting from natural hazards. Floods that occur in

Nigeria are as a result of extensive rainfall, drainage blockages and dam failures.

The floods were caused by poor drainage systems, ill-timed discharge of water from dams and the indiscriminate infrastructural development along river banks [7]. These days, flooding events are more rampant in urban cities in Nigeria than in the rural areas. It is fast becoming a serious environmental problem resulting in huge loss of lives, property and priceless arable land. Floods have rendered many people homeless and disrupted a lot of socio-economic activities in urban cities of the country [8].

In Makurdi town, flooding has become an annual event resulting to loss and destruction of properties worth millions of naira. Flooding has occurred in different parts of Makurdi town in 1996, 2000, 2005, 2007 and 2008. The latest flood and recent in Makurdi town is the one caused by the effect of dam failure from Cameroon where many residents of the town were rendered homeless and the properties worth millions of naira were destroyed, all the people living around the river banks were displaced [7]. Ayado [9] reported in Leadership newspaper that over 300 houses in Makurdi were flooded as a result of heavy downpour which destroyed properties and rendered many homeless. According to Ocheri and Okele [8] this also halted activities in some schools, churches and markets. Areas covered by the flood include Wadata, Idye, Atsusa, Wurukum, Akpehe, Logo1 and Logo 2, Ankpa Quarters extension, Nyiman and Gyado villa (Figure 1).

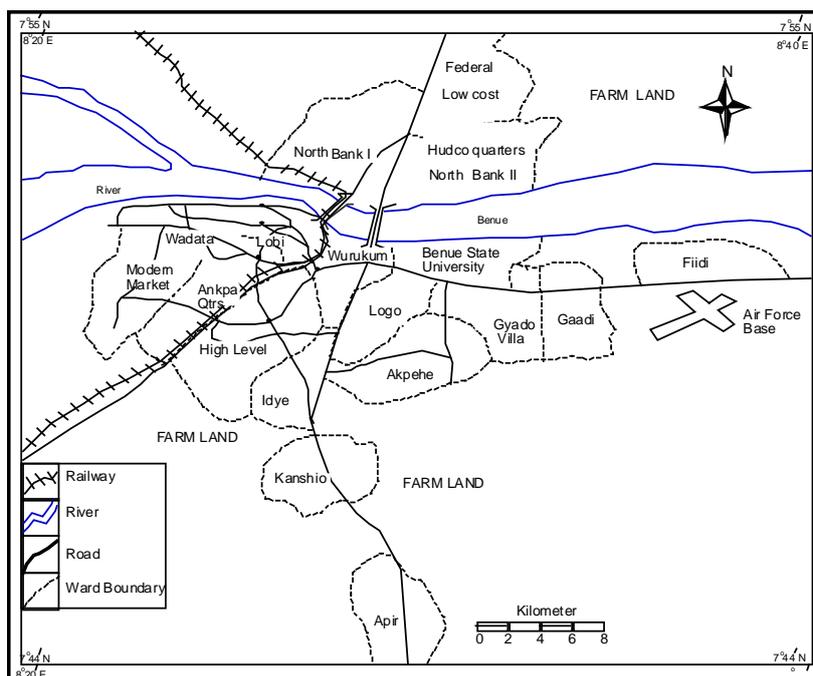


Figure 1. Map of Makurdi Town Showing The Study Areas (Source: Benue State Ministry for Lands and Survey, 2011)

2. Materials and Method

The data used in this study were collected from residents of Makurdi town living in flood prone areas. These areas include: Wurukum, Logo I and II, Gyado villa, Wadata, Atsusa, Idye and Nyiman. With the help of a well designed questionnaire, photographs, and field observation, information were gathered on socio-demographic status of people in this area, causes of flooding, effects of flooding and measures adopted by

residents of the town to avert the effect of flood incidence. Using Taro Yamine formula of determining sample size, a total of 338 respondents were sampled randomly across the study area. The data collected was analyzed using percentages and presented in tables for easy understanding.

2.1. Study Area

Makurdi town is located at Lat. $7^{\circ} 47'$ and $10^{\circ} 00'$ North and Long $6^{\circ} 25'$ and $8^{\circ} 8'$ East of the equator. It is bounded by Guma Local Government Area to the North,

Gwer Local Government to the South, Gwer-West Local Government Area to the South-West and Doma Local Government Area of Nasarawa State to the North-West (Figure 1). It is situated in the Benue Valley on the bank of river Benue. The town is strategically located on the North-South transportation network by road and by rail respectively, between Nasarawa and Enugu States with the total land area of about 810 square kilometer [10].

What is known as Makurdi today has been in existence since 1912. It started as a typical village composed of scattered Tiv compounds and Jukun fishermen settlement. With the advent of colonialism, Makurdi became a centre of river trade, a railway town and an administrative town. It became a provincial headquarters of Benue Province in 1927, when it was transferred from Abinsi. Following the Local Government reforms of 1970, Makurdi became the headquarters of Makurdi Division. In 1976, following the creation of Benue State out of the Benue Plateau, Makurdi doubles as the State headquarters (capital) as well as the headquarters of Makurdi Local Government Area. The rail road and the trunk 'A' road that connect the Eastern states to the North and the North-East making Makurdi a major cross road centre. Makurdi has a population of 226,198 a density of 323 persons per square kilometres as of 1991, the National Population Census data figures, has a population of 300, 377 with a density of over 400 persons per square kilometres as of the 2006 National population census data figures and the highest in the state [10,11].

3. Results and Discussion

3.1. Socio-demographic Characteristics of Respondents

Table 1. Socio-demographic Characteristics

Sex	Frequency	Percentage (%)
Male	217	72.4
Female	83	27.6
Ages	Frequency	Percentage (%)
0 – 19	24	8.1
20 – 29	119	39.6
30 – 39	103	34.5
40 – 49	45	14.9
50 +	8	2.9
Marital Status	Frequency	Percentage (%)
Single	149	49.8
Married	133	44.3
Widow	13	4.4
Divorced/separated	5	1.5
Occupation	Frequency	Percentage (%)
Civil servants	144	48.0
Businessmen/women	61	20.4
Students	93	30.9
Farmers	2	0.7
Education Qualification	Frequency	Percentage (%)
SSCE/GCE/FSLC	80	27.0
OND/NCE	150	50.0
First Degree/HND	50	17.0
Master Degree	20	6.0
PhD	0	0.0
Income (₦)	Frequency	Percentage (%)
Below ₦100,000	84	27.9
₦100,001 – ₦200,000	91	30.3
₦200,001 – ₦300,000	55	18.5
₦300,001 – ₦400,000	42	14.1
₦400,001 and above	28	9.2

Source: Fieldwork, 2012

The study analyzed the demographic characteristics of residents of makurdi town living in flood prone areas considering specific variables such as age, sex, marital status, and educational qualification. Out of the 338 number of questionnaire administered, 300 were completed and returned.

Table 1 shows that out of the three hundred resident of makurdi town sampled, 72.4% and 27.6% were male and female respectively. While, 39.6% and 34.5% were in the age groups of 20-29 and 30-39 years respectively. The respondents sampled were males and mostly youths who confirmed the frequent effect of flooding in the area. The results reveal that 49.8% of the respondents were single, 44.3% were married, while 4.4% and 1.5% of the respondents were widowed and divorced/ separated respectively. The study also shows that majority (48.8%) of the respondents earn between ₦100,000- ₦ 400,000 annually, with 50% of them having OND/NCE qualification. The implication is such that these households are capable of employing other livelihood options to cushion the impact of the floods.

3.2. Period of Flood Experience

The years of flood experience shows the adequacy of the knowledge of respondents concerning flood in their environment.

Table 2. Period of flood experience

Income (₦)	Frequency	Percentage (%)
1 – 5yrs	91	30.4
6 – 10 yrs	126	42.1
11 – 15 yrs	59	19.5
16 yrs and above	24	8.0
Total	300	100

Source: Fieldwork, 2012

Table 2 above shows that 91(30.4%) of the respondents have from 1-5 years of flood incidence experience, 126(42.1%) have from 6 – 10 years, 59(19.5%) have from 11 – 15 years while 24(8%) have 16 years and above of flood experience. This implies that majority of the respondents have reasonable flood incidence experience and should be able to keep track record of flood disaster and the coping measures adopted by them.

3.3. Causes of Flooding in Makurdi Town

A flood is caused by a combination of heavy rainfall causing drainage channels to over flow their banks. Its generally develop over a period of time, when there is too much rainwater to fit in the drainage channel and water spreads over the land next to it. However, they can happen very quickly when there is a lot of a heavy rainfall over a short period of time.

Table 3. Causes of flooding in Makurdi town

Causes	Respondents	Percentage (%)
Heavy rainfall	101	33.7
Poor drainage system	12	4.0
Building on water channels	48	16.0
Blocking of drainage with solid waste	50	16.7
Over flow of river Benue	28	9.3
Silting up of available drainage system	61	20.3
Total	300	100

Source: Fieldwork, 2012

Table 3 above shows that majority (33.7%) of the respondents asserted that heavy rainfall was the major cause of flooding in the area, followed by silting up of available drainage system and blocking of drainage with solid waste representing 20.3% and 16.7% of the respondents respectively. Another major cause of flooding in Makurdi town is building structures on water channels. This shows that apart from rainfall, majority of the causes of flooding in Makurdi town are as a result man's interference with the environment.

3.4. Effects of Flooding in Makurdi Town

Flooding can be very dangerous. Only 15cms of fast-flooding water are needed to knock you of your feet. Floodwater can seriously disrupt public and personal transport by cutting of roads and communication links when telephone lives are damaged. Floods disrupt normal drainage system in cities, and sewage spills are common, which represents a serious health hazard, along with standing water and wet materials in home (Figure 2). Bacteria mould and viruses, causes disease, trigger

allergic reactions, and continue to damage material long after a flood.

Effects	Respondents	Percentage (%)
Destruction of housing facilities	50	16.7
Destruction of road network	23	7.7
Loss of lives/personal property	125	41.6
Breeding ground for pest and diseases	60	20.0
Accidental release of toxic materials	13	4.3
Inundation of some areas	29	9.7
Total	300	100

Source: Fieldwork, 2012

Table 4 above shows that, loss of lives/personal property is the major (41.6%) effect of flooding in the area, followed by stagnant flood water (Figure 3) serving breeding ground for pest and disease representing 20% of the respondents. Also, in flood incidents, housing facilities are destroyed. This implies that, effects of flooding goes beyond when the flood waters.



Figure 2. Flood waters in Makurdi town



Figure 3. Stagnant flood water

3.5. Coping Strategies/Measures

The survey established that sampled household employed a range of coping strategies due to floods. The most important coping measures were creation of water channels and frequent (Figure 4) sand removal of blocked

drainages in the area represented by 32.7% and 36.3% of the respondents coping measure respectively. The use of sand banks is the third most important coping measure of resident of Makurdi town (Figure 6) represented by 18.7% (Table 5).



Figure 4. Created water channels



Figure 5. Sand filled Sack



Figure 6. Sand banks used in Makurdi town

Table 5. Coping measures adopted by residents

Coping measures	Respondents	Percentage (%)
Creation of water channels	98	32.7
Use of sand banks	56	18.7
Sand fill sacks	28	9.3
Frequent removal sand of block drainages	109	36.3
Fumigation of stagnant flood waters	05	1.7
Face-to-face awareness of flooding	04	1.3
Total	300	100

Source: Fieldwork, 2012

The research showed that residents of Makurdi town had diverse coping options. Although, of the 300 sampled respondents, 56% indicate that coping strategies adopted were not very effective. The survey established that households whose coping strategies were shifting to higher grounds and making sand banks had better income generating activities. The implication is such that these households would employ other livelihood options to cushion the impact of the floods.

4. Conclusion

Flooding affects more people on an annual basis than any other form of natural disaster. Its frequency and intensity has continued to increase every year. Urban dwellers of Makurdi town are devising ways in which they can cope with the problem. Coping measures adopted include: frequency removal of sand in blocked drainages, creation of water channels and the use of sand banks, use of sand filled sacks and fumigation of stagnant flood water. Although, there is every indication that coping measures adopted were not very effective. The study recommends a preventive and sustainable flood management options.

That is, there should be a close and working relationship between local people and agencies saddled with the responsibility of tackling the problem of flooding in the area.

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