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AN ASSESSMENT OF FLOOD SHOCKING TEARS DOWN: A CASE STUDY IN BOGURA DISTRICT

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ABSTRACT

This study was conducted on two chars of Bogura district using primary data and aims at understanding of how flood affects the rural poor living in the char lands. The study revealed that floods have long-term negative implications on socio-economic status. According to survey the most affected sector was agriculture (54.03%), followed by property (28.66%) and health (19.71%), diseases as Diarrhea occurred at alarming levels (76.07%) in the study areas. In the study year food availability and roads communications were also highly affected by flood. Floods make people vulnerable; as they take away their livelihoods at the first instance and leave them with little resources to overcome from the situation. Because of floods, rural poor communities face job loss, and two-thirds of their income is reduced, which limits their capabilities of preparedness, response, and recovery to subsequent floods. People cope with the situation by bearing substantial debts and a loss of productive assets. It also examines the impacts of flood on the livelihood of the rural poor and explores their coping strategies and also observes it as a positive ingredient for fertility and soil improvement. However the present study captures both positive and negative.

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INTRODUCTION

Flood is a common natural disaster in Bangladesh which every year imposes a heavy loss to the people living on the bank of the rivers economically as well as socially. Flood makes an enormous impact on the environment and society. Floods destroy drainage systems in cities, causing raw sewage to spill out into bodies of water. This can lead to catastrophic effects on the environment as many toxic materials such as paint, pesticide and gasoline can be released into the rivers, lakes, bays, and ocean, killing maritime life. Bangladesh is situated between the foothills of the Himalayas and the Bay of Bengal. Approximately 60% of the country's land mass is less than 6 m above the mean sea level. Further, Bangladesh is located in a low-lying river delta with three major river basins of South Asia, namely Ganges, Brahmaputra, and Meghna (GBM). These sorts of floods would cause substantial damage to agriculture, housing and settlements, and infrastructure. Therefore, lives and livelihood would be more vulnerable in such a changing climate. Floods in 1987, 1988, 1998, 2004, 2007, and 2010 all denote changes in the nature and extent in floods and eventually induced severe impacts on lives and livelihood, especially those who live in rural areas. Through empirical study, this research will examine not only the impacts of flood on the livelihood of the rural poor but also scrutinize their coping strategies in the course of floods. This research will rely on intensive field investigation, where sampling will be taken from different villages that were the most badly affected by previous floods. Every year in Bangladesh, 30%–70% of the landmass is flooded, especially the riverside areas. The River Jamuna runs by the east side of Sariakandi Upazila. Flood is severe in the study area, as the two main rivers, namely the Jamuna and the Bangali River that flows in a wide by the west side of Sariakandi Upazila. During monsoon and sometimes post-monsoon season, floodwater spills from the rivers and accumulates in the low-lying areas. Heavy and incessant rainfall in the upper catchments of the Rivers increases the discharge and forces the river to exceed its drainage capacity, and flood eventually occurs. Sariakandi Upazila is vulnerable to several natural hazards such as flood, riverbank erosion, drought, and tropical storm. However, flood is considered the most crucial. Almost every year, it is adversely affected by flood. People of Sariakandi struggle with flood their whole lives. In spite of this, their livelihood is directly and indirectly dependent on rivers and floods. These long-lasting high water level floods caused substantial damage to agricultural production, homesteads, and the means of livelihood, especially for the poor. The people in this area have generally had the strength to cope. However, often due to different limitations and poverty, coping mechanisms of the poor have not been effective; all previous floods have rendered the poor more vulnerable. Among the different aspects of livelihood, this study will be focused on the flood-related impacts and coping mechanisms related to incomes and occupations of the rural poor. Here, the term "coping mechanisms" describes the approaches people employ to deal successfully with crisis. Among natural catastrophes, flooding has claimed more lives than any other single natural hazard. In the decade 1986 to 1995, flooding accounted for 31% of the global economic loss from natural catastrophes and 55% of the casualties.

Borrows and De Bruin, 2006 remarked that, the damaging effects of flooding are likely to become more frequent, more prevalent and more serious in the future specially in developing countries. According to Carey, 2005 & Bankoff, 2003 human populations worldwide are vulnerable to natural disasters. Water related events such as floods have been a major concern since the dawn of human civilization. They continue to hit every generation of human beings, bringing suffering and death as well as immense and still growing, material losses. Kundzewicz *et al.*, 2002 observed that the hazards tend to hit communities in developing countries, increasing their vulnerability and setting back their economic and social growth, sometimes by decades. The floods have led to loss of human life, destruction of social and economic infrastructure and degradation of already fragile ecosystems and social structures. Lind *et al.*, 2008 & Gao *et al.*, 2007 opined that, the loss in case of flooding has many dimensions. In addition to economic loss and loss of life and injury, there may be irreversible loss of land, of historical and cultural valuables and loss of nature or ecological valuables.

Vulnerability is not increased for poverty, but also the poor tend to be the most vulnerable due to their lack of choices. Poverty does not equal vulnerability but being poor makes people more vulnerable to disasters because poor people have lack of resources (physical, social and knowledge based) to prepare them for and respond to such threats and shocks as natural hazards. Poor people often get locked in a cycle of vulnerability. Over half of the world's poor live in rural areas. Poverty worsens when natural hazards destroy vital rural infrastructure. Asia is struck by 70% of all floods in the world and the average annual cost of floods over the past decade is approximately 15 Billion USD. Economic losses and impacts have remained high and constitute a large developmental burden (Hanson, *et al.*, 2007 & Khandhela *et al.*, 2006). According to Brouwer, *et al.*, 2007 Bangladesh is a highly flood prone country. Eighty (80) percent of the country consists of floodplains and several other minor rivers. These floodplains sustain a predominantly poor rural population. Once every ten (10) years roughly one-third of the country gets severely affected by floods while in catastrophic years such as 1988,

1998 and 2004, more than 60% of the country was inundated. Floods caused social disruptions and resulted in scarcity of drinking water as surface water got contaminated. Rashid, 2000 observed that, the 1998 flood that hit Bangladesh as the worst in the last century. Almost two-thirds of the country was submerged under water and millions were affected. A total of 33 million people were marooned of whom 18 million needed emergency food and health services in 52 districts. The floods continued for more than 65 days. Those floods destroyed basic infrastructure like roads and bridges as well as houses, crops, animals and cattle. The most damaging aspect of the flood was the destruction of people's means of livelihood. The response to the floods included distribution of food, medicine and clothing for the poor. From above discussion, it is clear that the increasing population of our planet is leading to the increasing exposure of people and property to hazards of flooding and the documentation of longer-term flood impacts on communities especially on its socio-economic sector.

METHODOLOGY

This cross sectional narrative study was carried out in the selected villages under Sariakandi Upazila of Bogura district. A door to door survey was conducted among the villagers to find out the sample group of this study. The survey was carried out for finding out the affected populations in flood and river bank erosion of the village. People, whom we got by during a survey, were the samples of this study. The sample selection procedure of this study was purposive. The survey has been conducted through a simple self-developed questionnaire. Two sets of data were used in this study namely primary data and secondary data. Primary data were generated through sample survey. Considering the time and resource constraints 60 farm households from each village (total 120 households) was selected. The selected farms were surveyed after the flood season of 2019. Secondary data would also be used to supplement the analysis. In this respect, data from different statistical documents published under Bangladesh Bureau of Statistics, Bangladesh Water Development Board (BWDB), Different local NGO's, published scientific papers, books and research working papers would also be used as sources of secondary data in this study.

RESULTS AND DISCUSSION

Causes of Flooding

Sariakandi Upazila has a total area of 408.50 square kilometers (157.72 sq mi). About three-fifths is land and two-fifths is water, chiefly the Jamuna River, which flows south through the upazila. About 50,000 people are marooned in Sariakandi of Bogura as water level of the Jamuna River kept on rising due to heavy rainfall and onrush of water from the upstream.

Flood is severe in the study area, as the two main rivers, namely the Jamuna and the Bangali are surrounded by it. The River Jamuna is characterized by fine sandy bottoms, flat slopes and substantial roundabout. Its bank is susceptible to erosion and the channel shifts almost regularly. Heavy and incessant rainfall in the upper catchments of the River Jamuna increases the discharge and forces the river to exceed its drainage capacity, and flood eventually occurs. If Jamuna and Bangali reach peak-flood levels, the likelihood of a flood increases.

Table 1. Causes of flood

Causes	Respondent(Percentage)
Serious river erosion	38.1
Overflowing rivers due to heavy rain	45.0
Heavy and prolonged rainfall	43.8
Changes in the course of a river	21.4
Landsides deforestation	10.0
Impermeable rock (doesn't allow water through)	8.7
Weak flood embankments	39.1
Development and infrastructure in flood-prone areas.	7.6

Source: Field survey, 2019

Table 1 shows that, 45% respondent said the main cause of flooding is overflowing rivers due to heavy rain in the study area, which was the highest followed by the 43.8% respondent who said the heavy and prolonged rainfall is also responsible for flooding. 38.1% respondent discloses that the causes of flood are serious river erosion and 39.1 opined about weak flood embankments are also responsible for flooding.

Problem Faced during Flood

Table 2 shows that during flood the human being faces many problems. The study found that, the 71 (59.17%) respondents said that the most common problem was the lack of food during flood. 38 (31.66%) respondents said that communication problem occurred during flood. The number of respondent was health service problem occurred during flood in the study area; the value was 6 (5.00%).

Table 2. Problem Faced during Flood

Problems	Frequency of the respondent (%)
Lack of communication	38 (31.66)
Lack of food	71 (59.17)
Lack of health care services	6 (5.00)
Others	5 (4.17)
Total	120 (100)

Source: Field survey, 2019

Impacts of Floods on Livelihood and People's coping Strategies

Floodplains of Bangladesh are predominantly where the rural poor live. It has been stated that the community expected to be hit the hardest by flood is the poor, who lack adequate means and have limited capacity to prepare and cope with the loss of income and property. Households, crops, property, livestock, income, occupation, food, water supply, sanitation, and health are all sectors devastatingly impacted by floods. This study focuses on the issues that are directly related to occupation and income: impacts on livelihood and the associated coping mechanisms.

Impact on Occupations and Income

Occurrence of flood is always a serious threat, especially for poor households in the area. Occupation and income of the poor are the two most important sectors on which flood have significant impacts. Because, the poor has a limited capacity to cope with the loss of income associated with floods.

Table 3 shows that, in the study area, an overwhelming majority of the household incomes fall below the poverty line. About 63.3% of respondents claimed that they normally earn less than Tk. 3000. Even though this income is not enough to a living, during a flood, income radically decreased due to a lack of opportunity to work or to continue the previous profession.

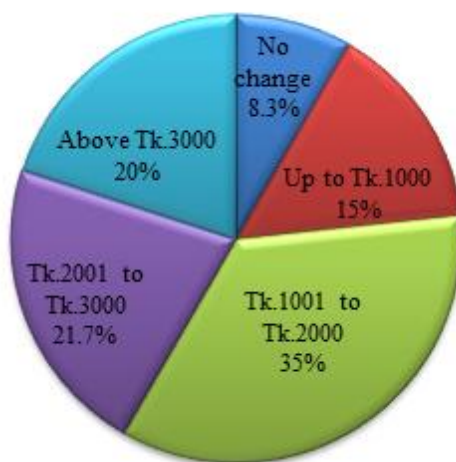
Table 3. Distribution of households according to income

Before the flood		After the flood	
Income range per month in Taka	Number of households	Income range per month in Taka	Number of households (%)
Up to TK.2500	18 (15.0)	No income	35 (29.17)
Tk.2501 toTk.3500	58 (48.3)	Up to TK.1000	21 (17.5)
Tk.3501 toTk.4500	24 (20.0)	Tk.1001 toTk.1500	18 (15.0)
Tk.4501 toTk.5500	14 (11.7)	Tk.1501 toTk.2000	25 (20.83)
Above Tk.5500	6 (5.0)	Above Tk.2000	21 (17.5)
Total	120 (100)		120 (100)

Source: Field survey, 2019

About 35 households (29.17%) claimed that they have no income during flooding and are completely dependent on external help, borrowing money, or selling off assets. Only 21 (17.5%) of people have had an income above Tk. 2500 during a flood; before a flood, 102 (85%) persons of people earn an income above Tk. 2500. This gives a clear indication of the severe income disruption and vulnerability to flood these people experience.

Survey findings showed that almost all households about 110 (92%) experience a reduction in their income due to floods. Thirty-five percent of households reported a decrease in income greater than Tk. 1000, while 41.7% see a reduction of more than Tk. 2000 (Figure 1).



Source: Field survey, 2019

Figure1. Distribution of households as percentage according to income change due to flood

Table 4. Distribution of households according to occupation before flood and income change due to flood

Change in income	Occupation before flood				
	Agriculture (%)	Service (%)	Poultry (%)	Day labor (%)	Business (%)
No change	--	75.0	--	7.7	14.3
Up to TK.1000	9.4	--	25.0	38.5	--
Tk.1001 to Tk.2000	40.6	--	--	53.8	14.3
Tk.2001 to Tk.3000	25.0	25.0	75.0	--	14.3
Above Tk.3000	25.0	--	--	--	57.1

Source: Field survey, 2019

Approaches to Financial Coping

In response to the reduction in income due to flood, people in the study area adapt various financial measures, including savings, loans, consumption pattern changes, and the selling and mortgaging of assets (productive, domestic, and liquid assets). Due to poverty, since not much is saved in normal conditions, these poor people endured severe hardship. During flooding, most families try to cope with income loss by reducing their consumption of food and daily necessities. About 70% of households mentioned that the quantity of food consumption is highly reduced during a flood. It was also observed that, due to reduced incomes owing to asset losses, the flood-affected rural poor experience increased difficulties with food that create substantial health and nutrition problems. Along with the reduction in consumption, various financial measures taken by households to cope with the situation are taken due to devastating floods. These financial coping measures are shown in Table 5.

Table 5. Approaches followed to financially cope

Type of Financial Coping Approaches	Approach Followed by Majority	Next Best Approach	Least Followed Approach
Taking Loan	From Money Lender	From NGO and Bank	From Relatives and Neighbors
Selling Productive Asset	Selling Poultry	Selling Livestock	
Selling Domestic Asset	Selling Cereals/Rice Stock	Selling Household Items	
Selling Liquid Asset	Selling Large Tree	Selling Jewelry	

Source: Field survey, 2019

It was found that 51.28% of total households sold productive assets, and 9.1% sold household mortgage assets to survive. In addition to the loss of productive assets, the loans taken at high interest rates rendered them more vulnerable. Moreover, after a flood, many families spend the rest of the year paying back the loans they took during the flood. Emergency food and medicine supplies were the main supports received by the majority of the households. Besides these, credit supply, material aid, and awareness programs were also offered mostly by the NGOs for their members. This study also reveals that only about 47% of households received emergency food supplies, and the percentage of households availing other institutional supports ranges from 5% to 25% (Table 6).

Table 6. Distribution of households according to availability of supports (Percent of household)

Institutional Support	Get	Don't get
Emergency Food Supply	46.6	53.4
Emergency Medicine Supply	24.8	75.2
Credit Supply	20.1	79.90
Awareness Building Program	17.2	82.8
Material Aid	17.8	82.2
Emergency Medical Treatment	5.9	94.1

Source: Field survey, 2019

Sectors Affected by Flood

Table 7 shows that during flood, different sector have been damaged and loss of property happened. The study revealed that, sixty (50%) respondents said that Agriculture was the most common sector which is affected by during flood, followed by the 31 (25.83%) respondents said the properties were affected during flood. A significant percentage of respondents said the health and livestock were also affected by the flood, the value were calculated as 22 (18.33%) and 7 (5.83%) respectively.

Table 7. Sectors Affected by Flood

Affected sectors	Households (Frequency)
Agriculture	60 (50 %)
Livestock	7 (5.83 %)
Properties	31 (25.83 %)
Health	22 (18.33 %)
Total	120 (100 %)

Source: Field survey, 2019

Diseases occur during/after flood

It is evident from the table 8 below that; flood has many impacts on human being and environment. The persons of the flood affected have seen suffered many contagious diseases like waterborne diseases such as typhoid, dysentery, cholera, hepatitis B, and diarrhea. The study showed that, the 91 (75.83 %) respondents said that Diarrhea was the most common diseases during/after flood, followed by Typhoid and unpredicted diseases occur during/after flood in the study area.

Table 8. Diseases occur during/after flood

Affected Cases	Number of household
Diarrhea	91 (75.83 %)
Typhoid	11 (9.16 %)
Others	9 (7.50 %)
Not Affected	9 (7.50 %)
Total	120 (100 %)

Source: Field survey, 2019

Type of Adaptation during flooding

The Table 9 make known that, the percentage of the respondent take adaptation during flood of Vulnerable feeding and storage, the value was 82 (68.33%), which was the highest, followed by 29 (24.17%) respondents who said they took have migration and stored food type of adaptation during flood. Only 9 (7.50%) respondent said they take both type of adaptation.

Table 9.Type of Adaptation during flooding

Type of Adaptation	Number of household
Migration and storage food	29 (24.17 %)
Vulnerable feeding and storage food	82 (68.33 %)
Both	9 (7.50 %)
Total	120 (100 %)

Source: Field survey, 2019

Opinion to manage flood

There are various methods of managing flood. The study revealed that, 48 (40) respondents said that river dredging is the most common managements system to manage flood, followed by 40 (33.33) respondents who said the construction of flood embankments and planting trees. The respondents opined about the road construction were 19 (15.83) (Table 10).

Table 10.Type of Adaptation during flooding

Type of Adaptation	Number of household
Long term loan from bank	13 (10.83 %)
River dredging	48 (40.00 %)
Road construction	19 (15.83 %)
Construction of flood embankments and planting trees	40 (33.33 %)
Total	120 (100 %)

Source: Field survey, 2019

Therefore, dwellers of Sariakandi Upazila are vulnerable to several natural hazards such as flood, riverbank erosion, drought, and tropical storm. However, flood is considered the most crucial. Almost every year, it is adversely affected by flood. People of Sariakandi struggle with flood their whole lives. In spite of this, their livelihood is directly and indirectly dependent on rivers and floods.

CONCLUSION AND RECOMMENDATIONS

Flood is a part of the lives of the people of Sariakandi. Due to flood, people living in this area loss their property, reduce income, loss of their lives sometimes and to copy with this loss they face a high interest of loans which ensures their perpetual poverty as well as low living standard. Flood also brings fertility of land which may help in their production system in the next phase of the flood.

In order to achieve the Millennium Development Goals (MDGs) along with the community, government and local institutions need to find effective alternative solution to minimize the adverse impacts of floods on the livelihood of the rural poor and to find suitable coping mechanisms that will not lead to more vulnerability.

From the discussion above, a set of following recommendations could be made:

1. Government has to take initiatives for improving the submerged condition of homestead and agricultural land..
2. It is necessary to enhance alternative job opportunities through appropriate policy implications.
3. It is natural that a decrease in income is a common picture in flood affected areas. Therefore, policy makers could arrange short term loans through banks and other financial institutions for serving them.
4. Transportation and communication problems could be minimized through proper policy planning.
5. Problems regarding water supply, sanitation, and diseases could be handled through different government agencies and local government institutions.
6. Different NGOs can play an important role here. Rather than addressing a large number of issues, NGOs should have to pay focuses on the issues that are directly related to occupation and income: impacts on livelihood and the associated coping mechanisms of the flood affected areas.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interests regarding the publication of this paper.

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