

Impacts of Riverbank Erosion: A Study on Mizanpur Union

Shyamal Kanti Ghosh*

Abstract: Riverbank erosion is a widespread and recurrent natural hazard in Bangladesh. Every year millions of people are affected by sudden shifts in the river courses that imperil standing crops, farmland and homestead land. It is estimated that about five percent of the total floodplain area of Bangladesh is directly affected by riverbank erosion. It is often looked upon as a by-product of flood, without realizing the fact that its after effects are more severe than that of more commonly known disasters such as floods, storms and cyclones. It increases landlessness, which adversely affects the employment and income generating opportunities of the rural population. Riverbank erosion has disastrous socio-economic impact too. The impact of land loss involves primarily the loss of homestead land, housing structures, crops, cattle, trees and households, leaving little scope for immediate recovery for marginal households. Loss of homesteads forces people to move to a new place without any option and puts them in terrible situations. The degree of economic loss and vulnerability of the people due to riverbank erosion has dramatically increased in recent years. - How long will the majority of the population be left vulnerable to river erosion? With the modern stock of knowledge and technology such a situation should not be their fate for an indefinite period. So, it must not be unrealistic and irrational to try to make a little focus on riverbank erosion that deterring very much to achieve our national goals. Considering the issue of high importance the topic of this paper has been selected to - i) highlight the impact and effects of riverbank erosion along with the responses frequently taken to mitigate the problem highlighting the study area's sufferings and put forward some suggestive measures.

1.0 Introduction

Bangladesh is largely a flat country. Except the hilly regions in the north-east and the south-west, and some areas of high lands in the north and north-western part, the country consists of low, flat, and fertile land. A network of river and their tributaries is covering the country flat down to the Bay of Bengal. The alluvial soil thus, continuously being enriched by heavy silts deposited by rivers during the rainy season. Bangladesh is commonly divided into six physiographic regions- as - 1) Alluvial plains:

* Director (Joint Secretary), Labour, Directorate of Labour, Dhaka

The piedmont alluvial plain includes the north-western and part of central districts. The region has limited rainfall and low domes of undulating terrain. 2) Central valley flat: This composed of most of the central Bangladesh. This region is intersected by a network of rivers. 3) South-west moribund region: This region forms into a moribund delta and the rivers flowing through this regions are either dead or dying. 4) Coastal areas: These are the islands in the south of the country. A number of major rivers flow through these areas and land is generally fertile but often affected by saline water intrusion. 5) Northern depression zone: This is a low depressed area, commonly known a 'haor', through which rivers pass sluggishly. This region is flanked by hills on the north and the east. 6) Hilly region: This region consists of the eastern and north-eastern part of the country.

Riverbank erosion is a widespread and recurrent natural hazard in Bangladesh. Every year millions of people are affected by sudden shifts in the river courses that imperil standing crops, farmland and homestead land. It is estimated that about five percent of the total floodplain area of Bangladesh is directly affected by riverbank erosion (Mamun and Amin 1999). Although the area affected appears negligible in absolute terms - by our standards, where a meagre 0.5 hectare is available to each farmer (Khan and Hossain 1989). The rivers cause erosion in Bangladesh to large scale and high frequency due to their unstable character. The rivers assume a braided pattern consisting of several channels separated by small islands in their course. During the last 200 years or so, the channels have been swinging between the main valley walls. As a result, during monsoons, extensive over-bank spills, bank erosion and bank-line shifts have become typical (Adnan 1991). The gradual migration or shifting of channels of the major rivers in Bangladesh may be anywhere between 60 meters to 1,600 meters annually. In a typical year about 2,400 km of the bank-line would experience major erosion. The unpredictable shifting behavior of the rivers and their encroachments not only affect the rural flood plain population but also the urban growth centers and infrastructures.

There is no systematic pattern yet observed for the erosion hazards because of the involvement of a large number of variables in the process. Many hydrological studies have recorded both dramatic and gradual shifts of river channels. Mamun and Amin (1999) shows that the variation of erosion-prone region with a long and short-term perspective. Even in shorter time frame the erosion trend can shift from one direction to

another. He reports further, citing Elahi (1991), bank erosion is taking place in about 94 thanas out of 489 thanas of the country. More than 150 thanas spread over 50 districts featured in erosion related newspaper reports; at present, bank erosion and flood hazards in nearly 100 thanas have become almost a regular feature, of which 35 get severely affected.

Riverbank erosion may not have been the most serious disaster in our country, but it is a regular phenomenon and the people are struggling for years to find a solution for this without much success. Indeed, it is often looked upon as a byproduct of flood, without realizing the fact that it's after effects are more severe than the more commonly known disasters such as floods, storms and cyclones. It increases landlessness, which adversely affects the employment and income generating opportunities of the rural population, especially those without education or skills. On the other hand, most extensive floods and cyclones cause death, create miseries, destroy crops and infrastructure, and disrupt communication. These consequences are of a short range as economic recovery is possible within a predictable time. But the socio-economic impacts due to riverbank erosion are mostly permanent. Floods, though directly linked with riverbank erosion, do not directly cause landlessness and migration as riverbank erosion does. It is only riverbank erosion that contributes directly to landlessness by reducing the physical stock of land, resulting into impoverishment and marginalization.

Bangladesh is located in the delta of some of the world's largest rivers - the Ganges, the Brahmaputra, and the Meghna. This river system shapes the daily life of her people. These rivers also bring the perennial threat of floods and riverbank erosion; some degree of which is beneficial for agriculture and fisheries but major floods play havoc with crops, property and people's lives, undermining national confidence in and progress for development. The unpredictable occurrences of rapid river encroachment are devastating for the population, particularly for those who build settlements in the vulnerable areas. This in particular, affects the marginal peasants with a meager 0.048 hector of land, who lose their last parcels of land due to erosion; the rich people can also become paupers overnight.

2.0 Objectives : The main objectives of the study are to -

- identify measure and analyse the socio-economic impacts/consequences of riverbank erosion in the study area;
- analyse the responses so far made at different levels to address the problems of riverbank erosion; and
- suggest required policy measures considering both the people's and national perspectives.

3.0 Methodology

Both primary and secondary sources of information have been used in this paper. For primary data, a detailed questionnaire was developed which included the following components - basic demographic characteristics of the members of the sample households; economic and social structure of household, landholding, land uses, income and expenditures; people's perception of flood and riverbank erosion hazards, perception about understanding of these hazards, and displacement history, migration aspects etc. Moreover, outside the sample households, officials working at the local level have been interviewed and some books and articles on the issue published in the newspapers also been consulted to develop a conceptual framework.

4.0 Scope and Limitation

The havoc created by natural hazards has become a concern for academics, policy makers and development planners. The disaster events like erosion causes enormous resource losses, population displacement and landlessness is no new phenomenon for Bangladesh, but until recently, little attention had been given to it from an effective point of view, and no long-term measures were undertaken. How long will the majority of the population be left open to river erosion? With the modern stock of knowledge and technology such should not be their fate for an indefinite period. So, it must not be unrealistic and irrational to try to make a little focus on riverbank erosion that deterring very much to achieve the national goals.

5.0 The Study Area and Location

5.1 An Overview of Mizanpur

The study area, Mizanpur Union is located on the south bank of the mighty river Padma at Rajbari Sadar Upazilla which is the biggest union in the upazila. This union consists of 27 villages now but once it was of

35 villages. Total population of the union is 31528, out of this, 16429 are males and the rest 15149 are females as per 1991 census. A new para is developed in Charsonakandor by the migrants from some eroded villages.

Table-1 : Age-Sex Distribution of the People of the Sample Households

| Age Group | 1 – 10 | 11 – 16 | 17 – 30 | 30 + | Total | % |
|-----------|--------|---------|---------|------|-------|----|
| Male | 41 | 32 | 20 | 38 | 131 | 57 |
| Female | 29 | 10 | 24 | 34 | 97 | 43 |

The table indicates that the age distribution (male-female ratio) in the locality is not conforming to the national average age distribution of the country. The difference between the first age group i.e. 1 - 10 depicts that there is a strong son-preference in the locality as it exists any other rural areas in our country; further, there may have been carelessness to the female childs. Especially, the 11 - 16 age group shows big difference between male and female which might have been one of the causes of child-marriage of the girls in the locality.

Table-2 : Educational Status of the People of the Sample Households

| Level of Education | Age-Group | Non schooling | I – V | V – III | IX - above |
|--------------------|-----------|--------------------------|-------|---------|------------|
| Male | 1 – 10 | 23 (Under school-age) | 18 | 0 | 0 |
| | 11 – 16 | 14 | 12 | 6 | 0 |
| | 17 – 30 | 9 | 7 | 4 | 0 |
| | 30 + | 29 | 7 | 2 | 0 |
| | Total | 75 | 44 | 12 | 0 |
| Female | 1 – 10 | 15 (Under school-age) | 14 | 0 | 0 |
| | 11 – 16 | 2 | 6 | 2 | 0 |
| | 17 – 30 | 13 | 6 | 3 | 2 |
| | 30 + | 32 | 2 | 0 | 0 |
| | Total | 62 | 28 | 5 | 2 |

Source: Authors Survey

The table points out that rate of literacy in the locality is low (%) in comparison to our national rate (62%). The schooling rate amongst the girls at the similar age groups is higher than that of the boys possibly because of the female scholarship schemes; since females of 30+ age group are totally illiterate when the scholarship scheme was not introduced.

5.2. Trend of Erosion Over the Years

Table-3: Characteristics of erosion in the study area

| Name of mouza | Number of <i>Khana</i> | | |
|-----------------|------------------------|-------------|------------|
| | 1989-90 | 1993-94 | 2001-2002 |
| Ambaria | 332 | 317 | 00 |
| Char-Ambaria | 294 | 00 | 00 |
| Char Sonakandor | 302 | 252 | 128 |
| Kathuria | 191 | 130 | 50 |
| Malikanda | 181 | 80 | 85 |
| Moukuri | 394 | 403 | 00 |
| Total | 1649 | 1182 | 253 |

Source: Mizanpur Union Parishad

The statistics furnished in the above table show that from 1989-90 to 1993-94 each and every year 7.08 percent of household was eroded; whereas, during 1993-94 to 2001-2002 the rate of eroded household is 9.82. That is, out of 35 villages, 8 villages have been disappeared from the map almost within two decades. Mizanpur is one of the union of Rajbari Sadar upazila

5.3 Rajbari Sadar Upazila

Administration -Rajbari thana was established in 1888 and was turned into an upazila in 1984. The upazila consists of one municipality, 12 union parishads, 203 villages and 228 mouzas. Population 263555; male 51.46%, female 48.54%; Muslim 88.75%, Hindu 11.15% and others 0.10%.

Religious institutions- Mosque 257, temple 132, church 1, graveyard 16, cremation site 4, tomb 15.

Literacy and educational institutions - Average literacy 31%; male 32%, female 30%. Government college 1, private college 3, government women's college 1, madrasa 15, secondary school 21, lower secondary school 6, primary school 97, mass education centre 3, homeopathic college 1, vocational training institute 1. Noted educational institutions: Rajbari Government High School (1892), Government Girl's High School (1961), Raja Suryakumar Institute (1888), Yasin High School (1950).

Main occupations - Agriculture 38.83%, fishing 1.28%, agricultural labourer 19.49%, wage labourer 3.22%, industry 1.07%, transport 3.42%, construction 1.5%, commerce 14.04%, service 9.58%, others 7.57%.

Land use - Cultivable land 24538 hectare, fallow land 499 hectare; single crop 5%, double crop 71% and triple crop land 22%; land under irrigation 37%.

Value of land Market - value land of first grade is approximately per 0.01 hectare Tk. 5000 per 0.01 hectare.

Main crops - Paddy, jute, sugarcane, onion, linseed, groundnut, catechu.

Extinct and nearly extinct crops - White jute, watermelon, and cotton.

Main fruits Mango, black berry, jackfruit, litchi.

NGOs activities - BRAC, ASA, BRDB, Grameen Bank, JAS, Satatai Unnati, Sangjog, KKS, VPKA, VFDA.

Health centres - Upazila health complex 1, union health centre 9, family planning centre 6, sadar hospital 1, child hospital 1, and a homeopathy hospital. There are a few private clinics also.

6.0 Findings

Out of 35 villages, 8 have already been washed out by erosion. Some of the existing villages may be eliminated at any moment.

Riverbank erosion in Mizanpur is mainly caused by seasonal flooding though it is being happened a little bit, now and then round the year.

Most of the people of Mizanpur have to take a new profession due to elimination of their homestead, agricultural land and other properties and plunged into deep miseries.

Most of the inhabitants of the locality have experienced displacement of households in their life many a times; and the people on the very near of the riverbank informed, they are awaiting for another displacement in the next flooding season.

Most of the people (70%) of this area (study area) are living on lease agreement, 12 people have only a little piece of land amount of which combindly would have been 2.96 acre; and some people are there who do not have any ability to come any lease agreement are living on charity with constant threat of dislodgement.

Most of the people of the locality are unhappy with government and local responses, they are always at danger and are ready to establish in a safer place rather relying on temporary lease agreements or on emergency relief provided by government and non-governmental agencies.

All the affected people of the study area believe that more embankments, groynes and dams should be built, and that there be more strengthening and concreting of existing embankments.

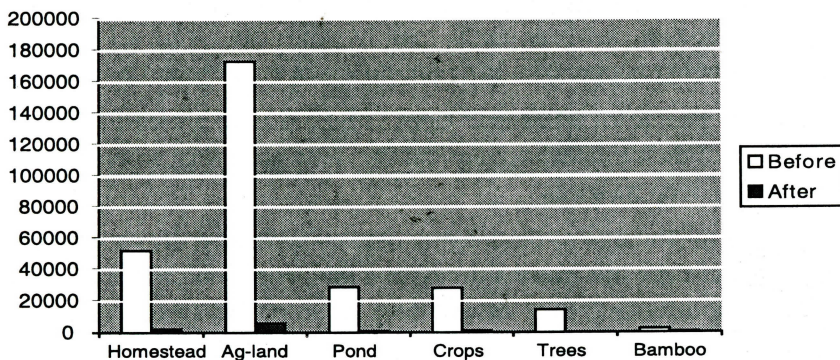
6.1 Loss of Assets

Table -4 : Average Amount of Lost Assets (Immovable Property) per Household

| Item | | Before erosion | | | After erosion | | |
|----------------|---------|----------------|------------------------|--------|---------------|------------------------|-------|
| Name | Unit | Quantity | Price/ Unit (Tk) | Total | Quantity | Price/ Unit (Tk) | Total |
| Homestead | Decimal | 26 | 200000 | 52000 | 0.015 | 15000 | 2250 |
| Agri-land | do | 1.44 | 120000 | 172800 | 0.074 | 80000 | 5920 |
| Ponds | do | 0.16 | 180000 | 28800 | 0.005 | 150000 | 750 |
| Standing Crops | kg | 2556.69 | 11 | 28120 | 90 | 12 | 1080 |
| Trees | Nos. | 9 | 1600 | 14400 | 0.25 | 500 | 125 |
| Bamboo | Nos. | 24 | 100 | 2400 | 4 | 150 | 600 |
| Grand Total | | | | 298520 | | | 10725 |

Source: Field Visit

Chart-1 Average Loss of Asset in Taka per Household



The sample survey was conducted on 40 households; out of these households, the table depicts that about all of them have lost almost all of their immovable properties. Only 12 households have a little belongings but the rest have nothing to their credit. The table also indicates that the people of erosion-prone area constantly lose their land, homestead, crops and other assets and becomes landless, economically weak and the situation leads to marginalization.

6.2 Occupational Change

Table –5: Occupational Status of the People of the Sample Households

| Occupation | Before Erosion | After Erosion |
|----------------------|----------------|---------------|
| Male | | |
| Agricultural Farming | 24 | 6 |
| Sharecropper | 9 | 4 |
| Labour | 19 | 9 |
| Fishing | 11 | 3 |
| Boat man | 3 | 0 |
| Small trader | 6 | 0 |
| Tailoring | 0 | 3 |
| Rickshaw/van puller | 0 | 12 |
| Brickfield worker | 0 | 15 |
| Others | 3 | 20 |
| Female | | |
| House wife | 56 | 15 |
| House Maid | 7 | 6 |
| Brickfield labour | 0 | 6 |
| Other Labourer | 9 | 29 |

Source: Field Visit

Most of the people of this area were engaged in agriculture before erosion, some in fishing, small trading and boating. But after erosion most of them have lost almost all of their landed property and ultimately compelled to change their trade and profession; compelled to move to suitable places with whatever way of life they could manage. Before erosion there was no people engaged in rickshaw/van pulling, tailoring, and in the brickfields. The brickfield, as emerged newly and interestingly the workers falls within our study, a good number of them are child. The small traders are now also in troubles, they do not minimum access to any sources of viable means that could help stand on their own feet firmly. The people covers in the 'others' group do not have any specific way of life, rather, they have to do whatever the situation allows; though a small number amongst them have expertise in specific field but they rarely get the opportunity and ultimately remain unemployed or employed with any other business they could manage.

6.3 Nutritional Status

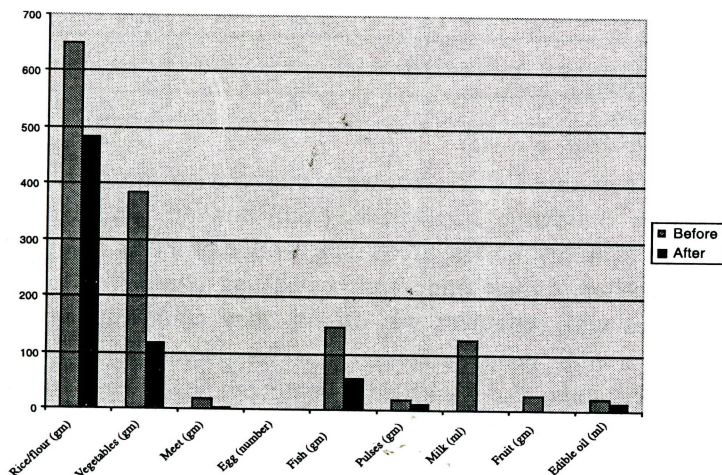
Riverbank erosion has negative effects on food and nutrition as appeared in the study area. We found a significant difference in food intake between two periods - after erosion and before, which is shown below.

Table – 6 : Nutritional Status of the Sample Households
(Average Food Intake before and after Erosion Person/per day)

| Food Item | Before Erosion | After Erosion | Difference |
|-----------------|----------------|---------------|------------|
| Rice/flour (gm) | 649.78 | 484.85 | 154.93 |
| Vegetables (gm) | 385.66 | 116.65 | 269.01 |
| Meat (gm) | 17.45 | 2.29 | 15.16 |
| Egg (number) | 0.19 | 0.05 | 0.14 |
| Fish (gm) | 146.66 | 56.60 | 90.06 |
| Pulses (gm) | 19.69 | 10.89 | 8.80 |
| Milk (ml) | 125.62 | 0.56 | 125.06 |
| Fruit (gm) | 25.56 | 0.96 | 24.60 |
| Edible oil (ml) | 21.52 | 12.45 | 9.07 |

Source: Field Visit

Chart-2 Food Intake Before and After Erosion



The table shows that the incidence of erosion severely affected their daily food intake, which has great implication on the overall life pattern. The disaster leads to malnutrition, which in turn leads to susceptibility to disease, decrease in work capacity etc.

7.0 Socio-economic Impacts of Riverbank Erosion

The shifting of major rivers in Bangladesh has long been a dominated environmental problem affecting a sizeable population. Erosion by river is mainly hydro geologic and when it is associated with a widespread flood, the magnitude of destruction is enormous. In Bangladesh, the rivers, particularly the Jamuna, cause erosion due to their unstable character.

Riverbank erosion phenomenon has a direct bearing on differential population change and on related human occupancy and bank line settlements of the affected people. A striking aspect of human occupancy in the erosion-prone areas is the development of rural slums inhabited by these people, that is, the victims of riverbank erosion. The following paragraphs portray a few situations that riverbank erosion is creating, which hamper the development efforts of the country.

7.1 Social Impact

Riverbank erosion has disastrous socio-economic impact. The impact of land loss involves primarily the loss of homestead land, housing structures, crops, cattle, trees and household utensils (Mamun & Amin 1999), leaving little scope for immediate recovery for marginal households. Loss of homesteads forces people to move to a new place without any option and puts them in terrible situations. The degree of economic loss and vulnerability of the people due to riverbank erosion has dramatically increased in recent years. A study conducted by Islam & Rahman (1987) found that about one million people are directly affected each year by riverbank erosion in the Bangladesh. They estimated a total monetary loss of approximately \$500 million a year. In particular the demographic and socio-economic impacts as a result of riverbank erosion significantly affect the condition of the household size, educational attainment, labour force participation and occupational status, land holding and income at both individual and household levels.

It affects the people irrespective of their farm size. Big and medium farmers were the most severely affected groups since they own more land. Small and landless farmers are less affected and on occasions make net gains of farmlands through household mobility (Hossain 1993). Riverbank erosion causes setback for village agriculture along with homestead settlements; it erodes farmland, infrastructure and communication system. The affected people lose their assets and are forced to draw on past savings and often fall into further debt. land loss, economic deprivation, social isolation and administrative or institutional negligence worsen the continuing poverty of the displaced and prevent them achieving socio-economic success.

7.2 Economic Impact

Riverbank erosion reduces income, wealth, and assets of households resulting into a decline in their food security status. The big and medium

farmers, unlike to the landless groups, have no income originating from agricultural wages (Hossain 1993). Crop income, the main source of economic well-beings of big and medium farmers, drops from land erosion. This drop in income thus adversely affects the food consumption of even the large house holding farms. On the other hand, hunger and inadequacy in calorie intake, among the marginal population, relates more to inability to pay rather than inadequacy of supply. Hence, even after good harvests, the poor simply do not have adequate purchasing power with which to meet their needs. The landowners' fall in income decreases their capacity to hire laborers and the demand for agricultural laborers decreases drastically. Coupled with the steady increase in seasonal price of food grain and related commodities, the poor peasants and wage laborers become increasingly prone to starvation over time.

Riverbank erosion is traced as one of the major causes for national poverty. Rogge (1991) studied the responses to the annual flood problem and the perennial loss of land by erosion both at individual and national level and developed a model to show the factor contributing to impoverishment and marginalization. Wiest (1991) observes that riverbank erosion has not received much attention either by social scientists or by government, despite the fact that it is one of the major disasters in our country. His findings include that there are historical conditions that have given rise to the emerging household pattern in rural Bangladesh, which is nuclear. He noted another major point that the demise of joint and extended family households is related to the fracturing of estates and the loss of corporate kin control over landed resources. He goes, further, a significant number of households increasingly, especially in vulnerable areas, are found to be headed by females.

7.2.1 Migration, Occupation and Adjustments

As riverbank erosion erodes the land and habitation pervasively; so displacement is its immediate impact. Displaces are forced to leave the affected areas, resulting into involuntary migration. The immediate move is usually to some nearby areas but migration to some distant places is not also uncommon. The decision of relocation to a nearby site or migration to an urban centre depends on factors like individual attitudes, economic condition, social relationship, education, etc. In the erosion-prone areas, most of the families have witnessed a displacement in their lifetime. This involuntary movement can go up to 10 times or even more (Rogge 1991).

The human response strategies to disasters require focus on the adjustment network at two major levels: institutional and individual. The institutional responses to cope with riverbank erosion are usually confined to large-scale structural engineering works. It is evident that countryside does not undergo any major institutional structural responses. As a result, the inhabitants of the floodplain become more dependent on indigenous strategies for generations. Again, most of the local adjustment strategies are incidental rather than purposeful. In most cases shifting of movable housing materials are by using country boat or bullock carts. It appears that the common adjustment strategies of the displaces are to accept the loss through abandoning land; reduce the loss by salvage of houses and selling livestock; and moving family from the hazard affected area. The options for the land eroded displaces are essentially limited to - i) remaining in the immediate rural areas as cultivators by buying new lands; ii) remaining in the immediate rural area as leaseholders or sharecroppers; iii) remaining in the immediate rural area as day laborers; iv) remaining in the immediate rural area by becoming dependent upon kinfolk; v) moving to other rural areas where land is available; vi) moving to one of the government resettlement areas on emergent coastal islands; vii) moving to neighborhood towns and taking up employment as day laborer, hawkers, rickshaw pullers, or becoming beggars; viii) moving to Dhaka where few viable prospect exist and most have to lead a life in abject poverty.

Mahbub and Islam (1991) focused on urban adjustment by erosion induced migrants. His observation reveals that migrants mostly originated from districts of Faridpur, Barisal, Comilla and from greater Dhaka district. A closer examination of this distribution further reveals that most of the migrants have come from a smaller area consisting of few thanas mostly located around the rivers Ganges-Padma and the Meghna and their combined estuaries. The displacement caused by riverbank erosion, mostly involve the displacement of the whole family rather than individual separation. It has also been observed that permanent relocation due to riverbank erosion is an involuntary type of migration as the victims do not have any option or assistance from any source for economic recovery in the place of origin. This displaces' formal education level is found to be very low. They were landless at the time of migration. It is observed that a household on an average experienced riverbank erosion effects 2.33 times in their life. Some of them experienced displacement 4-5 time or more. Some socio-economic characteristics of the migrant household heads and their other members showed that most of these

migrants turn mainly into laborers or rickshaw pullers. Only five percent of them are skilled workers or craftsman. A large proportion was found to be unemployed due to lack of opportunity for work. Most of the families did not want to back to their place of origin; rather they would like to stay permanently in the suburbs or closer to it.

Haque and Zaman (1989) reports that displaces do not usually opt for changes in resource use or location during their initial experiences. They suggest that it is mainly because of financial constraints and the hope of getting back their land soon, which is, often, proves to be delusory. Assistance from government for rehabilitation program is found to be non-existent. Among the limited assistance received by displacees, most was provided by relatives and friends. The adjustment patterns of displacees are also conditioned by wider social, economic and political relationship. The marginal groups of the displaced households, who cannot expect any material assistance from their equally poor relatives, have very little choices. Majority of this group remains in the floodplain as dependents of the village leaders who provide land and necessary support in exchange of their cheap labor and support to strengthen their power base.

7.3 Riverbank Erosion and Boundary Dispute

River erosion also has always been great socio-political implications, as the incidence frequently touches our international relations along with territorial disputes within the district boundaries. Bangladesh's territorial boundaries with India are facing increasing threats of erosion by seven transboundary rivers due to stoppage of riverbank protection work for over a year now due to objections from India (The Daily Star, 25.08.2005). Due to rising erosion of river banks inside Bangladesh territory on various border points, the government made numerous efforts for revetment work at 15 points on seven cross-border rivers over the last one year but failed to do so as the Indian authorities opposed that. These 15 points include Gilabri and Poladanga, two bordering areas in Chapainawabganj district that witnessed the most fierce skirmishes between the border guards of India and Bangladesh Rifles in the recent past. The two sides traded hundreds of gunshots over a typical common river erosion dispute.

Bangladesh is now risking losing its bordering lands on the banks of those seven - Mohananda, Atrai, Nagar, Punarbhaba, Korotoa, Muhuri and Feni

- out of 54 common rivers with India. Experts pointed out that on numerous occasions both India and Bangladesh had agreed to allow each other do revetment work, build embankments on their respective sides to contain erosion of rivers and stable their course. But they also agreed that none should go for building spurs and groynes in the cross-boundary rivers that might divert their course adversely affecting other's territory. Though due to lack of clarity of the critical cross-border river management issues at local levels and due to differences of opinion over exact 'zero line' at the porous Indo-Bangladesh border, tension prompts the border guards to go for unnecessary exchange of fire.

Like the same, though not having exchange of fire, cross-district disputes in the country due to riverbank erosion are always in existence; as the people of our study area experienced bitterly many a times. Once they owned landed property within the boundary of Rajbari district, those land now disappeared to water and newly emerged chars yet to be identified in which region those would be fallen - Rajbari or Pabna?

8.0 Responses to the Problem

The Government of Bangladesh has begun to put more emphasis on ways and means of reducing human, economic and environmental costs of riverbank erosion in Bangladesh. Measures to face riverbank erosion can be structural or non-structural. Usually structural measures are taken in the form of constructing hard structures such as pavements, spurs, and groyn etc. Cost of construction and maintenance of these structures is huge. Particularly for very dynamic rivers like the Jamuna, Meghna and Padma the cost of such structures is even more.

In order to reduce Disaster Risk of all kinds of natural Disaster including River Erosion, the Government of Bangladesh has initiated a Project named "Reducing Disaster Risks of the Poorest through Sustainable Livelihood Development". Reducing Disaster Risks of the Poorest through Sustainable Livelihood Development is a new initiative of the Government of Bangladesh that demonstrates national political commitment to support the poorest households at-risk living in the most disaster prone areas in the country to develop capacity to manage livelihoods and thereby address disaster risks. The ministry of Food and Disaster Management (MoFDM) is implementing this project of Tk. 500 million from government's own resources. The project will operate for five years, commencing from March 2004 to February 2009. The project

will be piloted in selected locations in the most vulnerable and natural disaster flood, cyclone and river erosion affected areas of Bangladesh.

Responses to this problem at local, regional, and national levels has been limited to date, although there has developed an increasing awareness of the severity of the problem in recent years. Most government sponsored interventions have been structural, i.e. engineering solutions in the form of embankments, barrages, etc. and very little attention has been paid to developing more effective non-structural and self-help strategies (Elahi & Rogge 1990). The human response strategies to disasters require focus on the adjustment network at two major levels: institutional and individual. The institutional responses to cope with riverbank erosion are usually confined to large-scale structural engineering works. It is evident that countryside does not undergo any major institutional structural responses. As a result, the inhabitants of the floodplain become more dependent on indigenous strategies for generations. Three levels of responses are common: at the individual or household level, at the local village and local government level, and at the national level.

8.1 Individual Level

Given the scarce economic resource base most of the affected people can draw upon, there are only limited ways in which they can reconstruct their livelihoods without external help. On being affected they usually remain as a family unit, and if moving as group, also remain together with their kindred. New neighborhoods are generally established without too much difficulty at resettlement locations on embankments or elsewhere. The re-establishment of homesteads is the major priority for the people affected by riverbank erosion, if only because of the acute necessity for shelter during the monsoon. The dismantling of houses, or at least the salvaging of roofs, is one of the few loss-reduction strategies widely practiced (as it has been found in the study area). For many, however, the re-establishment of homesteads is delayed while they recover in local government flood shelters, or become dependent upon accommodation offered by known or kind people elsewhere. Moreover, as land and livestock are the sole sources of their livelihood prior to being affected.

8.2 Local Level

Relatives and friends are seen as a major source of help in the event of displacement by river erosion. Relief agencies are also regarded as potential sources of help. Aside from friends and relatives, from whom

assistance was expected and is received, few other anticipated sources of help appear to materialize in time of need. The greatest expectation for assistance is from the national government as it having the responsibility for providing relief. Though local leaders and officials as well as relief agencies provide only minimal help to the affected people. There always exists distrust amongst the affected people of the local administration on the one hand, and a detachment, and perhaps even indifference among the local administration to the problems of the affected people, on the other. The entrenched hierarchical administrative machinery as well as the urban middle or even upper-class origins of most officials, leave little scope for inputs to decision-making from illiterate local people; nor does it foster a climate where local officials can develop respect for and confidence in the ideas and concerns expressed by the affected people.

The type of local level assistance received by the affected people is limited. Moreover, the limited levels of material assistance can be explained in terms of overall scarcity of resources in rural Bangladesh.

8.3 National Level

The national governments response has been limited, especially with regard to the provision of direct material assistance. However, the predominant response by government has changed little from that traditionally adopted, namely, the focus on structural (engineering) solutions, such as, higher and bigger embankments or cross dams, or the provision of temporary relief facilities, such as, flood and cyclone shelters and emergency food rations. The emphasis government institutions place on structural solutions is shared by most local inhabitants. A highly visible form of assistance in most affected areas is food relief. In some areas, such assistance is being sought by the rural population in general as local food stocks decline. Food relief is, therefore, becoming a permanent institution in some regions of the country. Apart from these direct interventions by the government, there are many possible areas of indirect intervention.

9.0 Recommendation and Conclusion

9.1 Recommendations

- ✓ Better preparedness should be ensured which will increase the scale and effectiveness of loss-reduction measures undertaken by individuals and communities;

- ✓ Effective remedial measures should be adopted that improve the affected people's socio-economic conditions and allow them to progress from survival to full recovery;
- ✓ Proper distribution of accreted land among landless people, displaced and marginal farmers should be taken as a strategy for poverty alleviation; and if possible, the rules regarding alluviation and delluviation should be ammended;
- ✓ Government flood policy should be changed from flood prevention to flood adaptation, that is, there should be options to encourage the vulnerable group to identify best ways to protect their property by developing improved measures of flood management;
- ✓ There should be schemes that will address alternative spatial strategies for the distribution of socio-economic activities and human settlement through regional settlement and growth centre planning, together with assessments of implications for regional and local planning as basis for decision making within government's legal and administrative framework;
- ✓ Special credit programme exclusively for the erosion-affected people should be introduced;
- ✓ Extensive training schemes will be formulated immediately for these hapless people that could help them with suitable employment opportunities;
- ✓ More embankments, groynes and dams should be built, and that there be more strengthening and concreting of existing embankments; and
- ✓ A better meaning should be identified of appropriate resettlement strategies for the affected people who cannot be locally accommodated.

9.2 Conclusion

The widely known incidence of riverbank erosion disaster, especially its physical and settlement aspect has not so far received necessary importance in the planning process. Although a highly desirable National Physical Plan (NPP) project has been underway since 1978; it appears that it is also taking a direction in which the climatic and physiographic factors will not receive the required focus (Mamun & Amin 1999). A lack

of climatic consideration in physical planning and an absence of specific public policy on vulnerable settlements that often entail a permanent loss of land and property and even total dislodgement.

Riverbank erosion is a problem that reaches out to the delicate issues of the economy, ecology, society, demography, settlement pattern, transportation and even of politics and culture. Strategies are needed for retaining the known benefits of annual flooding. The general problem of impoverishment is not a direct product of floods in the floodplain, but due to loss of land, income, assets, and increased debt burden. The formulation of policies towards income diversification is needed to address such problems.

References

- Elahi, K. Maudud & Rogge, John R. (1990) Riverbank Erosion, Flood and Population Displacement in Bangladesh- A Report on the Riverbank Erosion Impact Study, Jahangirnagar University, Savar, Dhaka;
- Hossain, Moazzem (1993) Economic Effects of Riverbank Erosion: Some Evidence from Bangladesh, Disasters, Vol. 17, No. 1, 1993;
- Hossain, Mosharraf, Islam, ATM Aminul and Saha, Sanat Kumar (1987), Floods in Bangladesh: Recurrent Disaster and People's Survival, University Research Centre, Dhaka;
- Mamun, Muhammad Z & Amin, ATM Nurul (1999) Densification - A Strategic Plan to Mitigate Riverbank Erosion Disaster in Bangladesh, The University Press Ltd. Dhaka;
- Roy, Proshanta Kumar (2003) River Erosion Nexus, published in Right - A Journal for Development and Research Activities Vol. 5, December 2003.