



Original Research Paper

Effects of flood disasters on livelihood coping mechanism in Tolon/Kumbungu district of northern region of Ghana

Accepted 4 November, 2013

**Musah^{1*}, B. A. N.,
and
Akai,² C. Y.**

¹Ministry of Food and
Agriculture,
P. O. Box 14
Tamale, Ghana.

²Ministry of Food Agriculture,
Ghana.

*Corresponding Author
E-mail: putubabam@yahoo.com
Tel: +233(0)244738688/
+233(0)203050111

This research examines effects of livelihood coping mechanism in Tolon/Kumbungu District. The results of the analysis showed that flood occur on yearly-basis which affected farming, the main livelihood activity. Floods wreaked havoc on short to medium and long term livelihoods of the inhabitants. The short-term effect of floods included destruction of farmlands, soil erosion and pollution of drinking water and fisheries resources. In the medium-term, flood has its toll on food reserves in households which stretched hunger period from two to six months. The long-term effects of flood disaster include soil fertility which led to a bigger threat in food security within households in the district with a consequential effect on the Northern Region as a whole. With the absence of activities or weak alternative coping livelihood mechanisms to floods by households has led to the over reliance on support. Chi square test used to analyze the data on livelihood coping mechanism before and after flooding showed significance level or relationship of 0.001. The findings further showed that majority of household heads are male-dominated. This confirms what is believe in Muslim societies which happen to be the dominant religion in the study area. The District assembly in consultation with NADMO and MOFA should prepare and implement a disaster response plan for effective management of flood in the district. Ultimately, flood plain mapping and movement of victims from flood prone areas should be considered as a long term solution.

Key words: Floods, disasters, livelihoods, effects, coping mechanism, Tolon/Kumbungu, northern region and Ghana

INTRODUCTION

Among all the natural hazards to which humans are exposed, floods are most wide-spread and account for most damages and loss of life. Aside their frequent occurrences they are devastating and costly in terms of their devastating effects on the lives of the victims and human settlements. The inability to predict floods is one major challenge faced by most countries worldwide. It is estimated that 1.6 million deaths occur globally in a year due to the inability of flood-prone countries to address floods challenges (Green and Penning- Row sell, 1989).

Despite significant achievements in science and technology and success stories on environmental management in the 20th century, people still continue to

suffer the consequences of climatic hazards worldwide. Floods have always been a primary issue of concern for human populations. Severe floods damage settlements, transport networks, and arable land. Although devastating droughts are harmful primarily for agriculture and terrestrial ecosystems, they can also lead to local water supply shortages.

Economic losses from flood catastrophes have increased ten-fold over the past 50 years, partially as a result of climate change. However, the complexity of climate change is that, it is not only seen in more intense rains, stronger storms and shift in rainfall seasons but also longer dry seasons and rising sea levels (Eisenreich, 2005).

In Ghana, floods are among the most frequent and devastating natural disasters that affect the livelihood of the people. According to the National Disaster Management Organisation (NADMO), Government and other stakeholders like Non-Governmental Organisations (NGOs) over the years have provided some kind of relief services to flood victims. Flooding in the country occur mostly during the rainy seasons in the months of May, June, July and August. Floods of various magnitudes hit some of the cities and its surroundings in the country. In the southern part of the country, Accra is one of the most hit areas in terms of flooding with devastating consequences. This is evidenced by the several years such as in 1959, 1963, 1968, 1973, 1986, 1991, 1995, 1997, 2001, 2010 and 2012 that Accra experienced serious floods (NADMO, 2012).

Agriculture is the main occupation of rural communities in Northern Ghana and also an important source of livelihoods. In Africa, about 70 per cent of the population resides and earn their living in rural communities, 40 per cent of all exports earnings come from agriculture, and about one-third of the national income is generated by agriculture. Yet, it remains one of the most vulnerable sectors to climate change in terms of decline in agricultural production and uncertain climate that significantly affect food security. The most vulnerable or the poorest people of society in Africa are those who depend on rain-fed subsistence agriculture for food, jobs and income, and hence the most vulnerable to climate changes (Frederick, A. David O. Genesis T. Justice O. and Ernest K. A. Afrifa, 2010).

In Northern Ghana, Tolon/Kumbungu is one of the flood prone Districts with yearly loss of property, farmlands and lives. Therefore, a study was carried out to investigate the extent of dangers caused by floods and findings use to advice on disaster preparedness. The study concentrated on communities along the White Volta basin in the Tolon/Kumbungu District of Northern Region of Ghana which sometimes receive excessive rainfall coupled with the occasional spillage of excess water upstream from the Bagre Dam in Burkina Faso to the north of Ghana that often result in flooding. The adverse effect of this has caused death to humans and animals as well as destruction of agricultural crops. Such floods also affect some amenities such as residential and farm buildings, bridges, schools and dispensaries, potable water and irrigation facilities as well as food storage and processing facilities. Floods are common in the District, Ghana and coupled with the combined effects of prolong droughts, abnormal torrential rains and spillage of the Bagre Dam in Burkina Faso, local coping strategies are required to reduce the shocks. This has been confirmed by the report by (NADMO, 2012) which elicits the magnitude of their effect.

Local people in the communities have always developed their own ways and means to deal with floods. The measures and techniques employed are local specific, require no external help or support and are inherently scientific. These have helped to shape the lifestyles of the

people in the communities and have also strengthened their adaptive capabilities. This is reflected in the measures adopted by the local communities that are extremely important in dealing with problems of floods, water-logging conditions and climate change effects. Government and development organizations the world over, have tried to deal with flood situations in their countries, but their initiatives have always been short term and more of resettling victims after flood incidences. As a result, there have been no long-term solutions to the flood victim's nor have such initiatives had a positive impact on the flood victim's coping mechanisms and capacities (Brahmi and Poupouh, 2002).

Coping mechanism framework for sustainable livelihood

This coping mechanism framework for sustainable livelihood shows the linkages flood disasters have with livelihood outcomes as a form of coping mechanism. The framework presents the main factors that affect flood victims during floods and typical relationships. When flood disaster occurs, the people in the affected area are vulnerable and subjected to its effects. The vulnerability impacts on livelihood assets are in turn influenced by the livelihood coping strategies as well as governmental/or other institutional policies and mitigating actions. Flood disaster can trigger the intervention of government agencies or /other non-governmental organisations, private institutions and livelihood coping strategies directly. If the intervention occurs early enough, it minimises the effects of flooding on the livelihood assets and can lead to a better livelihood outcome. The livelihood assets can be described as human, social, physical, financial and natural. Figure 1 provides detailed description of the individual components. These are linkages between the sustainable livelihood assets. (Human, Social, Natural, Physical Financial assets) and how they are affected during flood disaster. Labour which is a fundamental human resource is usually affected due to displacement of people and the outbreak of diseases. The social network among the people is usually broken due to the displacement of the people. Natural assets like farm lands from which the people derive their livelihoods are normally affected. Infrastructure, such as housing, schools, markets, food stuff trading and other commercial activities are all affected during and after the flood disaster. A major concern however, is that all these livelihood outcome categories should be given the due consideration after the flood disaster. Although often viewed as a donor objective, it is of course shared by many who recognise the long-term benefits of prudent resource use (DFID, 1999).

MATERIALS AND METHODS

Tolon/Kumbungu District was among the forty-five (45)

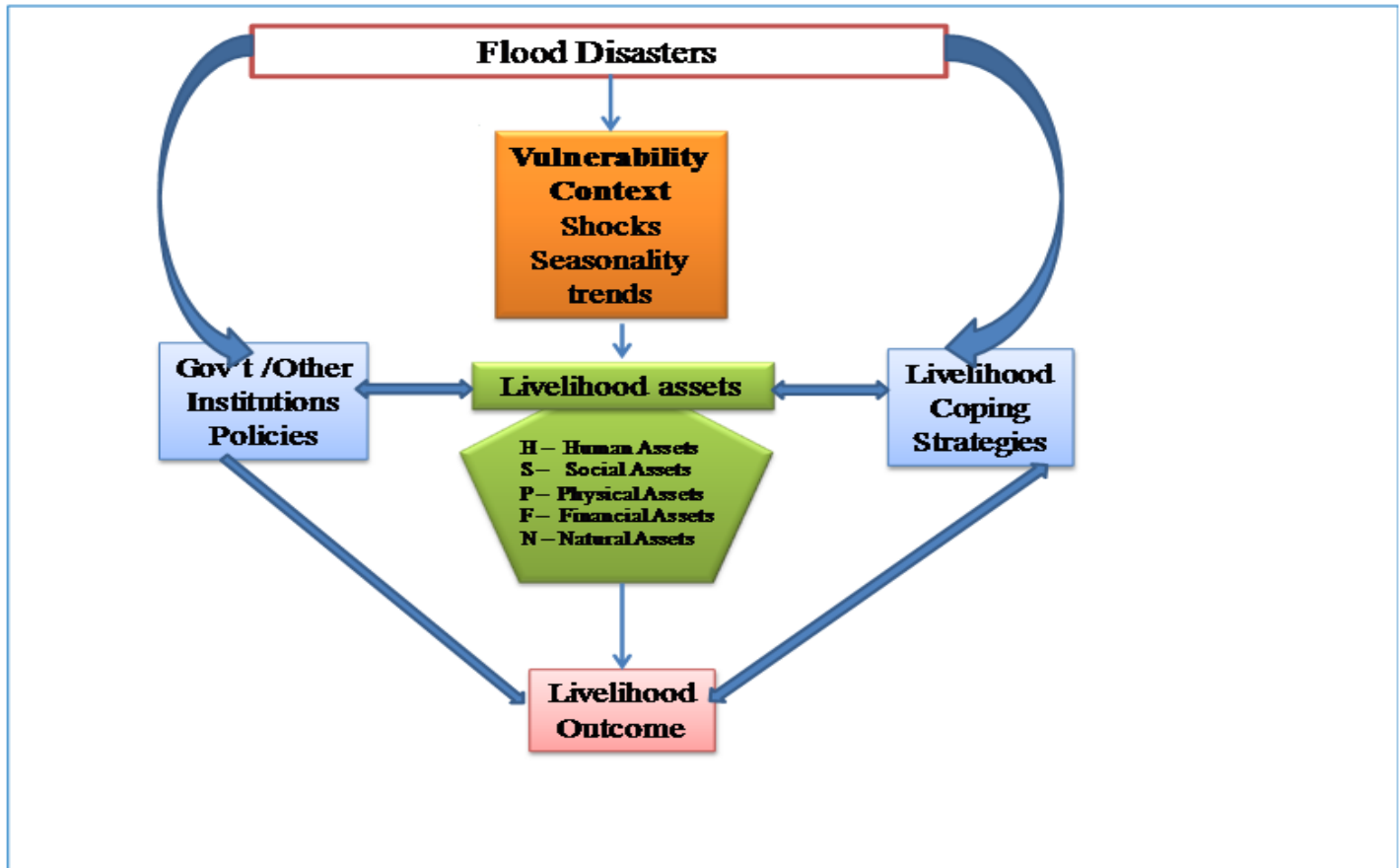


Figure 1: Coping mechanism framework for sustainable livelihood

districts created by the Provisional National Defence Council (PNDC) Law 207 in 1988 with Tolon as its Capital. The people of the district are predominantly Dagombas with few migrants of Gonjas and Bato along the White Volta. The people are mostly Muslims but others practice traditional and Christian religions. Tolon/Kumbungu District has two (2) Town Councils (Tolon and Kumbungu), ten (10) Area Councils and fifty-six (56) Unit Committees. The district has two constituencies of Tolon and Kumbungu. It lies on latitudes 90° - 201° North and longitude 10°-50° west (Tolon/Kumbungu District Profile and Poverty Mapping, 2005). Figure 2

The study area experiences single rainy season from April/May to September/October with a peak season in July/August. The district records a mean annual rainfall of 1,100 mm. Staple food crops farming is highly restricted by the short rainfall duration. The dry season starts from November to March with day temperatures ranging from 33 °C to 39 °C while mean night temperature range from 20 °C to 26 °C. The mean annual day sunshine is approximately 7.5 hours. The high daily temperatures make it possible to exploit and harness an economically sustainable solar energy for natural drying of agricultural produce (Tolon/Kumbungu District Profile and Poverty

Mapping, 2005). By a statistical formula, a sample size of 111 from a population of 2,501 in the six selected communities was determined with an error margin of 0.095 at a confidence level of 90.5%, as shown in Table 1. The sample size calculation and distribution are shown below: $n = \frac{N}{1+N(e)^2}$ Where n = sample size; N = sample frame and e = error margin (About Surveys, 2008) <http://www.aboutsurveys.com/determining-a-proper-sample-size/>. $N = 2,501$ (e) = 0.095; therefore: $n = \frac{2,501}{2,501+1(0.095)^2} = 110.759 \approx 111$. The target population for the study was the households with the household heads being the sampling units of the study. Proportional sampling was used to determine the sample size per community. This was used for the purpose of achieving equity in representation (Sarantakos, 1997). Simple random sampling was then used to select the respondents for the study. This technique was used to ensure that every household head stood the chance of being selected. The target population for the study was the households with the household heads being the sampling units of the study. Proportional sampling was used to determine the sample size per community. This was used for the purpose of achieving equity in representation.

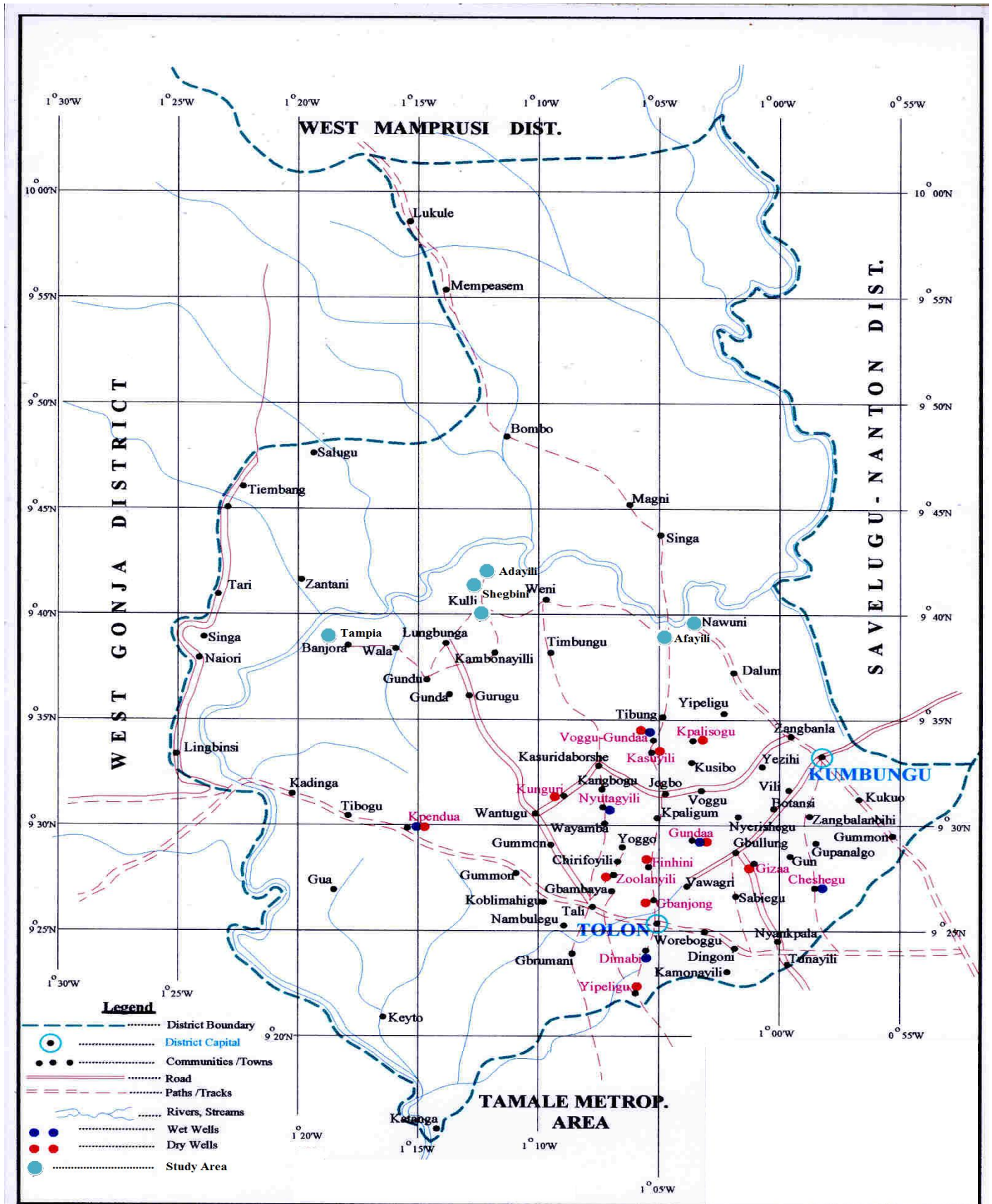


Figure 2: The Study Area

Table 1: Population and Sample Size

No.	Community	Population (N)	Sample size(N)
1.	Afayili	348	17
2.	Adayili	86	4
3.	Nawuni	642	31
4.	Kuli	1,083	52
5.	Tampia No. 1 and No.2	235	11
6.	Sheegbuni	107	5
Total		2,501	120

Source: Tolon/Kubungu district health population survey, Northern Region, Ghana, 2010

Simple random sampling was then used to select the respondents for the study.

The study employed both quantitative and qualitative methods of data collection. The quantitative approach was used to satisfy the objective of the study. One advantage of the quantitative approach is the ease and speed with which research is conducted and also its wide coverage of a range of situation (Amaratunga et al., 2002). Data about this study was collected through questionnaires which were administered to the household head. Both open ended and close ended questions were used in this method. The close-ended questions aided respondents to give specific and direct answers to questions asked. Open-ended questions allowed the respondents to provide detail information.

On the other hand interview schedules were used to collect data from the institutions such as National Disaster Management Organisation (NADMO), District Assembly, Ministry of Food and Agriculture (MoFA), Ghana Health Service (GHS) and Non-Governmental Organisations (NGOs) in the Tolon/Kumbungu district.

Several field trips to the study area were undertaken to make direct observations on some effects of the flood disaster in the communities. Special attention was paid to submerged farm lands, destroyed houses, food stuff, and the coping mechanisms. These factors were used in the assessment of their effects on the lives of the people in the study area.

RESULTS AND DISCUSSION

The study area has male-dominated household heads. The study revealed that out of 120 respondents, majority (92.5%) households are headed by males while few (7.5%) are headed by females. This supports the general belief that in Northern Ghana, households are predominantly headed by men except in some few cases where the household heads are females. The studies showed that majority (79.2%) of the people in the study area are farmers, suggesting that farming is the main occupation of the people. The study indicated that numeracy and literacy in the area are very low. This is deduced from the fact that majority of those interviewed had no formal education

(82.5%). On age distribution, the active age group (35-49 years) is the majority (54.2%), followed by 25.8% of the elderly (50-60 years) with fewer adolescent members of the communities (20.0%). This implies that good agriculture and disaster management programmes in the communities could tremendously improve the livelihood of the people.

Effects of floods on the livelihood of the people

Figure 3 shows the effect of flooding on households in the study area. Three parameters were taken into consideration; loss of food stuff, loss of human life and loss of other property (cooking utensils, clothing and household items). The results show that out of 120 respondents 59.2% lost almost all their food reserves during floods leading to hunger. The result revealed that 29.2% lost their property (household utensils and clothing) whilst 11.6% lost their livestock. The loss of personal property, livestock, food reserves and their effects confirms the documentation by LeDuc (2006) that disasters have massive human and economic costs. It further indicated that floods may cause deaths, severe injuries and food shortages. It was added that injuries and deaths occur during the time of impact, whereas disease outbreaks and food shortages often arise much later, depending on the nature and duration of the disaster.

Effects of floods on the environment

The result of the effects of floods on the environment is shown in Table 2. The results indicate that floods destroy farmlands, cause erosion, wash soil nutrients away and pollute water bodies in the study area. The results show that destruction of farmlands by floods was ranked highest (38.3%) followed by soil erosion (21.7%) while washing of soil nutrients was ranked least at 17.5%. The result further indicated that 13.3% of the respondents think flood cause pollution of water bodies whereas very few people (9.2%) think flood creates health problems.

From the above, it is evident that floods in the study area have posed a lot of problems for the inhabitants. These problems range from loss of personal effects, destruction of

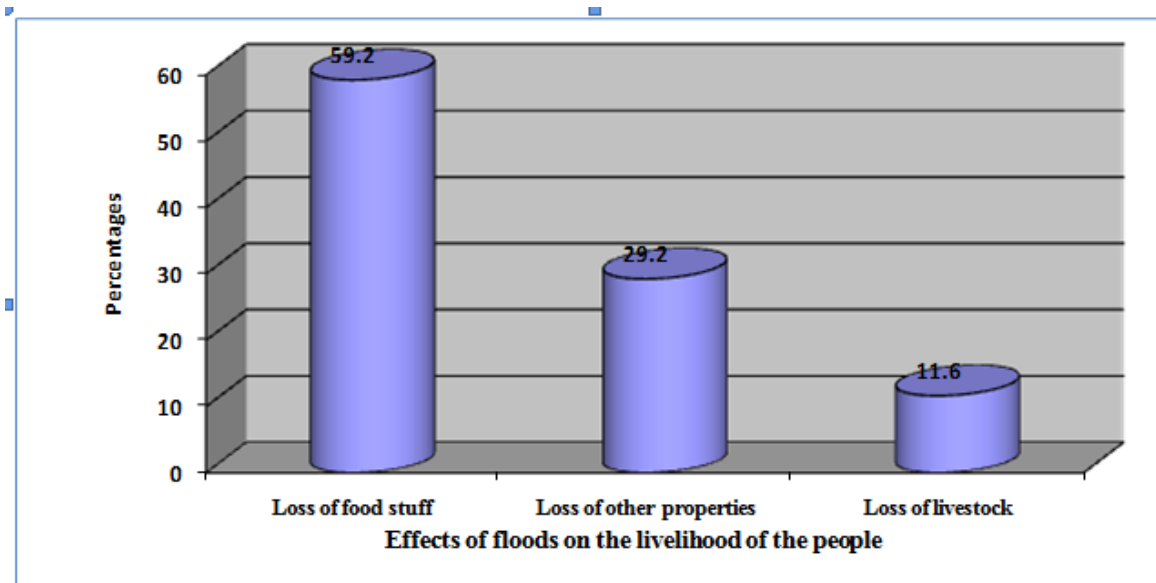


Figure 3: Effects of Floods on the Livelihood of the People
Source: Field Survey 2012

Table 2: Effects of Floods on the Environment

Responses	Frequency	Percentage
Destruction of farm land	46	38.3
Creation of erosion	26	21.7
Wash away of soil nutrients	21	17.5
Polluting of water bodies	16	13.3
Others	11	9.2
Total	120	100.0

Source: Field Survey 2012

food stuff and food resources, death of livestock, destruction of the environment including health problems such as malaria, diarrhoea and cholera. This is captured in the conceptual framework: sustainable livelihood coping mechanism framework which discussed the natural assets; like farmland, water bodies, nutrients cycling, forest reserves, economic trees and the biodiversity as a whole that the communities derive their livelihoods which are often affected during flood disaster.

Livelihood coping mechanisms in the study area

This section looks at the different types of livelihood coping mechanisms employed by the communities in the aftermath of flood disaster. These include: fish mongering, petty trading, zana mat weaving, thatch weaving for local roofing, twine weaving, fishing, exchange of labour for food, contracting loans from social contacts, trading in livestock. The chi square test (Table 3) shows high levels of coping before and after flooding. This indicates the lack of moderating measures by vulnerable communities making

them highly reliant on support from friends, relatives, District Assemblies, NGOs and the Government. The form of support however varied from provision of temporal accommodation by friends and relatives to provision of relief materials such as used clothing, food stuffs, household utensils, mattresses, roofing sheets and medicine.

Type of livelihood activities

The results show that most (67.5%) of the communities members engage themselves in fishing. Twenty per cent (20.0%) said they engage themselves in other activities like basket weaving, zana mat weaving, thatch weaving for roofing and twines weaving to generate income whilst 5.8% and 6.7% engage themselves in petty trading and no income generating activities respectively. The data showed that fishing is the number one coping mechanism in the event of flood disasters and emphasised the important contribution that fishing makes regarding the livelihood of the household of the communities during and after the floods. The findings presuppose that petty trading is

Table 3: Test Statistics for Livelihood Coping Mechanism before and after Floods in the Study

	Coping Mechanism before Floods	Coping Mechanism after Floods
Chi-Square	54.576 ^a	32.857 ^b
Df	3	3
Asymp. Sig.	.001	.001

Source: Field Survey 2012

Table 4. Livelihood Coping Mechanisms in the Study Area

Type of Livelihood Activities

Responses	Frequency	Percentage
Fish mongering	81	67.5
Petty trading	7	5.8
Others	24	20.0
None	8	6.7
Total	120	100.0

Type of Assistance

Responses	Frequency	Percentage
Food	59	49.2
Accommodation	52	43.3
Clothing	9	7.5
Total	120	100.0

Support from Government and Other Partners

Responses	Frequency	Percentage
Yes	102	85.0
No	18	15.0
Total	120	100

Source: Field Survey 2012

generally not the main livelihood activity of the people in the flood prone areas of Tolon/Kumbungu District. The 6.7% of respondents who said they did nothing to generate income to cope with the situation suggests that the effect of floods had always been devastating leaving them to survive on charity and aid. This is revealed by the financial assets of the conceptual framework (Figure 2). Figure 2 further emphasized that coping strategies adopted among the people were petty trading; buying and selling of agricultural produce, sale of livestock and fish farming are usually adopted as a livelihood strategy during and after flood disasters.

Type of assistance

The results show that victims of flood receive help from different sources. Many respondents (49.2%) indicated they received assistance from friends and relations in the

form of food. This is closely followed by those who get assistance in the form of accommodation (43.3%). Only 7.5% indicated that they receive clothing as assistance from their colleagues. From this analysis, food might have been considered the most needed factor followed by accommodation and clothing for human survival in times of flood disaster. This supports the general human needs ranking (Table 4) which puts food first, followed by shelter and thirdly clothing. It may also mean that food items are always the worst affected when the flood disaster occurred. This is probably true since floods most often than not destroyed farmlands as indicated by the respondents (Table 2).

Support from government and other partners

The dominant supporter to floods victims has been the Government. From the results, majority (85.0%) of the

respondents acknowledged receipt of support from Government whereas few (15.0%) did not receive any support from Government and other organizations. The supports are often in the form of food stuffs, used clothing, mattresses, blankets, cement, roofing sheets, roofing wood and some medicine. The work further shows that NADMO since 2007 have often warned the communities of imminent floods. From the above, flood disaster victims do not only receive aids from friends and relations, but also from Government and other organizations. It can be deduced from the many sources of support that the magnitude of these floods can be very high. It therefore means that emphasis should rest on preventive rather than corrective measures in order to effectively mitigate flood disasters in these vulnerable communities. NADMO and the District Assembly are the main relief sources. They should do more in mitigating the effects of flood and other natural disasters.

Conclusion

From the research findings, it is conclusive that the study area has male-dominated household heads. The findings support the belief that in northern Ghana, households are mainly headed by men. The respondents adopted some form of coping mechanism to reduce the effects of the flooding in their area. These include: fishing and fish mongering, petty trading, exchange of labour for food, trading in livestock, premature harvesting of crops, weaving basket, mat and thatch, dependence on food from previous cropping seasons, assistance from friends, relatives, government institutions and Non-Governmental organisations.

REFERENCES

- About Surveys (2008). Determination of a proper sample size. <http://www.aboutsurveys.com/determining-a-proper-sample-size/>
- Brahmi A, Pounphone K (2002). Study on Local Coping Mechanisms in Disaster Management. Lao.
- DFID (1999). Sustainable Livelihood Guidance Sheet. London, UK.
- District Poverty Profile Mapping (2005). Tolon/Kumbungu District, N/R.
- Eisenreich SJ (2005). Climate change and the European water dimension. European Commission-Joint Research Centre, Ispra, Italy.
- Frederick A, David O, Genesis T, Justice O, Ernest KAA (2010). Impact of Floods on Livelihoods and Vulnerability of Natural Resource Dependent Communities in Northern Ghana University of Cape Coast, Cape Coast, Ghana.
- Ghana Health Services (GHS) (2010). Tolon/Kubungu district health population survey, Northern Region, Ghana.
- Ghana Statistical Service (2000). Population and Housing Census. Summary Report of Final Results, Ghana Statistical Service: Tamale, Ghana.
- Green CH, Penning-Rowsell EC (1989). Flooding and the Quantification of 'Intangibles'. *Water Environ. J.* 3(1): 27-30.
- LeDuc A (2006). *The Disaster Cycle*. Eugene: Oregon Natural Hazards Workgroup. Oregon, USA.
- NADMO (2012). National Disaster Management Assessment Report, 2012.
- Sarantakos S (1997). *Social Research- 2nd Edition*, Pargrave Publishers, New York, N.Y. 10010.

Cite this article as: Musah BAN, Akai CY (2014). Effects of flood disasters on livelihood coping mechanism in Tolon/Kumbungu district of northern region of Ghana. *Int. J. Agric. Pol. Res.* 2(1):033-040.