

River Bank Erosion, Induced Population Migration and Adaptation Strategies in the Sirajganj Sadar Upazila, Bangladesh

Md. Rayhan Ali, Zihad Ahmed, AHM Hedayutul Islam, and Md. Mizanoor Rahman

ABSTRACT

Riverbank erosion, a regular natural phenomenon in the lower confluence deltaic country like Bangladesh. Among the natural disaster effecting Bangladesh each year, river bank erosion is the most vulnerable in term of effected people and loss of assets. As a riverine country there are huge number of rivers and their tributaries and distributaries criss-crossed over the country, but the mighty three rivers like the Padma, Jamuna and Meghna are mostly known for the erosional characteristics. River bank erosion possesses as a significant, endemic and recurrent natural disaster in Bangladesh by these rivers. This research is designed to explore the erosional pattern of the river Jamuna and its impact on population migration and the adaptation strategy of the migrants. For the study primary data were collected from the study area through questionnaire survey, FGD and mapping analysis while secondary data were collected from published and unpublished reports of different offices such as land office, union parishad office, census report, BBS, WDB etc. However, to analyze the trend of erosion mapping analysis was conducted through ArcGIS 10.3 and for statistical analysis SPSS software was used. The research findings indicate that the Jamuna is a highly dynamic river in term of erosion. Due to its severity and dynamic erosional pattern possess mass number of people to be displaced by losing settlements and agricultural land. River bank erosion of Jamuna River invites many obligatory problems at different stages of displacements like loss of residence, household assets, agricultural land etc. Though it pushes the victims to readjust all their activities associated to livelihood pattern as an adaptation strategy with a newer socio-environmental situation, but very often becomes unable to recover the damage even spending considerable time. From this point of view, river bank erosion needs to be considered as a unique disaster and give attention to take comprehensive riverbank erosion management policy, so that problem can be minimized to a tiny scale.

Keywords: Riverbank Erosion, Migration, Jamuna river, Sirajganj, Bangladesh.

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I. INTRODUCTION

Bangladesh is one of the least developed countries of the world with an area of 147570 square km. It is densely populated with 1.36 percent growths per annum [1] and more than 75% of the population lives in the rural areas [2]. Bangladesh is also a natural calamities prone country [3]. Locational characteristics like the funnel shaped coastline on the south enhances the proximity to the cyclone; Indian and Eurasian plate boundary on the east and north boosts the propensity to the earthquake; and downstream huge number of rivers increase the possibility to riverbank erosion (RBE) and so on. There are about 750 rivers in this country [4] among them Padma, Jamuna and Meghna are the most

influential. These huge number of rivers creates many kinds of natural disaster like flood, RBE etc. and among them RBE is vital one. Because this complex river and channel most of which are unstable in nature and thus river bank erosion is more common [5], [6]. However, 75 of 750 rivers are favorable for erosion [7]. Besides, among 64 districts 241 regions of 58 districts are victimized by erosion. This is such a natural disaster takes place almost round the year [8] and permanently displaces and impoverishes people. It is also stated that the RBE intensified the process of impoverishment in affected areas in Bangladesh [9]-[11]. According to Elahi and Rogge [12] at least 1 million people are being displaced due to RBE in the country every year. So, RBE in the Jamuna River is considered as one of the major natural disasters in

Bangladesh.

Thousands of people each year becomes landless due to loss their homestead and croplands. The erosion pushes people to migrate to other places like cities or nearest town and bound to live in the urban slum areas. To adapt with the unsafe riparian environment where lacking external support the displaced are forced to formulate different indigenous strategies. It is a disappointing fact that the land dislocation and population displacement due to riverbank erosion in Bangladesh has received little attention either by social organization or by the government [10], [13]-[20]. Too little or inadequate assistance has been providing to the RBE victims [21]. Elahi [22], Islam [23] and Khan [24] mentioned that urbanization rate in Bangladesh is more than 60 percent per decade since the independence, which is mainly contributed by rural-urban migration rather than a natural growth in urban population. It was observed that such growth has influenced of increasing the slums and squatters in many urban centres [25]. However, among the slum dwellers of Dhaka city almost 25 percent are being migrated from rural area due to cause of natural disasters [26] and almost one-tenth of the riverbank erosion induced marginalized people to migrate in urban centre in searching for livelihood options [27]. The Jamuna river basin covers most of the northern part of Bangladesh. Dynamic Jamuna river's local channels have strong and spontaneously meandered across the land, erode banks, demolished everything in their tracks and depositing land elsewhere. In this process a noticeable number of people is to be sufferer by the erosion of the river Jamuna each year. Keeping this view the study attempts to explore the trend of RBE and its impact on population migration of the study area with find out the strategy of adaptation to cope with it.

II. RESEARCH METHODOLOGY

To fulfill the objective of the study, two types of subject dimensions had to be considered. Firstly, discussion on the historical pattern of RBE of Jamuna which was conducted basically through mapping analysis with graphic presentation. Secondly, discussion on migration due to RBE and adaptation strategy with the vulnerable situation was presented through graphic and tabular analysis. Both primary and secondary sources were used to collect required data. Data regarding migration and adaptation strategy was collected through formal questionnaire survey, key informants' interview, FGD, case study and personal observation, and also from different books, journal, article, report, thesis paper, land office, union parishad office, census report, Bangladesh Bureau of Statistics (BBS). On the other hand, maps of different years those were used for changing pattern of RBE collected from Water Development Board (WDB). The collected data were analyzed especially for tabular and graphic presentation using SPSS while mapping analysis for measuring erosion and accretion was conducted using ArcGIS 10.3 version.

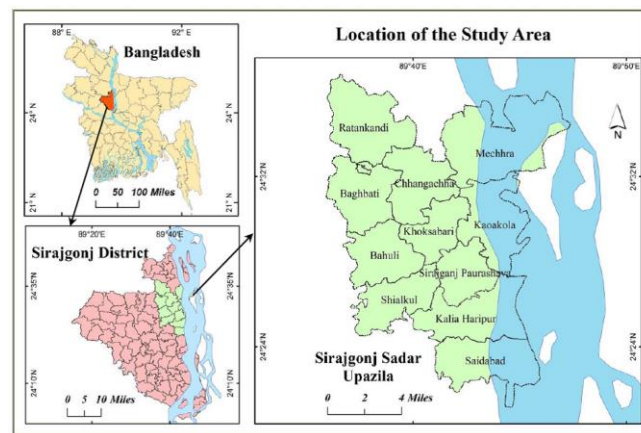


Fig. 1. Location of the Study.

A. Study Area

For the study Jamuna was selected as Study River (Fig. 1). Jamuna River passes through the nine districts of northern part of Bangladesh. Among the districts Sirajgonj is more prone to bank erosion than other districts. There are 9 upazilas in Sirajgonj and as one of the most prone upazilas Sirajgonj Sadar was taken for the study. The study area consists of about 325.77 km² [1] surrounded by Kazipur Upazila on the north, Kamarkanda and Belkuchi Upazila on the south, Jamuna river on the east, Rayganj Upazila on the west. Climatically, the area under the sub-tropical wet region which prevails over the northern part of Bangladesh. Characteristically, the climate character is generally marked as monsoons with medium temperature, considerable humid and moderate rainfall. Average rainfall is 1942 millimeters, about 90% (1690 mm) of total rainfall occurred during the rainy season (June to September or October) [28]. In the monsoon, long durational high intensity local rainfall is the main caused of rain flood. Though duration and intensity of rainfall varies from place to place and year to year depending on the monsoon. However, from November to March monthly average rainfall is less than 75 millimeters, so, this time is treated as a dry period. Whereas in winter average rainfall is 48 millimeters and it becomes dry for 4 or 5 months. In some months of rainy season amount of rainfall in Sadar Upazila is more than average [28], [29]. Though some of the tracts are low-lying alluvial plain of sandy clay and sand but general soil types of Sirajgonj Sadar Upazila predominantly include calcareous alluvium, calcareous dark grey floodplain soils, calcareous brown floodplain soils and non-calcareous brown floodplain soils. These soils are enriched every year with the newer alluvial deposits left by the Jamuna particular and the maximum soils of this tract are sandy loam with grey colour. However, due to loosen characteristics of the sandy loam soil easily become eroded by strong current of the river especially during the monsoon and post-monsoon season.

III. RESULT AND DISCUSSION

A. Riverbank Erosion in the Study Area

RBE is the common natural hazard alongside the Jamuna River in Sirajgonj district. Every year a huge amount of land of the river basin under Sirajgonj district is being eroded by

this river. A comparative scenario is presented in the figure 2, from which it can be observed that more erosion prone areas are Kajipur, Sirajganj Sadar, Shahjadpur and Belkuchi Upazila of Sirajganj district. Among the areas Maijbari and Subhagachha villages in Kajipur Upazila were found more erosion prone than the other. Besides, Shailabari, Bahuka, Shimla, Balighugri Pachthakuri in Sirajganj Sadar and Shahjadpur are also found as severe erosion prone area. However, analysis result indicates both erosion and accretion were much higher in 2015 as compare to 1973 even to 1985 (Fig. 2).

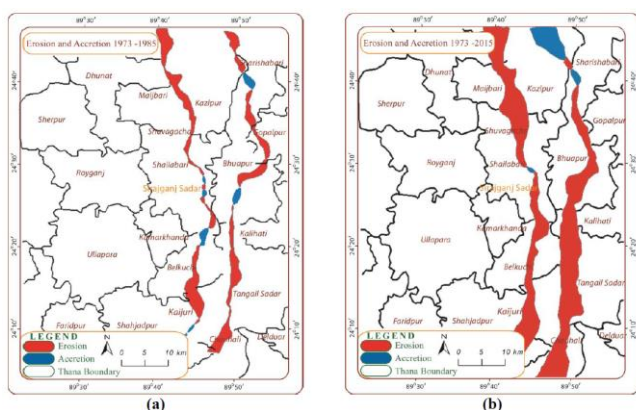


Fig. 2. Thana wise erosion and accretion pattern of Jamuna River.
Source: Water Development Board, Sirajganj, 2015.

1. Recent Scenario of Erosion Pattern

RBE is considered as the most unpredictable and acute type of disasters in the study area. It can be seen from the Table I, between 2005 to 2015 in total 91.5 km² area was eroded which was 28.08% of total upazila area. Erosion of Jamuna river is regular phenomena and consistently eroding each year.

TABLE I: ERODED AREA DUE TO RBE IN THE STUDY AREA DURING 2006-2015

Year	Erosion in sq. km	Total eroded area in sq. km	Average area in sq. km	Standard Deviation	Percentage
2005-2006	8.50				9.29
2006-2007	12.13				13.11
2007-2008	9.50				10.38
2008-2009	10.50				11.47
2009-2010	8.00	91.5	9.15	1.65	8.74
2010-2011	7.00				7.65
2011-2012	8.50				9.28
2012-2013	11.50				12.57
2013-2014	9.00				9.83
2014-2015	7.86				7.66

Source: Water Development Board, Sirajganj, 2015.

The yearly average erosion rate was 9.15 km² with 1.65 standard deviation which indicates little bit fluctuation from year to year. The highest erosional rate was found 12.13 km² between 2006-2007 years during the study period. Contrary, the lowest erosional rate was found in 2010-2011 with 7.00 km². Besides, a significant erosional rate like 8.50 km², 9.50 km², 10.50 km², 8.00 km², 8.50 km², 11.50 km², 9.00 km², and 7.86 km² of land were eroded by the year 2005-2006, 2007-2008, 2008-2009, 2009-2010, 2011-2012, 2012-2013, 2013-2014 and 2014-2015 respectively. Similarly, result of erosion pattern of Jamuna river in the study from 2000 to 2015 was presented in the Fig. 3.

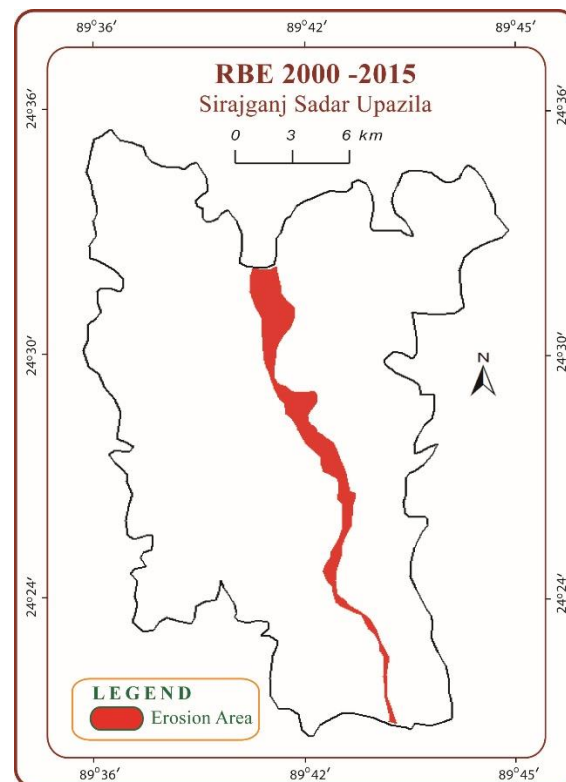


Fig. 3. Trend of RBE in the study area from 2000-2015
Source: Based on field survey 2015.

2. Pattern of Monthly Riverbank Erosion

Monthly intensity of Jamuna RBE is uneven due to difference in amount of monthly rainfall. But severity of erosion depends on the high speed flow of water both during the flood and after the flood.

TABLE II: MONTHLY INTENSITY OF RBE IN THE STUDY AREA

Intensity of bank erosion	Months July-August	Months September-October	Months January-March	Total
Severe	36.4	27.3	0.0	63.6
Moderate	4.5	13.6	4.5	22.7
Lower	0.0	0.0	13.6	13.6
Total	40.9	40.9	18.2	100

Source: Uddin and Basak, 2012.

The Table II shows that the study area face three types of bank erosion. The monsoon period in Bangladesh considered from late June to late August. Bangladesh experience enormous rain fall during this period. As a result, most of the areas of the country along with excessive water contributes from the upper catchment areas that over flows the banks of the rivers. During this period almost 36.4 % of the study areas face severe flooding problem. Besides, 27.3 % and 13.6 % of the respondents think severe and moderate bank erosion respectively take place during the late monsoon season (September-October). On the other hand, according to 4.5% respondents RBE is moderate in intensity during January to March. Overall, 40.9% of the respondents' experience both RBE and flood within the study area in the both July-August and September-October seasons.

3. Land Use Wise Erosion Pattern

Erosion rate depends on land feature and soil characteristics. For example, proximity of the convex slope is to be more eroded than the concave slope. Land feature characteristics of the study area is convex in term of slope, enhances the possibilities of widespread erosion. As the study

area located at the upstream of the Jamuna river, faces high velocity of the wave action which expedite the erosion of the sloppy land. As a result, every year, a huge amount of land of the study area is going under water by the process of erosion.

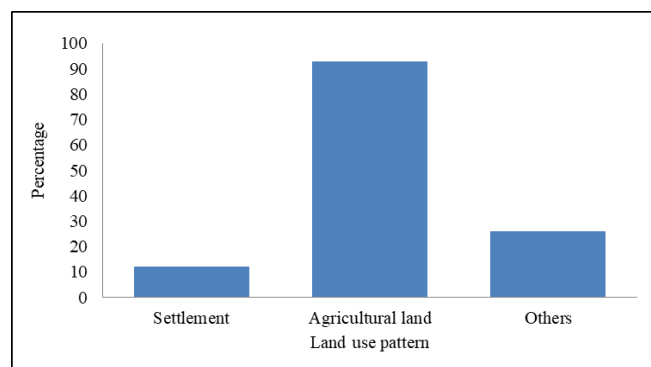


Figure 4. Land use pattern wise RBE in the Study Area (2005-2015)
Source: Field survey, 2015.

As an agrarian region most of the land being used for agricultural practices. The Fig. 4 reveals land use based erosion pattern, and it indicates between 2005-2015 among the total eroded land 12% settlement, 93% agricultural and 26% were other usable land.

4. Different Causes of Riverbank Erosion

The study area faces both fluvial erosion and mass failure in the course of RBE. As monsoon period starts, abundant rainfall occurred in the area and in the upper catchment that loosen the soil structure. More acutely, fluvial erosion prevails in these areas as the natures of rivers are braided. Such erosional process influence mass failure in some areas [30]. Especially, in the south-western part of Bangladesh where due to heavy siltation and newly developed char land the main flow of the river changes to another direction. Consequently, the bank of rivers faces new stress which exposes them into erosion. Other causes are heavy rainfall, deforestation, land degradation, stream bed lowering, climate change, human interfere such as making embankment dam and many other structural and non-structural projects, and flooding etc. Fig. 5 represents that heavy rainfall in upstream, heavy siltation in the river bed, along with sudden excessive rainfall in the study area are the prime causes of severe RBE.

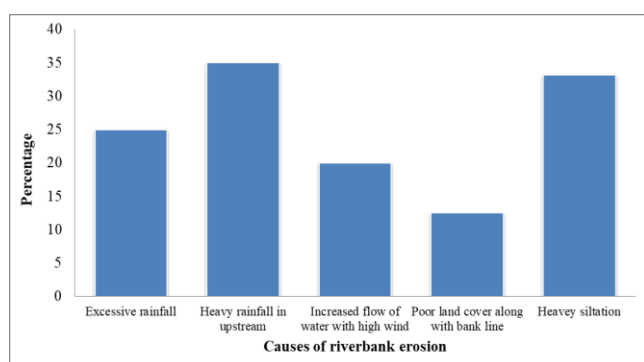


Fig. 5. Causes of RBE in the Study Area. Source: Field survey, 2015.

5. Vulnerable Area

Vulnerability is a product to physical exposure to natural hazard, and human capacity to prepare for or mitigate and to recover from (cope with) any negative impacts of disaster [31]. Generally, it is the incapacity to face a hazard or to

respond when a disaster has occurred. Again, vulnerability is a greater determinant of disaster than hazards themselves [32]. As Jamuna river is the most vulnerable to riverbank erosion and the study area is situated beside the west bank of Jamuna river, every year acres of land are being eroded. If RBE continues in the Sadar Upazila the role of vulnerable land/areas will increase gradually.

TABLE III: VULNERABLE AREA IN THE STUDY AREA

Types of vulnerable area	Area in sq. Km	Total area in sq. km	Percentage
High vulnerable area	35.00	226.49	15.45
Medium vulnerable area	86.56		38.22
Low vulnerable area	104.93		46.33

Source: Field survey, 2015.

Perception of the people on vulnerability to RBE presented in the Table III and Fig. 6 that a remarkable area is highly vulnerable in term of erosion, almost 15.45% of the total area. Whereas 38.22% and 46.33% land are medium and low vulnerable. Besides, as compare to downward areas upward areas are more prone to erosion because of high velocity and wave in the upward areas.

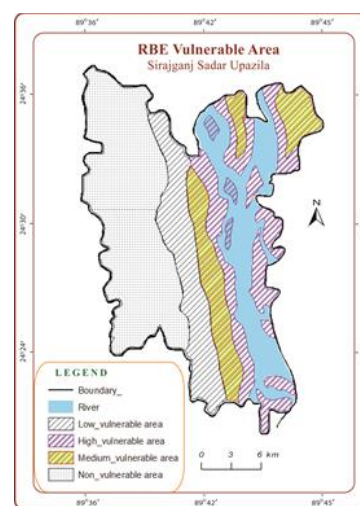


Fig. 6. RBE vulnerable area in the study area. Source: Based on field survey 2015.

B. Migration for Jamuna Riverbank Erosion

Migration can be defined as the movement of people from one place to another in order to residence permanently or semi-permanently, usually across the political boundary. Migration has historical background since the dawn of civilization due to contribution of the push or pull factors. Like other riverine country, RBE is a recurrent problem in Bangladesh. Population displacement due to erosion is pervasive throughout the country. Since Jamuna river flows alongside the Sirajganj district so RBE is the common hazard in the study area. According to an estimation almost ten thousands of people are displaced annually by RBE in Bangladesh [33]. Besides, about 5% of the total flood plain of Bangladesh is directly affected by RBE and among the area Sirajganj district is one of the most eroded areas of the country. Displacement due to RBE in Sadar Upazila is at increasing trend over the years that cause both in-situ and ex-situ migration.

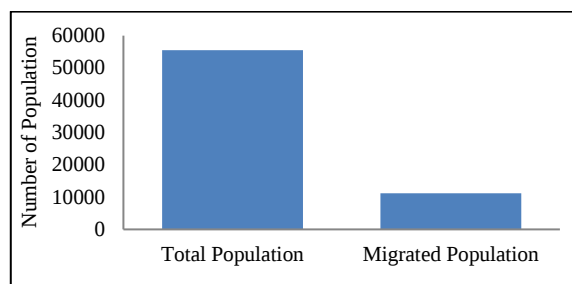


Fig. 7. Migration due to riverbank erosion in the study area.

The Fig. 7 represents the percentage of migrants due to RBE in the study area. Total population of Sadar Upazila is about 55,515 [1], out of them 12037 which is 21.68 percent migrated in the study area.

1. Migration Pattern Due to Riverbank Erosion

RBE largely affects poor and marginalized people as they have the least capacity to resist and to recover from the natural hazards [12], [34]. Existing tenancy structure of the Government of Bangladesh (GoB) pushes them to recommence their livelihood in rural areas, but massive erosion destroys the attempt and pushes the effected people to migrate from rural area to urban area. The number of displacement people due to Jamuna RBE in Sadar Upazila of Sirajganj district is at increasing trend over the years with a variation from year to year.

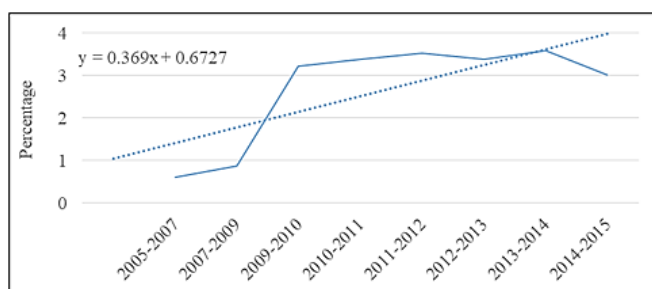
Fig. 8. Trend of migration due to RBE in the study area during 2005-2015.
Source: Field survey, 2015.

Fig. 8 reveals that the highest number of migrations was in year 2013-2014, about 3.58%. In the year 2014-2015 the percentage of migration was 3.02% which is bit lower than previous year. It is also observed that the lowest migration rate was about 0.61% in 2005-2007. However, an increasing trend is found with regression coefficient value 0.369 that forecast the alarming situation of the disaster.

2. Places of destination of the migrated households

Fig. 9 depicts that both temporary and permanent migration are prevalent in the study area. A large number of households are migrated recently from their origin place to different paces of destination by forcefully to save their lives. Even after the RBE strikes immediately people have to relocate homestead in a nearby area and the people who were able to do laborious work migrated to distant places for coping up with losses acquired from RBE. However, people of Bahuka, Shimla, Itali, Bali Ghugri and Pachtakuri villages relocated themselves nearly to their destroyed homestead and few numbers of people migrated from their own living places. Nevertheless, sufferers migrated in the nearest union of about 29.42% as they mostly preferred to migrate short distance followed by Sirajganj Town 27.66%, Dhaka 20.35%, neighboring district 10.86% and others 11.71%, respectively.

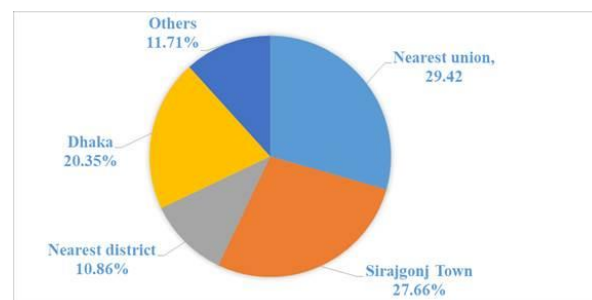
Fig. 9. Places of destination of migrated households.
Source: Field survey, 2015.

TABLE IV: PLACES OF ORIGIN AND DESTINATION OF MIGRANT HOUSEHOLDS

Places of Origin	Places of Destination in nearest union	Places of Destination outside Sirajganj Sadar Upazila
Mechhra, Kaoakola, Kalia Haripur and Saidabad	Ratankandi, Chhangacha, Baghbat, Khoksabari, Bahuli, Shialkul and Sirajganj Pauroshova	Nearest Upazila of Sirajganj, Dhaka, Gazipur, Narayanganj, Tangail, Jamlpur, Bogra, Natore, Pabna, Rajshahi, Kustia, Naogaoan, Joypurhat, Dinajpur

Source: Field survey, 2015.

The displacement of people caused by RBE takes shelter place known as place of destination [35]. Table IV and Fig. 9 revealed inter-union migration pattern and places of destination of RBE induced households. The people took shelter from origin to safer destination within nearest unions and outside Sirajganj Sadar Upazila are showed in the above table. Most of the households are out-migrants due to many crises as living place scarcity and absent economic opportunities. Present study exposes that people moved to capital and the nearest Upazila at a higher rate followed by the nearest districts such as Bogra, Pabna, Natore, Tangail, Rajshahi etc. It is also presented in the Fig. 10.

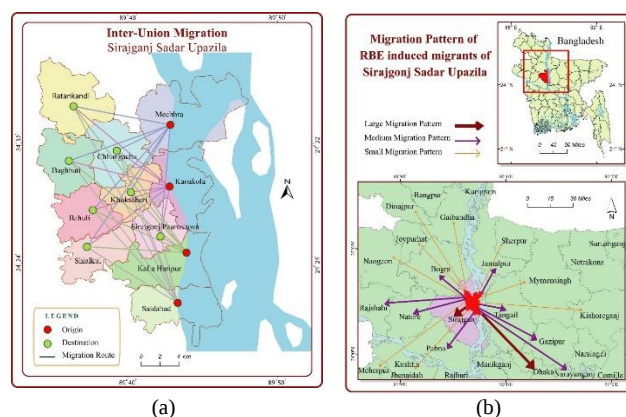


Fig. 10. Inter-Union migration pattern and places of destination of migrants of Sirajganj Sadar Upazila. Source: Union Land Office, Sirajganj and Sirajganj Upazila Office, 2015.

3. Age Group Wise Migration Pattern

Table V depicts that both temporary and permanent migration are prevalent in the study area. Different age groups of people migrate from the place. They migrate to distance place most often in search of works and residence. A number of respondents those have lack of monitory ability cannot migrate with other families to another place where no proximity of erosion.

TABLE V: AGE-WISE MIGRATION PATTERN IN THE STUDY AREA

Age group	Migration Place (%)				
	Nearest union	Main city	Nearest district	Dhaka	Others
20-25	23	4.9	9.0	27	3
26-30	33.3	4.5	4.5	31.5	7
31-35	15.1	7.3	4.5	9.0	11
36-40	13.5	31.5	4.5	22.5	9
41-45	6.7	17.9	9.0	4.5	4
45-50	4.5	2.3	4.1	0	5
50+	4.4	1.1	1.5	0	1

Source: Field survey, 2015.

Moreover, people of Bahuka, Shimla, Itali, Bali Ghugri and Pachtakuri village relocated themselves nearly to their destroyed homestead and some number of people migrate from their own living place. However, victims have to migrate in different districts to get works for their livelihood. On the other hand, sufferers firstly move to nearby place then other cities.

They study found that between 20-23 years age group of people mostly move to nearest union and also to the districts such as Bogra, Pabna, Natore, Tangail, Dhaka etc. while age group of 26-30 was found as both nearest and highest distant migrants. On the other hand, more than 35 years age of people are not intended to move far distance rather than migrating to their own district town and living through different occupation like rickshaw/van puller, day labours etc. so that, they can return to their locality after short duration of time staying. But those are more than 50 years, supposed to stay in their household due to less capability to do hard work. However, at a glance, the Table V shows that different age group of people migrate from their own living place to nearest union, main city, nearest districts, Dhaka city and many other places of the study area due to Jamuna riverbank erosion.

4. Respondents View on Causes of Migration

Though the RBE the direct cause of population displacement but the indirect causes are poor economic condition, environmental hazards, low income, unemployment, better living tendency as well as basic needs. The Fig. 12 presents the respondent's view on causes of migration of the study area.

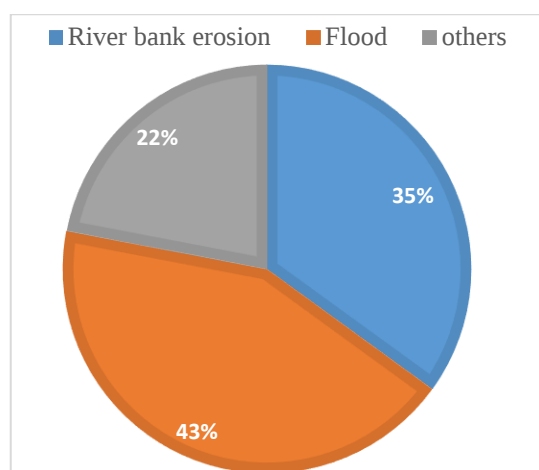


Fig. 11. Respondents view on causes of migration in the study area. Source: Field survey, 2015.

From the Fig. 11 it can be seen that majority portion of the RBE area is being affected by the flood (43%) which is more than RBE. Though RBE is significantly high (35%). Besides, other causes, basically indirect causes like low income, poor

work opportunity, to get better work and high income as well as social and living environment tendency

C. Adaptation Strategies Adopted by the Displaces

Taken adaptation strategies for the effected people can be seen from three levels, such as from governmental institutional level, non-governmental organizations (NGOs) level and stockholder level. Basically, government take three steps of measures as pre, during and post adaptation strategy. During survey, it is observed that government has built up concrete cross dam and embankment to slow down and control the flow of river as structural measure. Besides, during erosion, sand bags and concrete block are put alongside the erosion area as a measure of control. Again, after disaster GOs helps victims to resettle in a safer place through giving aids and soft loan. On the other hand, NGOs mostly work during disaster through supplying food, water, medicine etc. But the main role has to play by the victims adopting the different strategies these are-

1. Homestead Shifting

Among the losses the most harmful damage is homestead that makes people more vulnerable to lead a decent life. They stay there even losing of agricultural land and other infrastructures, yet not losing the last pace of homestead.

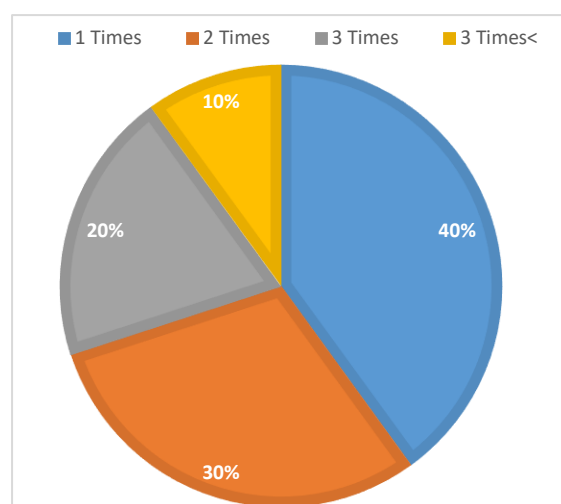


Fig. 12. Homestead Shifting of the Respondents of the Study Area. Source: Field survey, 2015.

Migration basically homesteads shifting in riverbank erosion prone area is regular phenomenon even more than once. According to the opinion of the displaces, majority (40%) people have shifted for one time during their lifetime, while 30% people for two times, 20% for three times and 10% more than three times (Fig. 12).

2. Resettle household

Though RBE creates diverse impact on affected people but more acute problem is loss of homestead. To cope with household loss resettling is one of them. To resettle their household after the disaster, the affected people expect that the GOs and NGOS should provide the homestead plot, housing materials and financial support etc. But due to insufficient help, the affected people very often unable to rebuild their damaged homesteads timely. So, to resettle their household, they also depend on their personal income, neighbourhood and relative support, money lender and only relative.

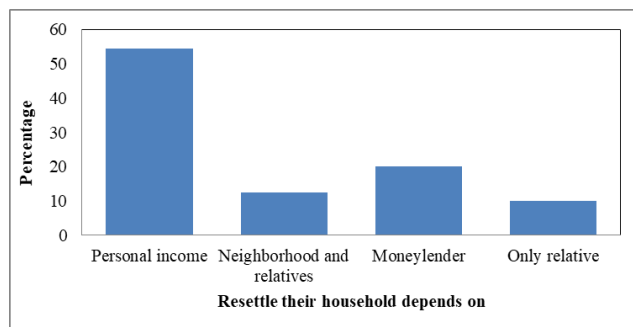


Fig. 13. Way to cope up with household loss in the study area. Source: Field survey, 2015.

Fig. 13 reveals that after disaster resettle their household is the main challenge. Most of the victims (54.5%) rely on their personal earnings in the study area. Besides, effected people have to rely on money lender as a second highest option. On the other hand, 12.5% and 10% of migrated people depends to resettle their household on neighbourhood and relatives and relatives respectively.

IV. RECOMMENDATIONS

Different structural and non-structural plans and strategies has taken by Government of Bangladesh to reduce riverbank erosion and its aftermath damages. Among them both short and long term as pre, during and post disaster management programs like build up embankment protection dam, rehabilitation of effected people, create work opportunity under social safety network programs were taken. Though a positive impact was observed of those programs but unable to achieve expected result those were fixed up in the strategies.

However, government has to be more sincere in implementation of the taken projects and programs to reach the targeted point. Government should take plan to allocate alternative shelter and farming land so that displaces can recover their lost assets and income opportunity.

Just after the event, the prime need of victims is shelter. So GOs and NGOs should take necessary steps to provide safe shelter.

After the shelter, the displaces suffer from food and drinking water crisis. To meet up the immediate needs of food and drinking water government needs to come forward with adequate assistance.

As a long-term measure Government as well as NGOs needs to formulate comprehensive RBE management programmes with integration others relevant organizations like Water Development Board, Department of Disaster Management etc.

The displaces are often suffer from health hazard and epidemic during RBE. The government should ensure health care and house as well as pure drinking water facilities.

Employment opportunities need to be created by the government and NGOs for their survival.

To resettle in a new place the basic challenge for the displaces is financial crisis, especially for to have a homestead plot and housing materials. In this circumstance, government and non-government organizations should come forward to help them with adequate assistance.

Awareness program should have been introduced in the society by the mass media.

It is observed that newly accreted land takes more than 15 years to be a productive land especially for agricultural purposes. But very often, the accreted land does not distribute among the sufferers of RBE. Government should take policies to distribute the land properly among the victims.

As a long term strategy RBE should be considered in the Property Relocation Strategy (PRS) along with RBE zoning through the institutional response and policy intervention.

To protect from RBE people use sand bag and sometimes Government take project to build up polder or cross-dam or protection wall to slowdown the flow in order to reduce bank erosion. But due to unethical mentality, the project very often does not complete timely. As a result, the construction goes to river basin before completing. So, government should pay key attention to long term and sustainable construction.

V. CONCLUSION

Based on the analysis and the findings of this research, it can be said that Jamuna is one of the most vulnerable rivers in terms of erosion. Every year a significant amount of land goes into the river of Jamuna pushes people to be homeless, landless as well as workless. Erosion has disastrous and multidimensional impact on people's livelihood assets like housing and cultivated land, earnings, crops, livestock, food, housing materials, population structure, health and sanitation as well as social status.

It destroys not only the homesteads and infrastructure, but also damages crops that increases poverty of the affected people. People displace from the homestead and losses main economic activities and social status upon which their livelihood depends. As a result, they bound to face the ambiguity of surviving in an unknown and volatile environment. This situation creates severe unemployment problem especially among the agricultural labours. Most of the people migrate from one place to another and change their occupation with life style based on intensity and number of occurrence of the events. As coping with the RBE migrants adopted different types of strategies like shifting of live and properties in order to reducing loss. It is found that some people pray to Almighty to save the housing structure and other properties. The strategies of loss-recovery, loss-reduction and shifting of lives and properties pay remarkably significant process as environmental adaptation to their hazardous habitat caused by RBE. So, GOs and NGOs need to draw attention to address the problem and take different structural and non-structural measure to minimize and proper manage the situation.

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