SOCIO-ECONOMIC IMPACTS OF GORAI RIVERBANK EROSION ON PEOPLE: A CASE STUDY OF KUMARKHALI, KUSHTIA

A Dissertation

Submitted by

A.T.M. Abdullahel Baki

MAGD-5, ID-13372004

MA in Governance and Development

Approved as to style and content by

Dr. Md. Humayun Kabir
Supervisor
&
Associate professor
Department of Geography and Environment
University of Dhaka

Institute of Governance Studies (IGS)

BRAC University, Dhaka, Bangladesh

July 2014

DECLARATION

I do hereby declare that this dissertation entitled "*Socio-economic impacts of Gorai riverbank erosion on people: A case study of Kumarkhali, Kushtia"* is the output of my own research, under the supervision of Dr. Md. Humayun Kabir, Associate professor, Department of Geography and Environment, University of Dhaka, Dhaka, Bangladesh. The whole dissertation is prepared for academic pursuit and solely aimed for the partial fulfillment for the degree of Masters of Arts in Governance and Development.

I authorize Institute of Governance studies (IGS), BRAC University to reproduce this dissertation by photocopy or by other means, in total or in part, at the request of other institutions or individuals for the purposes of research.

I further declare that this paper has not been submitted in part or in full previously for any degree or diploma either in this university or any other university. The document is submitted to IGS, BRAC University authority with due acknowledgement of the cited text and norms of research works.

ATM Abdullahel Baki

MAGD-5, ID-13372004

MA in Governance and Development

Institute of Governance Studies (IGS)

BRAC University

July 2014

CERTIFICATE

I hereby recommend and certify that this dissertation entitled **"SOCIO-ECONOMIC IMPACTS OF GORAI RIVERBANK EROSION ON PEOPLE: A CASE STUDY OF KUMARKHALI, KUSHTIA"** is a research work conducted by Mr. A.T.M. Abdullahel Baki, MAGD-5, ID-13372004, under my supervision for partial fulfillment of the requirements for the Degree of MA in Governance and Development (MAGD), BRAC University, Dhaka, Bangladesh.

Dr. Md. Humayun Kabir
Associate professor
Department of Geography and Environment
University of Dhaka

THIS RESEARCH TESTIMONY IS DEDICATED TO MY SON
AND TO THE MEMORY OF MY HEAVENLY MOTHER

SON
MAHADI ABDULLAH (NAFI)
&
MOTHER
SYDA LUTFA
LEFT THE EARTH
ON MARCH 3, 2012

ACKNOWLEDGEMENTS

At the very outset, I would like to express my greatest appreciation to Almighty Allah who has given me the opportunity to do my higher study at a very recognized institute like the Institute of Governance Studies (IGS), BRAC University. For the successful completion of my research, I am indebted to many persons and agencies.

First of all, I would like to express my deepest gratitude and sincerest appreciation to my advisor Dr. Md. Humayun Kabir, Associate Professor University of Dhaka, for his invaluable guidance, continuous support, advice and immense encouragement which helped me to triumph over many difficulties related to my dissertation.

I would also like to express my profound gratitude and heartfelt thanks to Professor Dr. Salauddin M. Aminuzzaman of Dhaka University, Dr. Rizwan Khair, Director IGS, Dr. Md. Zohurul Islam, Course coordinator, MAGD-5 for their valuable suggestions and comments which have helped me to develop the quality of the research.

I am greatly thankful to the Institute of Governance Studies (IGS), BRAC University for granting me the fund for my study. I would like to take the opportunity to extend my especial thanks to my respondents of Agrakunda, Tebaria, Sherkandi, Elongi, Elongi Acharya and Baruria for their kind cooperation and helps in the field during data collection. I consider myself very lucky to have nice cooperation from the local people. My sincere thanks are also due to District Statistical Office, Kushtia and Upazila Statistical Office, Kumarkhali for providing important data related to my dissertation.

I am indebted to all the participants of MAGD-5 and officials of the Institute of Governance Studies (IGS) for their constant support and encouragement. I am also grateful to Mr. Md. Moniruzzaman Manik, one of my bosom friends for his cooperation while conducting field survey. Finally I am deeply indebted to my beloved wife Mahim Sultana (Ely) for her immense moral supports towards me, and my son Mahadi Abdullah (Nafi) who has brought good luck for me from the Almighty.

A.T.M. Abdullahel Baki

ID-13372004, MAGD-5

ABSTRACT

The purpose of this research was to identify socio-economic impacts of riverbank erosion on people of Kumarkhali. It was hypothesized that the socio-economic impacts of riverbank erosion on affected people are quite significant and enormous. The findings of the study reveal that affected people have experienced substantial socio-economic impoverishment. At Kumarkhali point the erosion of Gorai solely started in the 40s of the last century. But at that time the erosion was not so remarkable for the inhabitants. A large number of people think that it took severe form specially when the river Kaliganga and the Dakatia were blocked at the time of implementing GK Project in the 50s. Some others believe that heavy siltation due to the lack of natural flow of Gorai as because of the Farakka barrage is another important reason of continued erosion. Whatever might be the reason all most 100% of the people on the bank line of Gorai had/have suffered due to erosion. Loss of homesteads, cultivable lands, kitchen garden lands & home yard lands have played vital role for the change of their livelihood pattern. Due to this they have lost their familial and social ties, have got separated from their kith and kin, and most painfully income erosion have turned them from well-off to poor overnight.

Irony is that several measures have been taken to control erosion from late 1960s to mid 1990s of the last century. But erosion continued as those measures were not taken at the right time. Even no consultation has been made with the victims when groin or revetment was made. 100% victims have said that, they are not consulted at the time of making groin or revetment. In a third world country like Bangladesh policy planning and implementation is almost a top-down approach. Moreover the policy is very often political motive and personal interest driven. It does not fulfill the need of the people. Hence governance is a very important issue for the effective planning and execution of the policy. Bad governance works as a catalyst for increased vulnerability of the people. Riverbank erosion at Kumarkhali is a classic example of this and that's why the people of the locality are suffering generation after generation.

Policy makers will have to learn from this experience and top down approach at the time of policy planning should be avoided.

Lack of good governance always increases the vulnerability of the people. So without good governance no development is real development. At the time of planning and implementation the policymakers should keep it in mind otherwise development will not be purposeful, sustainable and effective.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

List of Abbreviations and Acronyms

AC (Land) - Assistant Commissioner (Land)

BBS-Bangladesh Bureau of Statistics

BWDB-Bangladesh Water Development Board

COAST- Coastal Association for Social Transformation Trust

Ex-En.- Executive Engineer

GBM-The Ganges-Brahmaputra-Meghna

GK Project- Ganga-Kabodak Project

ha- hectare

IGS- Institute of Governance Studies

ISPAN-Integrated Strategic Planning and Analysis Network

JRCB-Joint River Commission Bangladesh

LGED-Local Government Engineering Department

NGO(s)-Non-Government Organization(s)

NWMP- National Water Management Plan

RBE- Riverbank erosion

SAE- Sub-Assistant Engineer

SPSS-Statistical Package for Social Sciences

USD- United States Dollar

VP- Vested Property

Chapter 1

INTRODUCTION

1.1 Background

Riverbank erosion is a common issue to many countries in all parts of the world; though the nature and impact of erosion may vary. It is a big problem to the socio-economic sector of our country too.

Bangladesh is situated at the convergence of three mighty river basins -the Padma, the Brahmaputra and the Meghna. The catchment area of the three major rivers is about 1.7213m square km (JRCB Website). According to JRCB; catchment areas of major rivers flowing through Bangladesh are shown in the following table:

Table-1.1: Catchment Area of Major Trans-Boundary Rivers

Rivers	Total catchment area (sq. km.)	Country-wise catchment area (Sq. km.)				
		India	Nepal	Bhutan	China	Bangladesh
Brahmaputra	552,000	1,95,000	-	47,000	270,900	39,100
Ganges	10,87,300	8,60,000	147,480	-	33520	46,300
Meghna	82,000	47,000	-	-	-	35,000
Total	17, 21,300 (100%)	11,02,000 (64.02%)	147,480 (8.57%)	47,000 (2.73%)	304,420 (17.69%)	120,400 (7%)

The sediments are washed down from highlands on three sides of the GBM basin. Over 92 % of the annual runoff generated in the GBM catchment area flows through Bangladesh, although it comprises only about 7% of the total catchment area (Coleman, 1969). The sediment discharge of the GBM river system is the highest of the world (Kuehl, Hariu and Moore, 1989). It has been estimated to be about 1050 million tons annually in the Bengal basin (Milliman et al., 1995). About 600 million tons of which are deposited in the Bengal delta itself (Meade, 1996). As a result the river bed is getting silted and losing its depth. Also the river bed configuration is being adjusted frequently and consequently the river channel is shifting. These all are responsible for flooding and riverbank erosion (Elahi et al, 1991).

About 700 rivers (including tributaries and distributaries) of Bangladesh have almost 2,400 kilometers of bank line in our country. Along with the bank line there are 283 locations, 85 towns and growth centers are vulnerable to erosion (Islam et al, 2011).

During 1970-2000, two of the main rivers the Padma and the Jamuna have consumed 180,000 ha of land (Islam et al, 2011). In 2008, bank erosion of the Padma, forced about 200,000 people to be homeless (The Daily Jugantor, 2008). Moreover 1,630 acres of mainly agricultural land, 370 settlement areas, 3,930 meters of road, 9 educational institutes, 5 hats and bazaars and 1 union parishad were eroded (Islam et al, 2011).

Satellite image on the three major (GBM) rivers gives information that about 106,300 ha of land was lost in ten years from 1982 to 1992. Conversely the amount of accreted land was only 19,300 ha. So the net annual loss was 8,700 ha during this span of time. It is estimated that about one million people become directly or indirectly affected by riverbank erosion every year (Islam et al, 2011).

From ISPAN made study, it was found that a total of 728,439 people were displaced from their original homesteads by riverbank erosion during 1981-1993. It was also estimated that annually the number of displacees to be 63,722. Four million of such homeless people are compelled to lead a suspended life in Bangladesh (Islam et al, 2011).

A report prepared by Geography and Environment Science Department of Jahangirnagar University on the losses of riverbank erosion from 1996 to 2000 (COAST Trust, 2007), gives the following picture (Table-1.2);

Table 1.2 Losses of Erosion from 1996-2000

Year	Financial Loss (in millions)	Affected areas (Acres)	Affected population
1996	5,809	71,680.4	10,103,635
1997	33,012	7,756	1,73,090
1998	2,201	41,519	3,21,000
1999	10,535	2,27,755	8,99,275
2000	3,286	2,19,310	4,16,870

Source: COAST Trust, 2007

From this chart it is quite evident that financial loss due to riverbank erosion is remarkable. Affected areas and affected people are also a large number.

So riverbank erosion is one of the most influential calamities Bangladesh is facing every year. Socio-economic impacts of this calamity on people are also huge.

1.2 Problem Statement

Bangladesh is suffering from acquit riverbank erosion. It has been estimated that between 2,000 to 3,000 kilometers of river-bank line experience major erosion annually (Islam and Islam, 1985). Erosion compels millions of people to be displaced from their place of origin.

More or less all the rivers of the country, whether big or small, are responsible for erosion at various points on their bank lines. According to a study report prepared in 1991 that 100 administrative units out of 462 were subject to some form of Riverbank erosion of which 35 were serious, and affected about 1 million people on a yearly basis (Department of Disaster Management, 2012). Annually rivers erode 10,000 ha of land in our country (NWMP, 2001) and make thousands of people landless and homeless. Along with floodplain, the country also loses several kilometers of roads, railways, and flood-control embankments annually. No other disaster is as disastrous as riverbank erosion in terms of long term effect on people.

The two principal resources of our country are its land and people. Maximum of the people are solely dependent upon small holdings as owner- occupiers, tenants, sharecroppers, or as landless labourers. As the socio-economic impact on people due to bank erosion is heavy it demands extra attention at the time of policy making. Moreover, due to erosion not only the resources are lost but also additional resources are required to manage erosion.

The river Gorai is a distributary of the Ganges. It is an important artery for Bangladesh, as it is the source of fresh water for the south-western part of the country (Addams, 1919).

The Ganges has entered Bangladesh at a point of Chapai Nawabganj and takes the name “The Padma”. At Talbari of Kushtia the Gorai takes off from the Padma. After about 190 kilometer from the off-take the river flows into the Bay of Bengal. According to DHV-Haskoning (2000) the Gorai was possibly first developed during the fourteenth and the fifteenth centuries. The planform of this river changed due to changes in the planform of the Ganges (Clijncke, 2001).

This river is used for various purposes as navigation, fisheries, agriculture and household activities. Moreover, the fresh water flow of the river is also important for many

economic activities. The ecology of the mangrove forests situated along the coast is also greatly influenced by Gorai river flow (Raalte, 2013).

Gorai was a strong river with full flow of water. The Ganga –Kabodak (GK) Irrigation Project was implemented in 1954-55 (Banglapedia, 2003). At that time the two distributaries of Gorai the Dakua and the Kaliganga were blocked for making canals and the two distributaries became dead. Water flow in the Gorai got hampered at that time and so is the current. Once again its flow got hampered when the Farakka Barrage was launched in1975. "During the eighties and nineties the flow in the river gradually slowed down, especially in the dry season" (Raalte, 2013). The Hindu (1997) has said quoting the project director of The GK Irrigation Project that "the Gorai stopped flowing in 1988-89". "From that time discharge of the river started decreasing rapidly and annual sedimentation rate was significantly increasing" (Raalte, 2013). As a result the river was losing its depth day by day and bank erosion at various point of the river Gorai was accelerated.

Because of Gorai riverbank erosion at Kumarkhali point from Baruria to Agrakunda, people have lost their homesteads, cultivable lands; two important educational institutes and also the Kumarkhali-Baruria and Kumarkhali-Tebaria-Agrakunda roads have been destroyed.

The Gorai depends upon on the Padma for its flow. Like the mother river Padma, Gorai is also erosion prone. Because of erosion a groyne was made at Kushtia point to save the town. Same thing has happened at Kumarkhali point. At first a groyne was made at Baruria about two kilometers east to Kumarkhali. But it failed to serve the purpose as erosion continued. Then a second groyne was made at Kumarkhali point to control the erosion. Still erosion continued and along with homesteads educational institutes, cultivable lands, roads were eroded. Many people losing their homestead took shelter in nearby rural areas, nearby land or on Khasland. Many people losing their livelihood were compelled to look for alternative sources of income. In a word the life pattern of many people had been changed being victimized by Gorai riverbank erosion.

Erosion victims face many unavoidable problems at different stages of displacement. Displacement marginalized them in respect of livelihood patterns and psycho-physical problems. Such forty million people uprooted from their home are compelled to lead a floating measurable life (Islam et al, 2011).

Also Gorai riverbank erosion victims have gone through heavy socio-economic problems. Not enough initiatives were taken for the settlement of the displacees. Many of the uprooted people losing cultivable lands and livelihood became poorer.

Keeping the above things in consideration this study tries to identify the nature of socio-economic impacts on the people caused by Gorai riverbank erosion and consequences as because of this.

1.3 Objectives: Main objective of this study is to analyze the socio-economic impact on people due to Gorai Riverbank erosion at Kumarkhali point, Kushtia

1.4 Research Questions: In respect to the above objectives the following research questions are important considerations-

(a) Whether the livelihood pattern of the displacees has been changed?

(b) What type of change has been occurred?

1.5 Rationale of the Study

Maximum of the major rivers of our country are trans-boundary rivers of Bangladesh and India and have come to Bangladesh through India. Dams have been made over many of the rivers by India and on the upper stream of cross-bordered rivers India has been making diverted flow through using different hydrological technologies like establishment of embankment and so on. As a result on the lower stream the natural flow of water is being hampered and the depth of the river is getting reduced day by day by siltation. When stress applied by the rivers exceeds the resistance of the Riverbank material, erosion occurs (Islam et al, 2011). As maximum of our rivers has got silted, erosion is very common in our country.

Same thing has happened in case of Gorai because of Farakka –Barrage. “Inadequate flows to carry the high silt load have raised the height of the riverbed at its off take point from the Ganges, three meters higher than the main river” (The Hindu, 1997). That’s why Gorai is now highly erosion prone and erosion-induced displacees are numerous.

The invariable threat of riverbank erosion was contributed to a substantial disaster subculture in the riverine zones of Bangladesh (Hutton et al, 2003). Severe river erosion by major rivers which has caused enormous socio-economic impact on people’s life has got special attention from both the policy makers and the researchers & academicians.

But small rivers which causes erosion slowly and have long-term influences, have failed to get proper attention from the policymakers and researchers & academicians. Same thing has happened in case of Gorai river erosion at Kumarkhali. As a result two Groins in two-kilometer have been constructed but they have failed to meet the demand. Along with many homesteads, one of the most ancient schools of the country Kumarkhali M. N. Pilot High School which was established in 1856 and another important institution Kumarkhali Degree College, and Kumarkhali-Tebaria, and Kumarkhali-Baruria roads have been collapsed to the river. Finally about a kilometer revetment had to make to save Kumarkhali town.

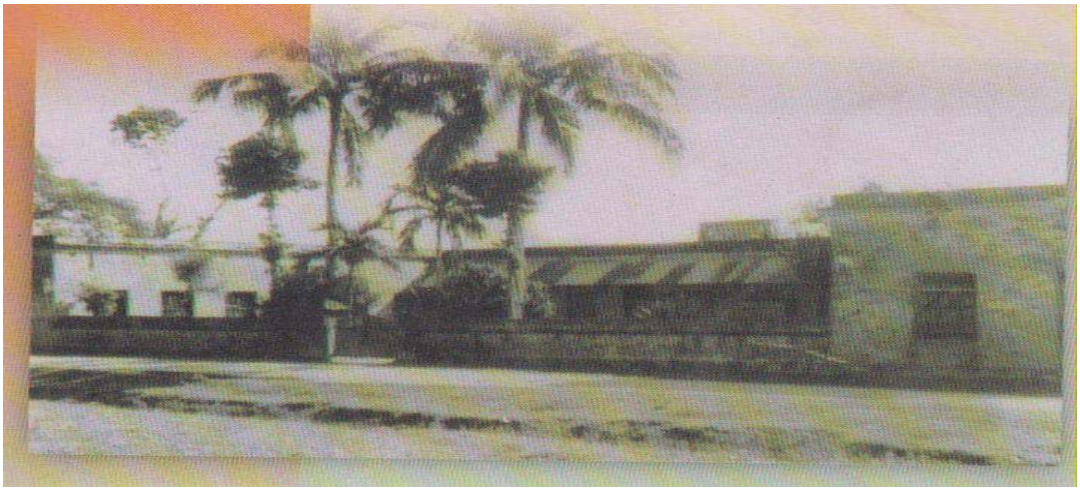

Figure 1.1 Old building of Kumarkhali M. N. Pilot High School (North faced) in 1980s (The river Gorai was far away to the south).

Figure 1.2 Present situation (2014) of the place where Kumarkhali M. N. High School was located (Marked Circle).

Though revetment was constructed finally but before that many people are displaced. No remarkable initiatives had been taken by the government for the resettlement of the displacees. Even they failed to have attention from the NGOs. This study is carried out to know the socio-economic change the displacees have gone through and still the problems they are facing. This study can help the development organizers to take new initiatives for the economic development of the victims. It can also help the policymakers to understand the nature of socio-economic problems of the erosion induced displacees and to take pro-people policy for development of the locality.

1.6 Scope and Limitation of the Study

Every study is accompanied by some scope and limitations. This study is not different from that. The scope and limitations of this study are given below.

1.6.1 Scope of the Study

Riverbank erosion displacees face many unavoidable problems in different times of displacement, i.e. before displacement, during shifting household materials and family members and after displacement at new settlement area. Displacees live in an area for long time - from generation to generation. Due to riverbank erosion, they are forced to migrate from their places of origin to other places. Displacement due to riverbank erosion marginalizes them in respect of livelihood patterns and psycho-physical troubles (Islam et al, 2011).

The troubles, problems and losses the displacees face are losses of land and changes in land holding capacity, changes in economic activities and loss of income, loss of house structure, loss of crops, loss of security and so on (Islam et al,2011).

This study will try to find out the nature of socio-economic impacts due to Gorai riverbank erosion. The findings can help the policy makers to make proper strategy to address riverbank erosion-induced problems in Kumarkhali as well as in other erosion-prone areas of the country.

1.6.2 Limitation of the Study

This research is an academic one with limited time, money constraint and small study area. So, it is probable to have some error. During field work some odds had to face in collecting data and documents. They are-

Time constraint: Time provided for the research is very limited. Only two months and a half is not a sufficient time to conduct a quality research. Time for collecting data is not enough. Also qualitative study requires more time to analyze data collected. At the same time extra time is required to design the research in the light of new developments and insights.

Money constraint: Amount of money allocated for the research is too low.

Non-availability of data and documents: For collecting reliable data a good understanding between the interviewer and informants is required. If the informants cannot take the interviewer with confidence they may be conservative in providing proper information. For that interviewer has to give enough time to make good rapport with key informants. With limited time it is difficult to ensure it. Another challenge is the difficulty in having documented information from officials. Sometimes documents may not be found readily available and considered confidential. Sometimes the public offices simply decline to provide any data. In case of this study it is found that getting data from the public office is quite tough. The AC (Land) office is responsible for maintaining all types of land related records in the Upazila. But irony is that AC (Land) office, Kumarkhali has no data about eroded cultivable lands. The situation of BWDB, Kushtia office is more than worse. The Executive Engineer has simply declined to provide any data.

Selective study area: The study area was small and selective. There may be some variation as sample was taken from a particular geographical location for time and budget constraint.

Determination of various losses: Losses for homesteads, cultivable lands and kitchen garden/home yard land are calculated on the basis of the value (approximately) given by the respondents. Remarkable variation may be observed. But it does not influence the findings broadly.

Determination of Sample size: Due to unavailability of the number of affected households the perception of local elderly people has been used in determining the sample size. According to them the half of the total households has been affected.

Chapter 2

LITERATURE REVIEW

2.1 Erosion

The word erosion has come from the Latin term “rodere” (NSW DPI Website). It means ‘gradually reduce’, the same origin that gives us the word ‘rodent’. Simply erosion means soil removal from the earth’s surface. According to Dictionary.com, it is process by which the surface of the earth is worn away by various agents like water, winds, waves etc.

From different point of views the conception of erosion may vary. From biological point of view, Erosion is “the changing of a surface by mechanical action, friction, thermal expansion contraction, or impact (Wiktionary Website).” The Connotation sounds a little bit different in agriculture. In agriculture, soil erosion refers to the wearing away of a field's topsoil by the natural physical forces of water and wind or through forces associated with farming activities such as tillage (Ritter, 2012). In Geology “erosion is the process of the movement of loosened or weathered materials from one place to another, and occurs due to the agents of erosion -wind, moving water, moving ice, and gravity (Answers.com Website).”

So erosion is the process by which soil and rock from the earth's surface are removed by exogenic processes such as wind or water flow or by any other natural or human activities, and then transported and deposited in other locations. It is a soil degradation process by wind forces or water forces (Oldeman, 1991-92).

Though erosion is a natural process, excessive erosion causes desertification, decreases in agricultural productivity due to land degradation, sedimentation of waterways, and ecological collapse.

2.2 Riverbank Erosion

Riverbank erosion is a “geo-morphological process of alluvial floodplain rivers”. Simply it is defined as the process of wearing of the banks of a stream river. It is because of bank adjustment, bank trampling, and changes in bed elevation and topography in reaction to modified flow conditions or bank resistance. Bank erosion is a natural process; without it rivers would not meander and change occurs (Wikipedia Website).

Severe riverbank erosion causes heavy displacements along the bank line of the rivers and impacts result in the socio-economic change.

2.3 Impacts of Riverbank Erosion

Impacts of riverbank erosion on people, society, culture, environment and ecology are very high. Increased erosion leads to decreased water quality that negatively impacts in-stream health and lead to the loss of native species. Plants growing on the bank reinforce the soil and provides over hanging trees, bushes, grasses and reeds that provide shelter for fish and other aquatic organisms. Tree roots growing along the bank also provide habitat for fish and other animals. When riparian vegetation is removed habitat for aquatic animals declines. Erosion can produce wider, shallower streams with uniformly sandy beds- unsuitable habitat for many aquatic organisms.

Erosion of riverbanks creates bare, disturbed surfaces which can be a focal point for wild plans colonization and penetration into river landscapes. When sediment settles to the bottom it covers the living space for many bottom-dwelling plants and animals. Sediment can block sunlight for aquatic plants, can clog the gills of fish, and reduces the amount of dissolved oxygen in the water, which is necessary for aquatic organisms to survive.

Many riparian areas are valued as sites of cultural and spiritual significance. Accelerated erosion of riverbanks can directly undermine cultural artifacts such as wharfs, bridges, buildings and monuments. Erosion of riverbanks can negatively impact on the cultural links people have to the special parts of the landscape.

Riverbank erosion plays a major role in socio-economic changes too. The displaced people experience substantial socio-economic impoverishment and marginalization as a result of compelled-displacement from the original residence (Islam et al, 2011). Due to erosion the displacees suffer from poverty, income erosion, occupation change, displacement, social destruction, degradation of quality of life and many others.

2.4 Socio-Economic Impact

The word ‘socio-economic’ is used to describe something that relates to or is concerned with the interaction of social and economic factors. It is basically, income and social position that is used to measure the status of a family or an individual in a community (Ask.com). According to businessdictionary.com ‘socio-economic’ refers to things that involve economic and social factors. Socio-economic factors include income, education, occupation, and involvement in the community.

A socio-economic impact assessment examines how an incident changes the lives of residents of a community (Edwards, 2000) - the change of lives of the residents in terms of income, education, occupation, involvement or belongingness, standard of life.

According to Mary Edwards (2000) the indicators usually used to measure the potential socio-economic impacts are-

- Changes in community demographics
- Demand for housing
- Changes in employment and income levels
- Changes in the standard of life of the community

Demography: Demographic impacts include the density and distribution of the people and any change in the composition of the population (e.g. age, gender, ethnicity, income, occupational characteristics, educational level, or health status).

Housing: It is strongly related to a community's land use, social bond and security. Displacements due to disaster break the community's land use pattern, social bond and security.

Employment and Income: Development directly influences changes in employment and income opportunities in communities. Similarly disaster like riverbank erosion that causes displacements etc also directly influences the employment and income of the people of the community.

Standard of life of the community: When the people are compelled to compromise with their basic and fundamental needs the standard of life deteriorates. When people lose their income sources or when their incomes erode usually standard of life falls.

2.4.1 Socio-Economic Impacts of Riverbank Erosion

Riverbank erosion has terrible socio-economic impacts on people in our country. Very often it creates adverse effects on people damaging standing crops and infrastructure, destroying settlements and disrupting communications. The degree of economic loss and sufferings of people has increased in recent years and the total monetary loss is estimated to be approximately USD 500 million a year (Hasan, 2011).

Riverbank erosion displacees' losses are unbound. Besides the loss of land, they also lose other things, and being homeless, they become assetless too. Erosion victims lose their agricultural and homestead lands in one hand and on the other hand they become rootless, ousted from their community, breaks down their family ties and social bondage. The effect is enormous and the loss is quite impossible to regain.

2.4.1.1 Demographic Change

Riverbank erosion displacees frequently move to other places for shelter. Thus they get separated from their well-known society. They lose their social bond. Also their family ties breakdown. The joint family system is one of the most ancient traditions of our country. The joint family culture also gets hampered due to erosion.

2.4.1.2 Resettlement Issue

Due to riverbank erosion many people lose their homestead and houses. When erosion is slow they can shift their household materials. But when erosion takes place rapidly and comes towards their houses, they all together dismantle their houses themselves pursuing to shift household materials. But all of them do not get enough time to take house materials. Many of them become victims of such incidents several times. Smaller owners of lands suffer a lot. After getting uprooted from the living place searching for homestead land becomes the main priority and a few of them can manage to become landowner. Sometimes they become destitute and live in *Khasland*[1].

2.4.1.3 Income Erosion

Any kind of displacement has direct impact on regular sources of income and income generating activities of the displacee households. Loss of income compelled them to live a sub-standard life and they could not continue their way of living even parallel to the way before displacement. They face difficulties to find new sources of income in new settlement areas. Riverbank erosion displacees take shelter in distant places or migrate to urban areas. The landless and jobless heads of the households under financial duress often desert their families. Left alone, women of those households has to struggle hard to maintain their family.

Bank erosion causes dislocation of huge people- many of them permanently. Besides, the demographic and socio-economic consequences of riverbank erosion are far reaching and often enormous in our country (Islam et al, 2011). Estimation shows that 50 percent of the total homeless people are victims of riverbank erosion and they cannot rebuild their home due to poverty and scarcity of resources (Islam et al, 2011).

[1] The land not owned by any individuals rather owned by the government itself.

Erosion induced displacees go through various problems- personal, familial and social. One major personal problem is related to income erosion that leads them to live a substandard life. As displacees' incomes are eroded it influences their amount of food-intake, health care, education of the children.

Loss of cultivable lands: Due to riverbank erosion many farmers become poor overnight. As agriculture is the main livelihood for maximum people, losing cultivable lands economically they become vulnerable. Finding no other alternatives maximum farmers become day- labourer. Sometimes they fail to cope with changed situation.

Loss of Industry/ grocery shops/ business centre: Some sort of loss of Industry/grocery shops/ business centre is found in every situation faced by the erosion affected people. Many people losing all these types of livelihoods become from poor to poorer.

Loss of kitchen garden/home yard land: Trees and plants sometimes become the alternative source of money to the rural people. Mango jackfruit, Papaya trees are available in many houses. They eat these fruits and sometimes earn money selling the fruits in local market. The trees also provide wood. Meeting their household demands they sell trees for money. In rural areas of Bangladesh bamboo trees are very common in almost every house. The bamboo not only meets their domestic needs but also helps to earn some money. But due to erosion the victims lose all the scopes.

2.4.1.4 Degradation in Quality of Life

River erosion induced displacees very often go through heavy social change. The impacts on the displacees may be positive or negative. But In most of the cases the impacts are negative. Due to riverbank erosion the victims lose their homesteads, cultivable lands, crops, livestock, plants and trees, business centers etc. Losing all these they suffer from income erosion and are compelled to lead sub-standard lives. They cannot spend more money for food, heath care, education and other necessary things of life.

2.5 Influence of Bad Governance

For proper implementation of any development policy, participation of the people, who are directly or indirectly related to this, is badly important. People who would enjoy the benefit of this development should own it. Otherwise it may not serve the purpose effectively. But like most of the developing countries in our country the participation of

people in development is not well accepted. Development work is very often not need-based rather political will and personal interest-driven. So it fails to ensure transparency and accountability. It is because of lack of good governance. In the following context the limitations in terms of governance issue are very often observed in our country.

Interest driven and political motivated policy: Because of the lack of commitment from the political leaders and policy makers very often interest driven and political motivated projects are taken.

People's participation: In our country development is a top-down approach. People have rarely any participation. As a result they do not own development and frequently it fails to serve the purpose. As a result sufferings of the people remains as it are and development is very often wastage of national assets.

Proper and timely policy: Government takes various measures to control erosion. Unplanned, untimely and political motive-driven initiatives have less positive impacts on socio-economic vulnerabilities. So sufferings and degradation of standard of life of the people continue.

2.6 Conceptual framework

Due to riverbank erosion displacees go through heavy loses of wealth. As a result they become assetless and subsequently, poorer than before. This loses lead to income erosion of the victims. They are compelled to lead a painful and measurable life. Their standard of life falls and vulnerability of life increases.

Government takes various initiatives to control erosion. Local people get less scope to participate in decision making, and actually it is imposed from the top. Policy taken is very often less effective. As a result development does not fulfill the purpose and results into wastage of public wealth. It does not help in increasing the standard of life of the community.

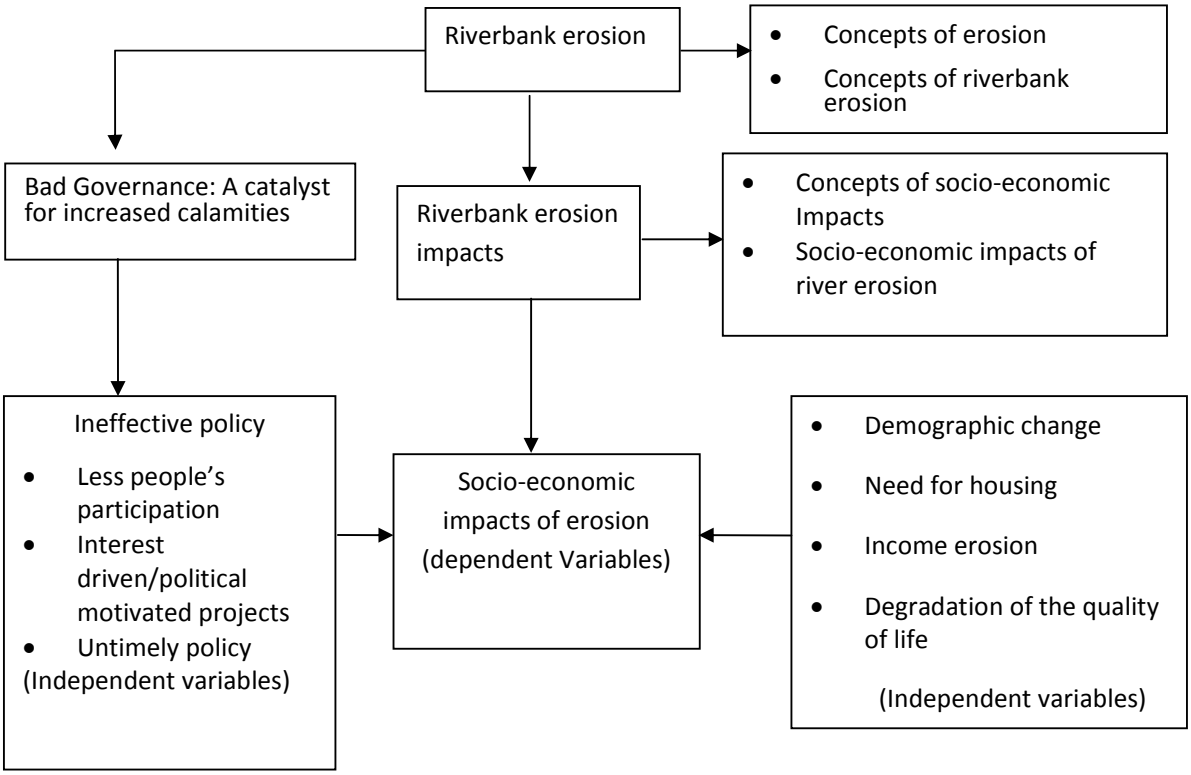

Figure-2.1: Conceptual frame work

Chapter 3

RESEARCH METHODOLOGY

This chapter contains the research methodology of the study. The chapter deals with various steps- study area selection, sample design and procedure, sample size determination, data processing, analysis- for completion of the research. Actually it focuses on the methodologies followed for conducting the research work from selection of the study area to analysis of the final report. For the present work data collection methods and techniques were mainly household questionnaire survey and informal discussion with the aged people who have experienced erosion.

3.1 Selection of the Study Area

For the present research work of riverbank erosion, Kumarkhali point has been selected purposively for the following criteria.

- Kumarkhali municipality which was established in1869 is one of the earliest municipalities of undivided Bengal [Banglapedia, 2003(a)]. The most important part of the municipality has been collapsed to the river Gorai. So the impact is huge.

- The river Gorai follows just by the side of the town. So it has important influence on the people of Kumarkhali municipality and its adjacent area- Tebaria, Agrakunda (to the east of municipality) and Elongi and Baruria (to the west of the municipality). Due to erosion many people of these areas have been suffering from generation after generation.

- Due to Gorai Riverbank erosion not only the homesteads and cultivable lands are destroyed but also important educational institutes, industries, roads have been destroyed. So the erosion has influenced the national economy as well.

- Two groins – one at Baruria in 1973-74 and other at Sherkandi in 1973-74 - were constructed to control river erosion at Kumarkhali. But both have failed to serve the purposes. The reasons behind this and people's perception may be an important lesson for policy makers.

Riverbank erosion is common matter in our country. So numerous studies have been made on riverbank erosion especially bank erosion caused by the major rivers like The Padma, the Brahmaputra and the Meghna. But small rivers that cause bank erosion

slowly but make huge impact on local people often do not get appropriate attention from the policy makers as well as the researchers and academicians. In this regard Kumarkhali could be an interesting study area on riverbank erosion.

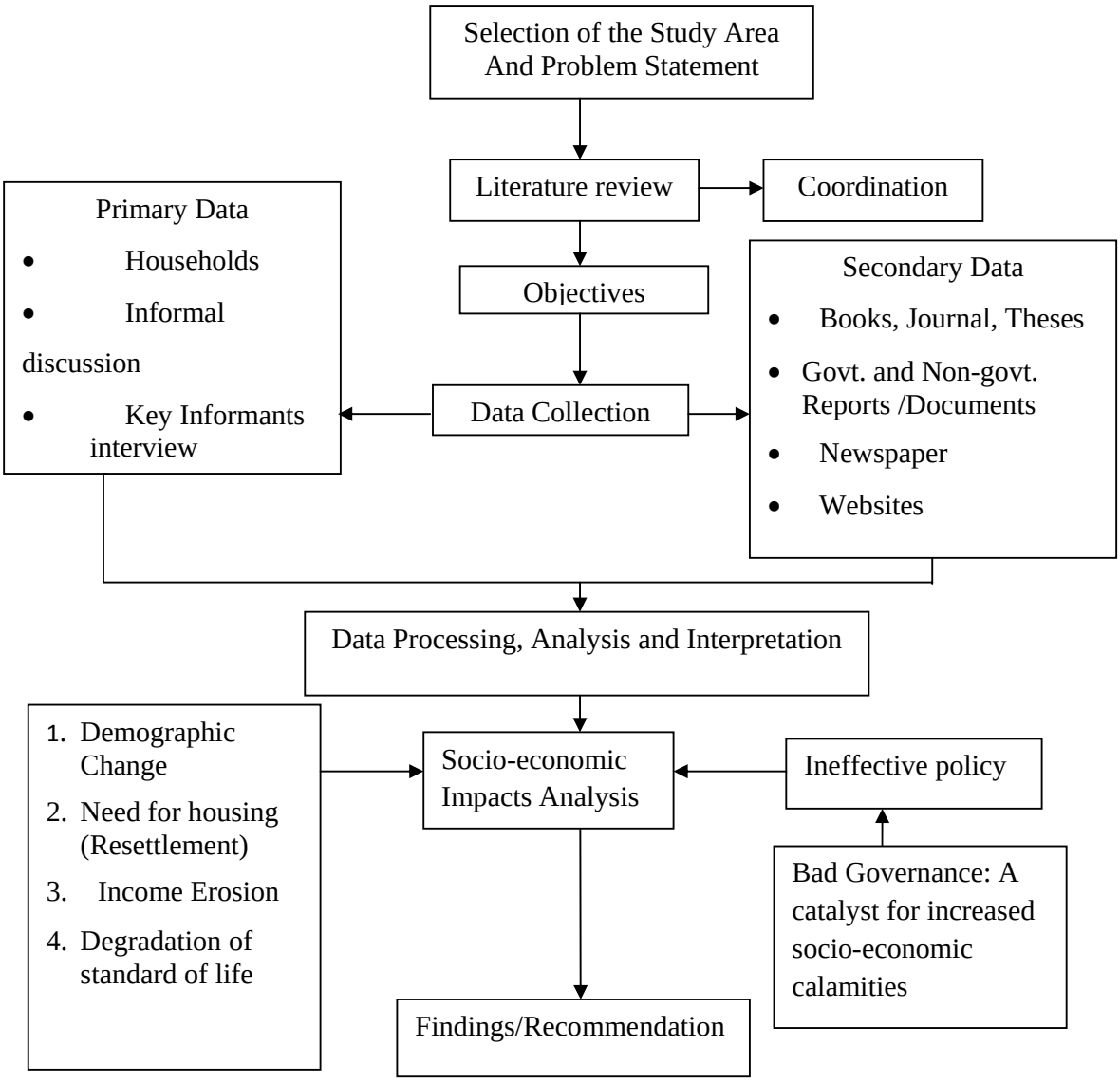

Figure-3.1: Research Frame Work

3.1.1 Erosion Prone Area of Kumarkhali Upazila

The big river Padma is flowing at the north of Kumarkhali and Gorai just by the side of Kumarkhali town. So the Upazila is experiencing erosion at various points on the bank line of two rivers.

Table-3.1 Erosion Prone Areas of Kumarkhali Upazila

Sl no.	Union/ward	Mauza	Sl no.	Union/ward	Mauza
1	Chapra Union	Bahala Gobindapur	28	Nandalalpur	Elongi Acharya
2		Bharara	29		Habashpur
3		Chapra	30		Kashimpur
4		Chewria	31		Sandaha
5		Dharma para	32	Sadaki	Agrakunda (Part)
6		Dheki para	33		Hizlakar
7		Jaynabad	34		Pathar Baria
8		Kaburhat	35		Uttar Mulgram
9		Lahini para	36	Sadipur	Bagunda bathan
10		Sauta	37		Chandpur
11	Jaduboyra	Hansdia	38		Bhairabpara
12		Jaduboyra Araji	39		Gobindapur
13		Keshabpur	40		Ghospur
14		Uttar Chandpur	41		Ebrahimpur
15	Jagannathpur	Char Bhabanipur	42		Sreekol (part)
16		Hasimpur	43	Shelaidah	Chhoto Majgram
17		Jagannathpur	44		Char Jorarpur & Jorarpur
18		Mahendrapur	45		Hamir Hat
19	Koya	Gattia	46		Kalyanpur
20		Ghorai	47		Khorshedpur
21		Paschim Koya	48		Parkotpara
22		Koya	49		Kamarkandi
23		Sreekol (part)	50		Chhoto Parkotpara
24		Baradi	51	Pourashava	Agrakunda (part)
25		Sultanpur	52		Tebaria (part)
26	Nandalalpur	Baruria	53		Sherkandi
27		Elongi (part)	54		Kundapara

Source: Upazila Statistics Office, Kumarkhali, 2014

3.2 Sampling Design

3.2.1 Sampling Procedures and Methods

The study area covers three villages of Nandalalpur Union, five paras of Kumarkhali municipality and one village of Sadaki Union. From the villages and paras individual households are selected randomly. The sample design and procedures are presented in the following manner.

Table-3.2 Sampling Procedures and Methods

Step	Sampling techniques	Description	Outcome
1	Purposive sampling	Selection of Kumarkhali point based on the criteria of the study site mentioned in section 3.1	Kumarkhali point
2	Purposive sampling	Seven villages/wards have been selected purposively for household survey	Four villages and five paras
3	Simple random sampling	Selection of households	Individual households

Table-3.3 Population Data of the Selected Villages/Paras

Sl no.	Name of the Village/para (According to the erosion-prone area, Table-3.1)	Population (Census- 2011)	Households
1	Baruria (Nandalalpur Union)	1574	399
2	Elongi (Nandalalpur Union)	3436	869
3	Elongi Acharya (Nandalalpur Union)	1149	271
4	Elongi para (Paschim, Kumarkhali municipality)	2018	519
5	Kundupara (do)	1286	320
6	Sherkandi (Paschim, do)	2477	559
7	Tebaria (Dakshin, do)	2388	590
8	Agrakunda (part, do)	993	226
9	Agrakunda (Part) (Sadaki Union)	420	111

Source: Compiled (Data provided by Upazila Statistics office, Kumarkhali, 2014 and Population census-2011)

3.3 Determination of Sample Size

The data of erosion affected households are not available. Not all the households are affected rather only the households used to live on the bank of river are affected. Assuming the number of affected households from the informal discussion with elderly people of the locality to be half of the total households the sample size are determined by using following formula given by Miah (1993):

$n=N/\{1+N(e^2)\}$

Where, n= sample size

N= Total number of households=399+271+869+519+320+559+590+111+226=3,864

e= level of precision=7% (assumed)

So, $n= 3864/\{1+3864(7\%)^2\} =193.84=200$ (approximately)

If the affected household is half of the total households then n is assumed to be 100.

Table-3.4 Number of Respondents

Sl.	Name of the villages/paras	Total no. of households	Sample of households
1	Baruria (Village)	399	10
2	Elongi Acharya (Village)	271	8
3	Elongi (Village)	869	25
4	Elongipara (Paschim) (Urban)	519	11
5	Kundupara (Urban)	320	8
6	Sherkandi (Urban)	559	12
7	Tebaria (Urban)	590	15
8	Agrakunda (Part) (Urban)	226	07
9	Agrakunda (Part) (Village)	111	04
Total		3,864	100

Household data source: Population Census, 2011

3.4 Data Collection Method

Data collection has been done for a week from 14.03.2014 to 21.03.2014 and information for this study has been collected through primary sources. In addition to secondary data has been collected from various organizations, Newspapers, Journals and other published literary works on Riverbank erosion.

3.4.1 Primary Data

Primary data has been collected from the local people – both victims and people who have witnessed Riverbank erosion- using both methods of formal and informal interviews with the households and key informants through the questionnaires. Informal discussions with various classes of people and direct field visits have also been done.

3.4.1.1 Household Questionnaire Survey

In order to carry out household survey a detailed pre-structured questionnaire for individual respondents with both open and close ended questions has been formed as the key instrument for primary data collection.

3.4.1.1.1 Present Value Calculation of Losses

Respondents have lost their homesteads, cultivable and garden lands in various years of the past. They have given approximate value of the land lost in particular year. The given value has been converted in term of present value according to the formula given below;

$FV = PV\ (1+i)^{n}$

Where, i= rate of inflation= 10% (assumed)

n= no. of years from 2014

PV= Value at that time (approximate)

FV= Value at 2014

3.4.1.2 Informal Group Discussion

While conducting the survey in the study area informal group discussion was carried out with different kinds of people. This informal meeting has been conducted in the gathering places of the locality. The issues related to riverbank erosion and its impacts were discussed and problems of the victims were identified.

3.4.1.3 Key Informants Interview

Interview with the key informants have been carried out with various walks of people in order to gather information about the problems of riverbank erosion, its impacts, perception and causes about erosion. List of the key informants is given below:

Table-3.5 List of key Informants

Sl.	Informants	No.
1	Present and Ex-mayor, Kumarkhali Pourashava	2
2	Ex-chairman, Nandalalpur Union	1
3	Present and Ex-headmaster, teachers Kumarkhali M.N. High School	3
4	Ex-councilor Kumarkhali Pourashava	1
5	Principal/ teachers Kumarkhali Degree college	3
6	Teacher, Kumarkhali Fadil Madrasa	1
7	SAE, BWDB, Kushtia	1
7	Older Village/ Municipality People	8

Source: Field Survey, 2014

The objectives of key informant interview are given below:

A. Headmaster/ Teachers Kumarkhali M.N. High School and Principal/Teachers Kumarkhali Degree College: Both the institutions were on the bank of Gorai and both were collapsed to the river. That's why the institutions were relocated at new places. As institutions head and teachers they have experienced river erosion closely and observed various steps and incidents related to Gorai river erosion.

The interview focused on:

- Erosion experience
- Steps to protect the institution from erosion.
- Measures they have observed to protect erosion
- Nature erosion and how the river shifting its channel

B. Public representatives: They have experienced erosion and they have undergone various pressures from the victims. So the focus was on:

- Erosion experience
- Government measures for protecting erosion
- Peoples sufferings and impacts of erosion

C. Elderly people of the locality: Many of them are directly victims. Many of them are observing Gorai for more than 40-50 years. So they have vast experience of Gorai riverbank erosion. So the focus was:

- Erosion experience
- Change of Gorai river course
- Impacts on society

3.4.2 Secondary Data

Secondary data for this study has been gathered in two steps. In first step, before going to the study area literatures were consulted in IGS, library. It includes book chapters, journals, reports, important articles, theses, related news/articles published in newspapers, related articles available in the websites. In the second step, going to the field area secondary data/materials were collected from local offices.

3.5 Method of Data Processing and Analysis

Data have been processed through coding and tabulation with the help of SPSS software before analysis. Primary and secondary data were analyzed both quantitatively and qualitatively according to the character of data. Later this data have been presented with tables.

Chapter 4

DATA ANALYSIS AND INTERPRETATION

This chapter presents an overview on geographical characteristics of the study area. It also highlights the procedure of data analysis and interpretation along with social, economic and demographic characteristics of the respondents.

4.1 Study Area Profile

4.1.1 Location

Kumarkhali is an Upazila of Kushtia District under the division of Khulna. It is located at 23.8542^0 North latitudes and 89.2417^0 East longitudes. It is 10 km east of Kushtia town.

4.1.2 Study Area

The focus is on the area on the bank line of Gorai within the Pourashava; in addition to this some very adjacent areas of Kumarkhali Pourashava Elongi, Elongi Acharya and Baruria of Nandalalpur union and Agrakunda of Sadaki union are considered (Figures 4.1 and 4.2).

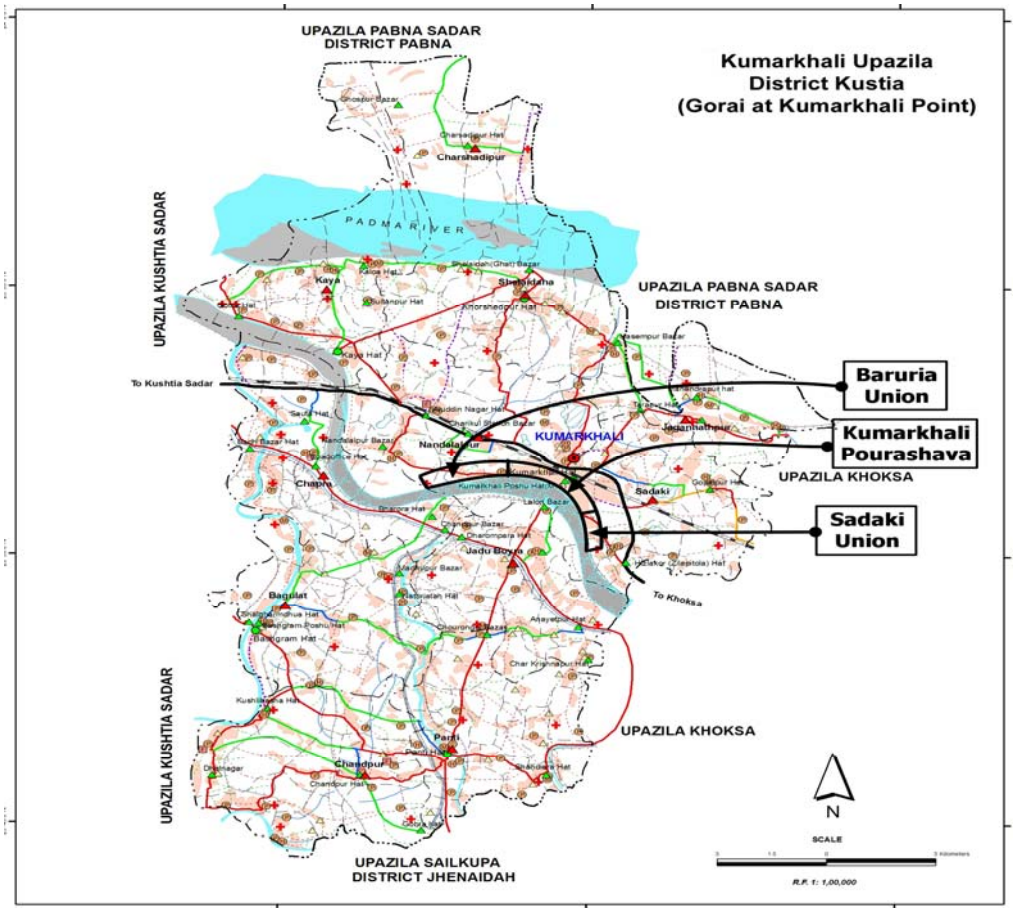

Figure-4.1 Gorai at Kumarkhali point (At present)

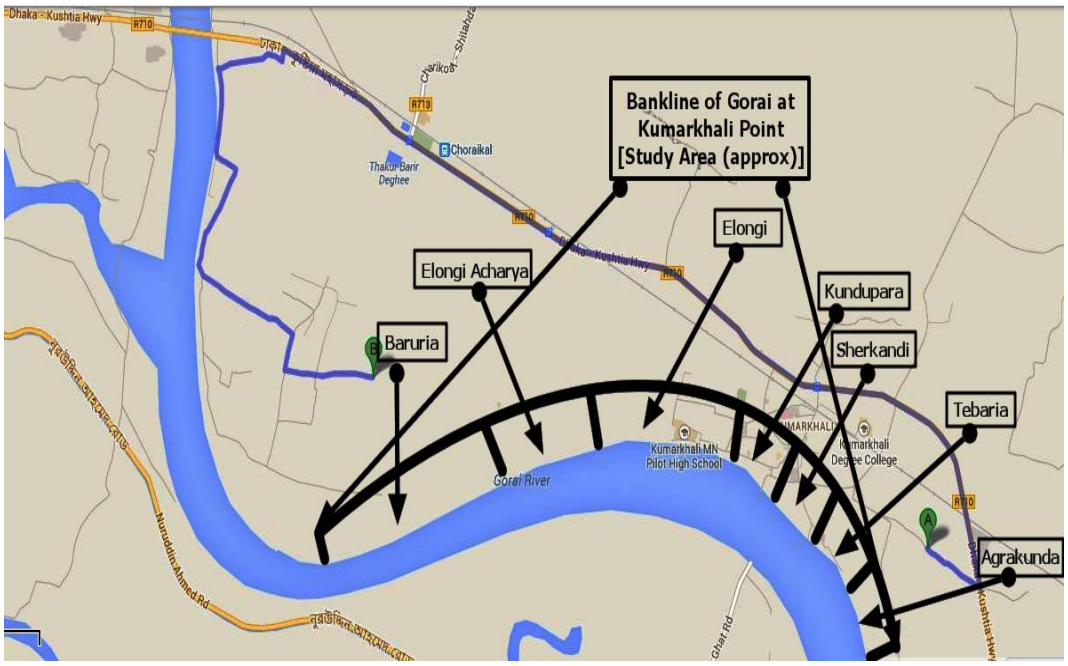

Figure-4.2 Bank line of various study area at Kumarkhali point

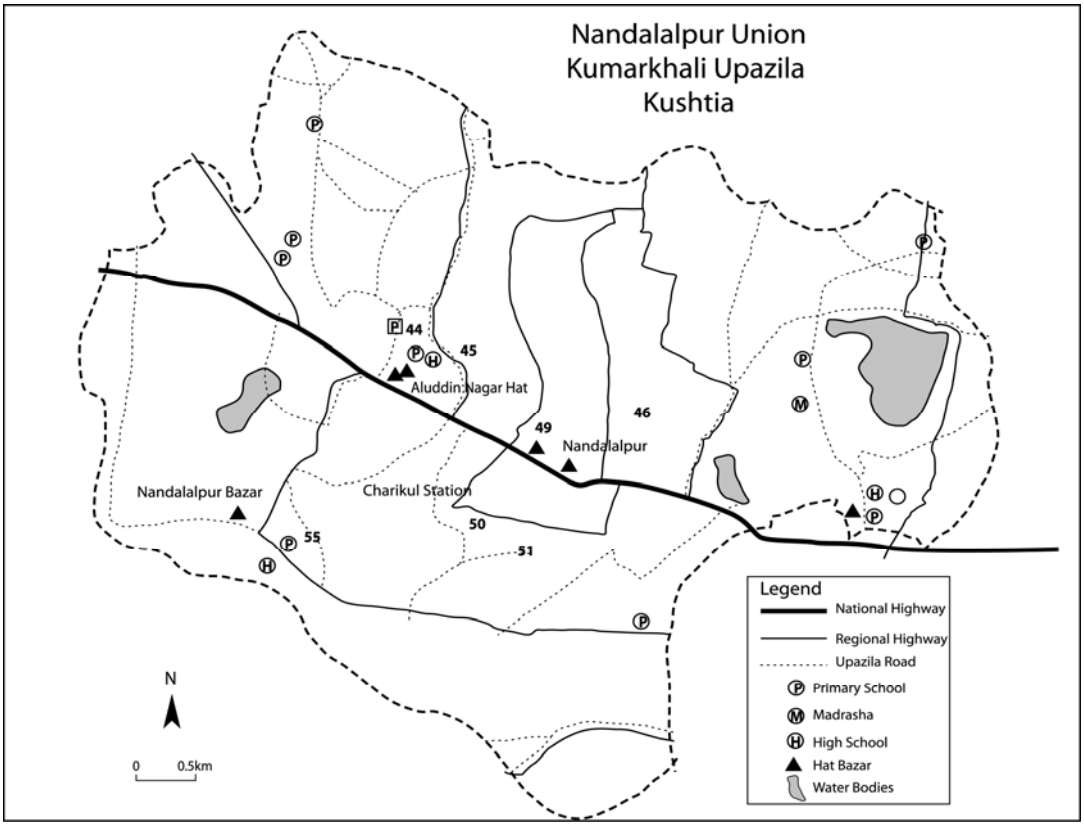

Figure 4.3: Location of Study Union Nanadalalpur

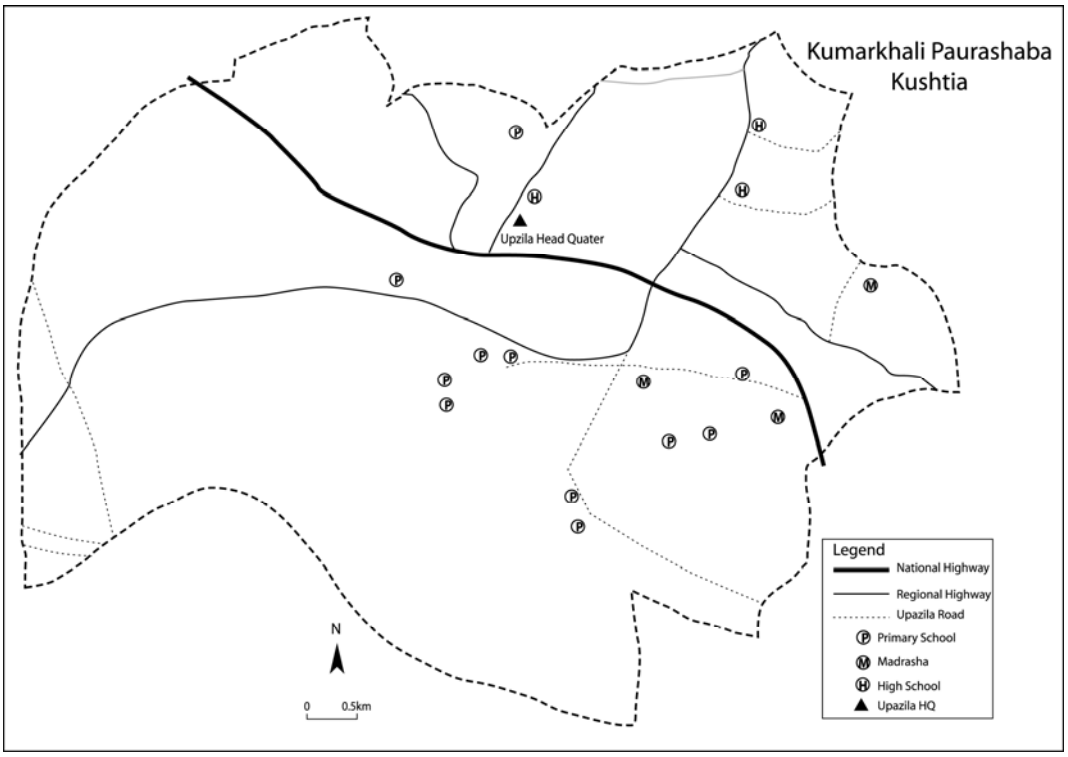

Figure 4.4: Location of the Study Pourashava

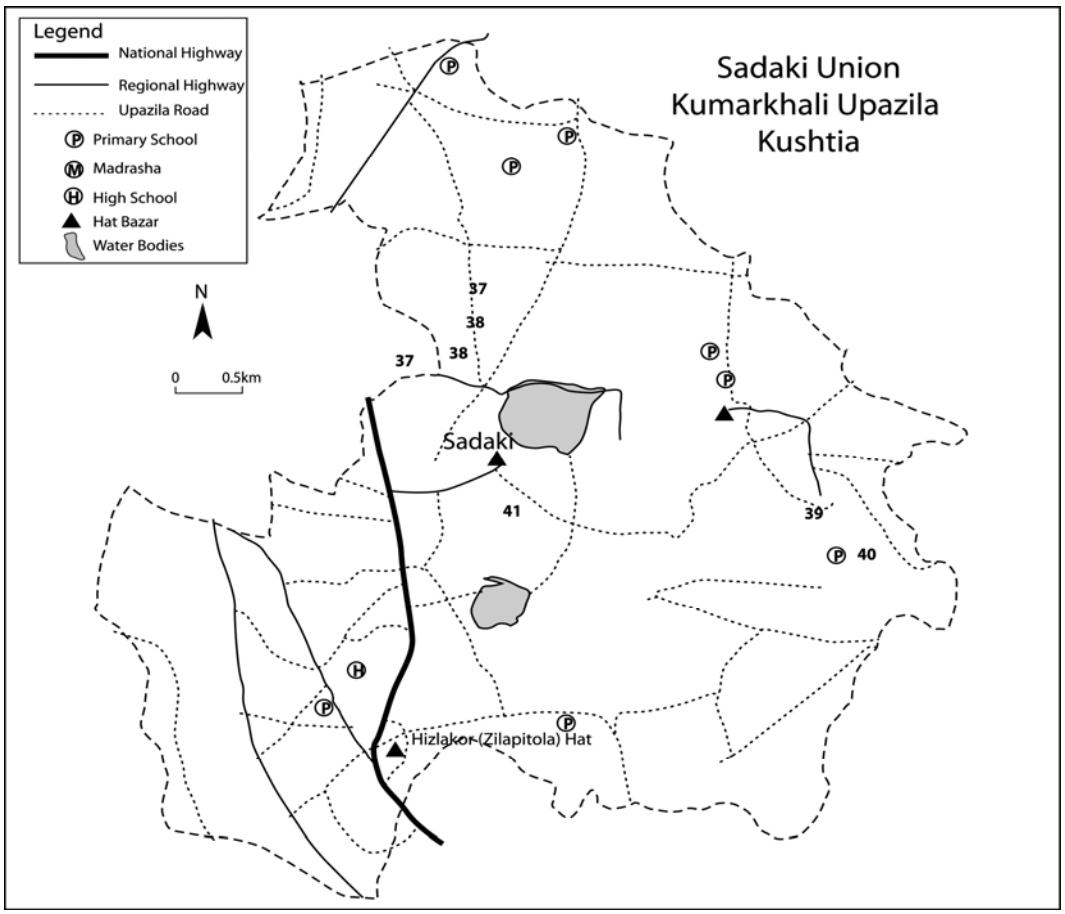

Figure 4.5: Location of the Study Union Sadaki

4.2 Characteristics of the Respondents

4.2.1 Age and Marital Status

Among the respondents number of respondents aged below 30 years is only 5% and number of respondents aged above 70years+ is only 9%. Highest number of respondents (31) is between 51-60 years followed by 25 persons of age between 61-70 years (Table-4.1).

Table-4.1 Age of the Respondents

Age (Years)	Frequency	%	Cumulative %
below 30	5	5.0	5.0
31-40	15	15.0	20.0
41- 50	15	15.0	35.0
51 - 60	31	31.0	66.0
61 - 70	25	25.0	91.0
70 +	9	9.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Table 4.2: Marital Status of the Respondents

Status	Frequency	%	Cumulative %
Married	98	98.0	98.0
Unmarried	2	2.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Among the respondents only 2% is unmarried (Table-4.2). They are still students or unemployed.

4.2.2 Education Level of the Respondents

About half (45%) of the respondents are illiterate and slightly more than half (55%) of the respondents are literate. 15% respondents have 11-16 year of schooling. Among the respondents about half of the total respondents (Table-3.4) are from Kumarkhali municipality. Maximum of those who have 11-16 year of schooling belongs to Kumarkhali town. Large areas of Tebaria and Agrakunda are still like village though the areas belong to Pourashava. In those areas education level of the respondents is not as high as Kundupara and Sherkandi. Most of the illiterate people belong to the villages and village like areas of Tebaria and Agrakunda.

Table-4.3 Education Level of the Respondents

Year of Education	Frequency	%	Cumulative %
0	45	45.0	45.0
1-5	23	23.0	68.0
6-10	17	17.0	85.0
11-16	15	15.0	100.0
Total	100	100.0	

Source: Field survey, 2014

4.3 Respondents' Socio-Economic Profile

4.3.1 Respondents' Household Size

Among the respondents household with more than 15+ member is only one (1%). Household with more than 11 members is only 9%. About half (46%) of the respondents have small family and about half (45%) of the respondents have medium family size.

Table-4.4 No. of Family Members in the Household

Indicators	Frequency	%	Cumulative %
up to 5	46	46.0	46.0
6-10	45	45.0	91.0
11-15	8	8.0	99.0
15+	1	1.0	100.0
Total	100	100.0	

Source: Field Survey: 2014

4.3.2 Occupation of the Respondents

Among the respondents 29% are small traders like owners of tea-stall, tailors, carpenters, plumbers etc. 23% of them are simply day labour. Farmers are only 12%. Among the 12% service holders there are Government officials, teachers, Class-IV employees of government and non-government organizations, NGO workers etc. Maximum of the service holders are residents of municipality. As Kumarkhali is famous for loom industries maximum of the 12% medium entrepreneurs belong to that category.

Table-4.5: Respondents' Present Occupation

Indicators	Frequency	%	Cumulative %
Day labour	23	23.0	23.0
Small trade	29	29.0	52.0
Medium entrepreneur/ Businessman	11	11.0	63.0
Farmer	12	12.0	75.0
Service	12	12.0	87.0
Rickshaw/Van puller	11	11.0	98.0
Students/un-employed	2	2.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

4.3.3 Income Status of the Respondents

Among the participants sixty percent (60%) have monthly income less than taka ten thousand. Only three percent (3%) earns more than thirty one thousand taka. These three percent are most likely the businessmen. From the table-4.6 it is clear that the highest number of the people (60%) of the locality is low-income generating.

Table-4.6 Monthly Income of the Respondents

Indicators	Frequency	%	Cumulative %
up to 10,000/=	60	60.0	60.0
11,000-20,000/=	20	20.0	80.0
21,000-30,000/=	15	15.0	95.0
31,000-40,000/=	1	1.0	96.0
50,000/=+	2	2.0	98.0
Unemployed/students	2	2.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

4.4 Gorai Erosion Experience

The impacts of riverbank erosion are long lasting and very often long term. According to Khalequzzaman (1994) the socio-economic impact and dislocation due to bank erosion are mostly permanent and most often long term.

In the study area Gorai river erosion is not a recent phenomenon. The local people have been experiencing this for the last hundred years. Almost all the people on the bank line of Gorai have experienced erosion. Directly victims are less in number as many of them have passed away. But their family members who were indirectly victims have witnessed erosion very closely. Among the respondents thirty six percent are directly victims and sixty four have witnessed it closely (table-4.7). Among two directly victims there are two heads of two educational institutes (Table-4.8).

Table-4.7 Gorai Riverbank Erosion Experience

Indicators	Frequency	%	Cumulative %
As a victim of RBE at Kumarkhali	36	36.0	36.0
As a witness of RBE at Kumarkhali	64	64.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Table-4.8 Victim of Gorai RBE

Indicators	Frequency	%	Cumulative %
Directly	34	34.0	34.0
Indirectly[2]	64	64.0	98.0
Institutions	2	2.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

4.5 Losses of Livelihood

River erosion seriously affects the livelihood of the affected people. Being affected many people become assetless, homeless, landless, in a word poor overnight. They lose homestead, house, cultivable lands, kitchen garden/ home yard land and many other properties. In the study area it is found that 83% has lost their homestead and houses (Table-4.9), 90% their cultivable lands (Table-4.10) and 20% kitchen garden/ home yard land (Table-4.11). One person has lost his loom factory in the 90s and his investment in the factory was tk. 15 lacs.

[2] Original victims father/grandfather

Table-4.9 Period of Homestead Lost

Year	Frequency	%	Cumulative %
1950-59	4	4.8	4.8
1960-69	36	43.4	48.2
1970-79	15	18.1	66.3
1980-89	19	22.9	89.2
1990-1999	9	10.8	100.0
Sub-total	83	83.0	
Did not lose home	17	17.0	
Total	100	100.0	

Source: Field Survey, 2014

Table-4.10 Period of Cultivable Land Lost

Year	Frequency	%	Cumulative %
1950-59	3	3.3	3.3
1960-69	37	41.1	44.4
1970-79	20	22.2	66.7
1980-89	24	26.7	93.3
1990-1999	6	6.7	100.0
Total	90	90.0	

Source: Field Survey, 2014

Table -4.11 Amount of Kitchen Garden/Yard Land Lost

Indicators	Frequency	%	Cumulative %
Up to 20 decimal	3	3.0	15.0
> 20 but < 30 decimal	3	3.0	30.0
> 30 but < 40 decimal	8	8.0	70.0
> 40 decimal	6	6.0	100.0
Total	20	20.0	

Source: Field Survey, 2014

4.5.1 Resettlement Issue: Need for Housing

After being displaced the displacees' first need is to find out some place where they can resettle. Experience of first time displacement is very common for the erosion victims. Sometimes they get uprooted for the second, third and even for the fourth time. In these circumstances getting shelter becomes a difficult issue for them.

In the study area among the respondents 83% have lost their homesteads. 44% have lost their homesteads at least one time. The number of family lost their homesteads at least two or three time is 21% and 16%. Even some of them have experienced this for four times, though the number is small (Table-4.12). So the resettlement was a big issue for the displacees.

Table-4.12 Lost Homestead

Indicators	Frequency	%	Cumulative %
One time	44	44.0	44.0
Two times	21	21.0	65.0
Three times	16	16.0	81.0
Four times	2	2	83.0
Did not lose	17	17.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

4.5.2 General Vulnerabilities

4.5.2.1 Rehabilitation

Different types of vulnerabilities are associated with riverbank erosion (Table-4.13) Many of the victims become homeless losing their original homestead and house. Rarely do they get any land from the government, relatives or neighbours for making shelter. Sometimes they move to nearby land, nearby rural area, migrate to the town or take shelter making huts in khasland, embankments. Hossain (1991) has said that the displacees move to one of the several places viz (i) to nearby rural areas, (ii) to the flood protection embankments, (iii) to emerged charland, and (iv) to nearly urban area.

In the present study among the displacees 61.9% (out of 83) settled in nearby rural areas. 18.1 % shifted to nearby land. A number of people has become landless and taken shelter in VP[3] or khasland. The amount is 18.1% (Table-4.14).

Table-4.13 Resettlement Scenario

Indicators	Frequency	%	Cumulative %
Nearby rural areas	52	52.0	61.9
Migrated to town (settled buying own land)	1	1.0	63.1
In VP land/ Khasland	14	14.0	79.8
Shifted to nearby land	15	15.0	97.6
Migrated to town (settled in VP/Khasland)	1	1.0	100.0
Total	83	83.0	

Source: Field Survey, 2014

River erosion displacees very often migrate to town for better livelihood. Hossain (1989) said that one tenth of the riverbank erosion induced marginalized people migrate to the city for better livelihood. In the study area we see that only two families out of eighty three families, who have lost homesteads (2.41%), migrated to town (Table-4.12) but they are not marginalized and not migrated to town for better livelihood.

4.5.2.2 Gorai Victims Bitter Experiences

Victims of Gorai riverbank erosion have gathered severe bitter experience due to erosion. Financial ability has decreased, compelled to change professions and got separated from their society. About 46% respondents have all the three experience. 5% respondents have both the experience of decreased financial ability and profession change. Individually the number of financial ability decreased displacees is the highest, 71%. On the other hand the number of people compelled to change profession is 69%. The number of two types of victims is almost same (Table-4.14).

[3] VP means Vested Property. In the mid and late 60s (during Pak-Indo war and afterwards) many Hindu families left the then East Pakistan. The government of the then Pakistan accrued those lands by an Ordinance in the name of "Enemy Property". After the independence it was named "Vested Property (VP)" by the government of Bangladesh.

Table-4.14 Vulnerabilities

Indicators	Frequency	%	Cumulative %
Financial ability decreased	20	20.0	20.0
Compelled to change profession	18	18.0	38.0
Lost social bond	11	11.0	49.0
Both 1&2	5	5.0	54.0
Both 1,2 &3	46	46.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

4.5.2.3 S1truggles of RBE Victims

The erosion induced displacees fight against erosion in many ways. They try their level best to protect their homesteads, cultivable lands and essential household materials. Nothing is the exception in case of erosion induced victims of Kumarkhali. Table-4.15 shows that 56% victims have taken protective measures against erosion. 44% did not take any measure.

Table-4.15 Personal Attempt to Control Erosion

Indicators	Frequency	%	Cumulative %
Yes	56	56.0	56.0
No	44	44.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Table 4.16 shows various steps taken by the erosion victims. 37.5% has tried by bamboo piling, 25% by tree and wood piling, 19.6% by sand bag and 17.9% by both bamboo, and tree and wood piling.

Table-4.16 Various Measures by the Gorai RBE Victims

Indicators	Frequency	%	Cumulative %
Bamboo piling	21	37.5	37.5
Tree and wood piling	14	25.0	62.5
Sand bag	11	19.6	82.1
Both 1 and 2	10	17.9	100.0
Total	56	100	

Source: Field Survey, 2014

Table-4.17 shows why victims failed to take any measure against erosion. 38.6% has said that they have failed to take any measures because of poverty. 25% thinks that those steps will not last long and 36.4% thinks that it may last for few weeks and better to shift.

Table-4.17 Reasons for not Taking Any Measures

Indicators	Frequency	%	Cumulative %
Poverty	17	38.6	38.6
Will not last long	11	25.0	63.6
Better to shift	16	36.4	100.0
Total	44	100.0	

Source: Field Survey, 2014

4.5.2.4 Assistance Received by the Victims

Displacees have lost their homesteads and have to build it again for shelter. They have to manage money for the construction of housings. But most of the respondents are from agri-based family; they rarely have any savings. Haque and Zaman (1989 quoted in Taleb et al, 2009) suggested that in any natural hazards government and other agencies offer relief and assistance to the affected people. But in case of Kumarkhali no such help is offered.

In the study area we observe that among the displacees only 1.2% (only one out of eighty three) has got help from his neighbour after the loss of homestead. 98.8% has got no help from either government or any other organizations (Table-4.18).

Table-4.18 Whether Any Assistance Received By the Respondents

Indicators	Frequency	%	Cumulative %
Yes	1	1.0	1.2
No	82	82.0	100.0
Sub-total	83	83.0	
Did not loss homestead	17	17.0	
Total	100	100.0	

Source: Field Survey, 2014

4.6 Losses for Displacement

The very common loss of riverbank erosion is loss of land- homestead land, cultivable lands. In a country like Bangladesh, where land is a scarcity, loss of land whether it is homestead land or cultivable land, creates heavy pressure on people. Erosion takes away thousand hectares of land every year where it is the scarcest resource (Hossain and Ferdousi, 2004). In the study area we see victims have lost their homestead land, cultivable land and kitchen garden/yard land and suffered a lot.

4.6.1 Loss of Homestead Lands

Due to erosion the victims lost homesteads, cultivable lands and kitchen garden lands/ garden yards. Amount of land losses and financial losses due to this were heavy. From table-4.19 we see that among 83, 27.7% people have lost homestead land below 10 decimal. But 72.3% have lost land more than 10 decimal.

Table-4.19 Amount of Homestead Land Lost

Indicators	Frequency	%	Cumulative %
< 10 decimal	23	23.0	27.7
>10 but < 20 decimal	16	16.0	47.0
>20 but <30 decimal	13	13.0	62.6
>30 but < 40 decimal	20	20.0	86.7
>40 decimal	11	11.0	100.0
Did not loss homesteads	17	17.0	
Total	100	100.0	

Source: Field Survey, 2014

25.6% have faced monetary loss below two lacs for homestead land. 21.7% have faced monetary loss in between 2 to 4 lacs; 16.9% in between 4 to 6 lacs and 22.9% in between 6 to 8 lacs. 13.3% displacees have faced monetary loss more than 8 lacs (Table-4.20).

Table-4.20 Approximate Monetary Loss for Homestead

Indicators	Frequency	%	Cumulative %
< 2 lacs	21	25.6	25.6
>2 lacs but <4 lacs	18	21.7	47.3
> 4 lacs but <6 lacs	14	16.7	64.0
>6 lacs but <8 lacs	19	22.9	86.9
> 8 lacs but <10 lacs	4	4.8	91.7
>10 lacs but < 12 lacs	4	4.8	96.5
12 lacs +	3	3.5	100.0
Total	83	83.0	

Source: Field Survey, 2014

4.6.2 Loss of Cultivable Lands

Agricultural land is the main resource of Bangladeshi people. Almost 48% of the total population lives on agriculture (BBS, 2011). So the loss of cultivable land causes heavy impact on people dependent on agriculture.

In the study area we see that out of 100 respondents 90 respondents have lost their cultivable lands. Among the 90 respondents 28.9 % have lost their cultivable lands below 100 decimal. 17.8% have lost lands in between 300 t0 400 decimals, 28.9% have lost their lands more than 400 decimals. 24.4% respondents (22 out of 90) have lost lands worth below 3 lacs. Second highest is 14.4% who have lost lands worth more than 17 lacs and 61.1% have lost their lands worth in between taka 3 lacs to 17 lacs (Table-4.21).

Table-4.21 Amount of Cultivable Lands Lost

Indicators	Frequency	%	Cumulative %
Up to 100 decimal	26	28.9	28.9
>100 but <200 decimal	13	14.4	43.3
>200 but <300 decimal	9	10.0	53.3
>300 but < 400 decimal	16	17.8	71.1
>400 but < 500 decimal	13	14.4	85.5
> 500 decimal	13	14.5	100.0
Total	90	90.0	

Source: Field Survey, 2014

In the study area 24.4% people's monetary loss for cultivable lands due to erosion is less than 3 lacs. 13.4% faced loss in between 3 t0 5 lacs. 62.2% lost more than 5 lacs (Table-4.22).

Table-4.22 Amount of Monetary Loss for Cultivable Land

Indicators	Frequency	%	Cumulative %
< 3 lacs	22	24.4	24.4
>3lacs but < 5 lacs	12	13.4	37.8
> 5lacs but < 7 lacs	8	8.9	46.7
>7 lacs but <9 lacs	8	8.9	55.6
> 9 lacs but <11 lacs	8	8.8	64.4
>11 lacs but<13 lacs	6	6.7	71.1
> 13 lacs but < 15 lacs	8	8.9	80.0
>15 lacs but < 17 lacs	5	5.6	85.6
>17 lacs	13	14.4	100.0
Total	90	90.0	

Source: Field Survey, 2014

The loss is remarkably huge as in most cases agriculture was their only livelihood. Loss of such amount of land has decreased the financial capacity of the families uprooted.

4.6.3 Loss of Kitchen Garden/Yard Land

15% (three out of twenty) have said that they have lost up to 20 decimal lands. 75% (seventeen out of twenty) have lost more than 20 decimal of lands (Table-4.11).

In the rural areas around the homesteads there are kitchen garden lands and yard land. Twenty respondents out of 100 have said that with their homesteads they have lost remarkable amount of those lands. 25% respondents have lost home yard land worth up to one lac. 75% (fifteen out of 20) have lost lands worth in between one to seven lacs (Table-4.23).

Table-4.23 Monetary Loss for the Kitchen Garden/Yard Land

Money (in Taka)	Frequency	%	Cumulative %
Up to 100,000	5	25.0	25.0
> 100,000 but < 3,00,000	5	25.0	50.0
>3,00,000 but <5,00,000	5	25.0	75.0
>5,00,000 but <7,00,000	1	5.0	80.0
>7,00,000	4	20.0	100.0
Total	20	20.0	100.0

Source: Field Survey, 2014

4.6.4 Other Losses

The loss of land is accompanied by a loss of infrastructure such as flood embankments, schools, hospitals, cultural and religious monuments and, of course agricultural lands and assets (Khalequzzaman, n.d.). In case of the study area we see that besides homestead, cultivable land and kitchen garden/yard land two educational institutes- Kumarkhali M. N. Pilot High School and Kumarkhali Degree College, two roads namely Kumarkhali-Tebaria-Agrakunda and Kumarkhali- Baruria, are also destroyed to the Gorai due to erosion. A handloom factory 'Masud Textile' is also destroyed in the Gorai river (Information provided by the owner at the time of questionnaire survey).

4.7 Income Erosion

Income erosion due to riverbank erosion is the most likely possibility. In case of Gorai riverbank erosion happening is the same. 95% respondents have admitted that their family status changed in term of financial ability being victims of erosion (Table-4.24). 93% of them are negatively impacted and only 2% are positively impacted (Table-4.25). So it is evident that maximum erosion induced displaces who have homesteads, cultivable lands and kitchen garden/yard lands have gone through income erosion.

Table-4.24 Whether Income Eroded

Indicators	Frequency	%	Cumulative %
Yes	95	95.0	95.0
No	5	5.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

4.8 Degradation of Quality Of Life

From table-4.26 it is seen that 84% respondents have said that their family has become hardcore poor, very poor or poor due to the impact of erosion. It is because, maximum respondents' family is agri-based; due to erosion their only source of income is hampered. Only 9% have admitted that their family status has not been changed but financial ability has decreased.

Among the 9% respondents who have said that their family status has not been changed, are urban dwellers. Professionally they are service holders. They have admitted though their family status is not changed but financial ability has reduced.

So it is clear almost all the erosion induced displacees have gone through degradation of quality of life.

Table-4.25 Status of Respondents after RBE

Indicators	Frequency	%	Cumulative %
Become hardcore poor	3	3.0	3.0
Become very poor	43	43.0	46.0
Become poor	38	38.0	84.0
Become rich	2	2.0	86.0
No change	5	5.0	91.0
Have not become poor but financial ability reduced	9	9.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

4.9 Ineffective Erosion Control Measures: Example of Bad Governance

Government has taken various initiatives for stopping riverbank erosion. Government has firstly constructed groins at Baruria and Kumarkhali. But effectiveness was not up to the mark. From table-4.26 we that 99% respondent have said that the effectiveness of the groyne at Baruria is dissatisfactory. Same amount of people are disappointed with the effectiveness of groins at Kumarkhali (Table-4.27).

Table-4.26 Respondents' Perception on Effectiveness of Groin at Baruria

Indicators	Frequency	%	Cumulative %
Very poor	77	77.0	77.0
Poor	22	22.0	99.0
Moderate	1	1.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Table-4.27 Respondents' Perception on Effectiveness of Groin at Kumarkhali

Indicators	Frequency	%	Cumulative %
Very poor	77	77.0	77.0
Poor	22	22.0	99.0
Moderate	1	1.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

In 1973-74 the execution of two groins was completed; still erosion continues at various points in Baruria, Elongi, Elongi Acharya, Sherkandi, Tebaria and Agrakunda. At that time BWDB tried to manage erosion making Parco-piling. But it did not last long; 100% respondents are unhappy with the effectiveness of the Parco-piling (4.28).

Table-4.28 Respondents' Perception on Effectiveness of Parco-piling

Indicators	Frequency	%	Cumulative %
Very poor	96	96.0	96.0
Poor	4	4.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

From table-4.29 we see that 75% people are satisfied with the embankment. Still 25% are dissatisfied. Among the 25% dissatisfied respondents maximum are of Tebaria, Sherkandi and Agrakunda as there is no embankment on the bank of those area and still they are afraid of erosion. A few of them are from Baruria, Elongi and Elongi Acharya where the embankment has been collapsed lack of proper maintenance.

Table-4.29 Respondents' Perception on Effectiveness of the Revetment

Indicators	Frequency	%	Cumulative %
very poor	17	17.0	17.0
Poor	8	8.0	25.0
Moderate	35	35.0	60.0
Good	40	40.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

From information provided by the respondents we come to know that Gorai erosion is a matter of last one hundred years. Measure was first taken in the 70s. Before that lot many people has faced erosion and gone through various suffering. Even after constructing groins erosion continued. So it can be said that ineffective plan cannot change the condition of the people rather it is the wastage of public assets. Field survey report also suggests that respondents are not satisfied with the measures taken by BWDB (Table-4.30).

Figure 4.6 Revetments from Kundupara to Baruria

Table-4.30 Respondents' Perception on Various Measures Taken by BWDB

Indicators	Frequency	%	Cumulative %
Satisfied	0	0	0
Not Satisfied	89	89.0	89.0
I do not know/no comment	11	11.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Improper plan and people's participation in planning are other two important factors for local development. People should have access to policy planning otherwise they will not own the development and corruption like localism; interest-driven plan will get reduced. Then policy implementation will be easier.

In case of Kumarkhali it was observed observe that government has taken initiatives without consulting with the local people (Table-4.31).

Table-4.31 People's Participation in Planning Process

Indicators	Frequency	%	Cumulative %
Taken peoples' consent	0	0	0
Not taken	93	93.0	93.0
I do not know	7	7.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Proper policy planning is important for effectiveness/better performance of the initiatives taken under the plan. In case of Kumarkhali 76% respondents think that BWDB measures were inadequate and not well-planned (Table-4.32).

Table-4.32 People's Perception about BWDB Measures

Indicators	Frequency	%	Cumulative %
Inadequate or inappropriate attempt	50	50.0	56.2
Not well-planned	26	26.0	85.4
Pre-study was not done properly	13	13.0	100.0
Do not know	11	11.0	
Total	100	100.0	

Source: Field Survey, 2014

Timely measures to control any calamities are also very important to reduce the sufferings of the affected people. But in case of Kumarkhali we see no timely measures have been taken (Table-4.33). 30% respondents have said that they have observed any measures taken by the government before late sixties; though according to them erosion took severe form in early 60s.

Table-4.33 Measures Respondents Observed At the Time of Being Affected

Indicators	Frequency	%	Cumulative %
Nothing before 1968-69	30	30.0	30.0
Groins in the 70s	33	33.0	63.0
Parco-Piling in 80s and up to mid 90s	28	28.0	91.0
Embankment in Mid 90s	9	9.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Policy makers are important part of development. Without honest, committed and sincere political leaders good governance cannot be ensured. The perceptions of the erosion affected people of Kumarkhali remind us that fact. 72% of the respondents have said that erosion could be controlled efficiently by the honest political leaders (Table-4.34).

Table-4.34 How Erosion Could Be Tackled Efficiently?

Indicators	Frequency	%	Cumulative %
Needed honest political leaders	66	66.0	66.0
Needed enhanced capacity of BWDB	6	6.0	72.0
Needed to consult local people	4	4.0	76.0
Needed regular river dredging	16	16.0	92.0
Both 1 and 2	8	8.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Bad governance is a huge problem in developing countries. That is why when challenges come they cannot negotiate the change properly. Bad governance works as a catalyst for increasing socio-economic vulnerability of the affected people. Same thing has happened in case of Gorai riverbank erosion control measures in Kumarkhali.

4.10 Respondents' Perceptions on the Reasons of Gorai RBE

Facing erosion induced vulnerability the respondents have conceived their own perceptions about riverbank erosion. According to 25% of the respondents the reason of Gorai riverbank erosion at Kumarkhali is Weak planned construction of groins; 18% thinks that it is because of blocking of Dakua and Kaliganga river due to GK Project. A large portion of respondents (15%) think that Farrakka Barrage is responsible for this.

Table-4.35 Respondents' Perception about Gorai RBE

Indicators	Frequency	%	Cumulative %
Channel shifting	15	15.0	15.0
Siltation	12	12.0	27.0
Bank widening	12	12.0	39.0
Farakka barrage	15	15.0	54.0
Weak-planned construction of groins	25	25.0	79.0
Due to GK project	18	18.0	97.0
Heavy current	3	3.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

4.11 Present Gorai RBE Scenario

Embankment has been constructed from Kundupara to Baruria. Erosion is under control. In this regard question may come whether people are relieved. Table-4.36 shows that 41% people are still in fear. Maximum of the people on the bank at Tebaria, Agrakunda are afraid of erosion. Also large number of people of Elongi, Elongi Acharya and Baruria has the fear in mind as the embankment is not repaired or constructed every year on the basis of emergency (Table-4.37).

Table-4.36 Still Afraid Of RBE

Indicators	Frequency	%	Cumulative %
yes	41	41.0	41.0
no	59	59.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Table-4.37 Maintenance Scenario of the Revetment

Indicators	Frequency	%	Cumulative %
Not at all	29	29.0	29.0
Irregularly	35	35.0	64.0
When BWDB feels required	19	19.0	83.0
I do not know	17	17.0	100.0
Total	100	100.0	

Source: Field Survey, 2014

Figure 4.7 Present Erosion Status at Tebaria

Figure 4.8 Revetment at Elongi

Figure 4.9 Revetments at Elongi Acharya

Figure 4.10 Present Erosion Situation at Sherkandi

Figure 4.11 Houses at risk (Revetment near Kumarkhali M. N. High School)

Riverbank erosion is a disastrous calamity; especially for Bangladesh where there are about 700 rivers, and many areas on the bank line are erosion prone. Every year somewhere some people are experiencing erosion and going through miserable vulnerabilities. Sometimes this suffering continues generation after generation because of the lack of proper measures to control erosion as we see in Kumarkhali.

Chapter-5
FINDINGS

Kumarkhali is one of the oldest municipalities of Bangladesh. According to the opinion of the elderly people of the locality they are fighting against riverbank erosion for the last century. A large area between Agrakunda to Baruria has been destroyed to Gorai. Thousands of people and families are affected and have gone through untold miseries. A long time research work can give vivid picture of the miseries, sufferings and social changes the local people have gone through. In this short and time-bound research to do something meaningful is really tough. With all the limitations following are some important findings of riverbank erosion at Kumarkhali has been identified.

Change of livelihood pattern: Their livelihood pattern has been changed as almost all of them have lost remarkable amount of homestead lands (83%), cultivable lands (90%) and kitchen garden/home yard lands (20%).

Social destruction: Many of them have got separated from their society as a result still they miss the social ties. Social destruction has taken place among the families. A number of joint families have been splinted into small families.

Income Erosion: 71% affected people has said that financial ability of the displacees has decreased i.e. they have faced income erosion badly, as a result most of them (84%) have become either hardcore poor, very poor or poor.

Change of Profession: Maximum of the respondents is from agri-based family. But now only 12% people are engaged in agriculture. That is, large number of people has compelled to change profession.

Degradation of life quality: Their quality of life has decreased. 93% people have gone through negative change of social status in term of financial ability of the family.

Influence of bad governance: Bad governance has acted as a catalyst for the miseries of the affected. General people believe that only honest political leaders could work efficiently to control calamity like riverbank erosion.

Beside above findings there are some observations given below-

I) the people of the locality are experiencing riverbank erosion generation after generation. 36% people have said that they are directly affected by the erosion. 64% are indirectly victims i.e. they are the successors of victims, still experiencing the painful after-effects of erosion.

II) Maximum victims out of the municipality are from agri-based families. At present only 12% people are leading lives on agri-based profession. That is, a large number (69%) of erosion induced displacees have been compelled to change their professions.

III) 71% people have admitted that they missed the financial ability they had before. Getting compelled to change profession, getting separated from the society are also become headache for them.

IV) 60% erosion victims are low income generating (monthly income up to 10,000 taka).

V) 83% people have lost their homesteads. Among them 53.01% has lost their homesteads at least one time. 46.9% has lost their homesteads twice or more. 18.1% displacees have no lands of their own for making their homesteads; they live in VP/Khasland.

VI) 90% victims have lost their cultivable lands. 20% has lost remarkable amount of kitchen garden land or home-yard land.

VII) 95% erosion victims admitted that their family status has changed. Among them 93% are negatively and 2% are positively impacted.

VIII) 84% erosion victims have become hard core poor, very poor or poor.

IX) No-timely measures are not taken by the government. 30% people, who were experiencing severe erosion, have not seen any immediate measures taken by the government.

X) Joint family is a tradition of Bengali cultures for years. This tradition has also been hampered by Gorai riverbank erosion. 46% erosion induced displacees are single family.

XI) 100% erosion victims are not satisfied with the performance of BWDB. Various measures are taken by this organization. 50% have said that measures taken by BWDB are inadequate or inappropriate, to 26% not well planned, to 13% survey not done properly and 11% did not give their consent.

XII) Interesting is that almost all the people are dissatisfied with the performance of BWDB. But when they are asked how the erosion could be tackled efficiently 66% have said that needed honest political leaders or political commitment to solve the problem. Only 6% have said that needed enhanced capacity of BWDB to mitigate erosion. Indication is that political leaders play all the role of making plan and executing that plan.

XIII) Policy Planning is always top-down approach. 89% victims say that affected people or people of the locality were not consulted at the time of taking various measures to control riverbank erosion.

XIV) 99% victims have said that they have got no help at the time of resettlement.

XV) Erosion displacees' perception about the reason of erosion is very much divided. 25% thinks it is because of weak planned construction of groins by BWDB. 18% think it is due to Farakka barrage. They have also identified some other reasons such as—channel shifting, bank widening, siltation, blocking two distributaries of Gorai namely the Dakua and the Kaliganga, and heavy current.

The socio-economic impacts of Gorai riverbank erosion on the people of Kumarkhali were crucial and still it is a nightmare for their successors.

Chapter-6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Bangladesh is an agri-based country. Maximum of the people are dependent on agriculture for their livelihood. Also agriculture plays an important role for economic development. Like other part of the country many people living near the bank of Gorai are engaged in agriculture. In case of Kumarkhali town maximum people are business dependent or dependent on any other professions. But a portion of people from Elongi to Baruria and Sherkandi to Tebaria who had cultivable lands by the side of the Riverbank were dependent on agriculture. Agriculture dependent many families of the study area have lost homesteads, cultivable lands due to erosion and have become socio-economically vulnerable.

Gorai riverbank erosion at Kumarkhali is not a recent phenomenon. The people of Kumarkhali have been experiencing this for the last one hundred years. According to the elderly people due to some manmade reasons erosion took severe form. Personally the victims have fought against riverbank erosion. But that was not enough against natural calamity like riverbank erosion. Being compelled they moved to various places for shelter. They lost homesteads, cultivable lands and as well as lost their livelihood. They were compelled to change their profession; they were compelled to untie their social bond. Their horrible sufferings and miseries conveyed to from generation to generation. But from early fifty to late sixty of the last century they observed no government initiatives. From late sixties to mid-nineties various steps including groins, parco-piling, and revetment have been taken. At first groins were constructed but failed to serve the purpose and erosion continued. Then Parco-piling was made to control erosion but result was the same. Finally embankment is made.

Actually weak-planned and interest-driven attempts to control riverbank erosion have failed to reduce the socio-economic vulnerability of the people; moreover it has wasted huge national resources.

In our country policy planning and implementation are top-down approach. In case of Kumarkhali same thing has happened. Generally people are not consulted before policy formulation. If the people’s voice would have been heard proper policy planning and implementation would become easier and it would also be effective.

Political masters are the fortune maker of the country. There is no alternative of the politicians as policy makers. Once again it is revealed from the statement of the erosion victims of Kumarkhali. They are not satisfied with the performance of BWDB but feel honest and committed political leaders could solve the problem efficiently. Riverbank erosion is a natural calamity. There is no perfect way to control this but if there is honesty and commitment from the policy planners then proper policy planning is possible consulting with stakeholders and together with people it is easy to combat disaster like riverbank erosion.

6.2 Recommendations

Riverbank erosion is a threatening problem for the people of Bangladesh and for the economy of the country as well. It also breaks the environmental and ecological equilibrium. The loss of erosion is irreparable. As our country is densely packed with people and maximum of them are directly or indirectly dependent on agriculture proper measures for erosion control are badly needed. The following recommendations are made on the basis of discussion and analysis of this study-

I) Riverbank erosion is a regular and common phenomenon in our country. Every year in some areas on the bank line of the 700 rivers are getting affected by riverbank erosion. So a comprehensive riverbank erosion management policy should be made nationally.

II) The rights and security of the victims should be ensured.

III) Proper steps for relief and rehabilitation for the displacees should be taken. 'Development Program' for resettlement of erosion-induced displacees can be introduced. Accreted land should be given to the original owners. Also 'emergency fund' for the erosion-induced can be created by the government.

IV) 'National Coordination Council' can be formed to coordinate bank-protection works and victims' "development program" for resettlement.

V) Local and affected people should be consulted before taking any type of erosion control measures.

VI) Many affected people become landless as a result of erosion. They should be provided accommodation in *Adarshya Gram* and *Abashon* projects in priority basis. Minimum amount of khasland should be allotted to them for shelter if possible.

VII) Many erosion-induced displacees are compelled to change their profession. They suffer from income erosion. At this time they should be given micro-credit.

VIII) Proper planning for erosion protection is badly required. Political motivated and interest driven plan for erosion control must be avoided.

IX) No development plan that hampers the natural flow of the river should be taken. Timely and effective erosion control measures should be important consideration while making plan.

X) Honest political leaders are the fathers for the safeguard of common peoples' interest. So people have the sacred duty to elect them as public representatives.

References

Answers.com; Retrieved April 2014 from answers.com website: http://wiki.answers.com/Q/What_does_erosion_mean_in_geography?#slide=1

Ask.com; Retrieved April 2014 from ask.com website: http://www.ask.com/question/what-does-socioeconomic-mean

Clijncke, A., 2001, *"Morphological response to dredging of the Upper Gorai River"*, Main report, p-4

Banglapedia, 2003; Ganga-Kabotak (GK) Project, vol.6, page-146

Banglapedia, 2003(a); Kumarkhali Upazila, vol.6, page-148

Bangladesh Bureau of Statistics, 2011; Bangladesh Population Census 2011, Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

Coleman, J.M., 1969 *Brahmaputra River: Channel Processes and Sedimentation*, Sedimentary Geology; B129-239

COAST Trust, 2007; *River erosion in Bangladesh*; Campaign Brief: Impact of Climate Change in Bangladesh, Dhaka.

Department of Disaster Management, 2012; Department of Disaster management, Ministry of disaster Management and Relief, Government of the people's Republic of Bangladesh, Retrieved April 2014 from the website: www.ddm.gov.bd/erosion.php

DHV-Haskoning, 2000 Cited in Clijncke, A. 2001; *Gorai River Restoration Project (GRRP), feasibility study*, main report.

Elahi, K. M. and Rogge, R. J. 1991, *Riverbank erosion, flood and population displacements in Bangladesh: A report on the riverbank erosion impacts study*, Jahangirnagar University, Savar, Dhaka

Edwards, M. 2000; *Community Guide to Development Impact Analysis.* Retrieved March 2014 from the website: www.lic.wisc.edu/shapingdane/facilitation/all_resources/impacts/analysis_socio.htm

Haque and Zaman, 1989; Cited in Taleb, M. A., Kabir, M. H. and Mubullah, M., 2009, *Survival strategies among erosion-induced displacees at Haimchar Upazila, Chandpur district, Bangladesh*, The Chittagang Univ. J. B. Sci., vol.4(1 &2); 25-39

Hossain, M.Z.1991, *Displacees of Riverbank erosion in Urban Squatter Settlements in Sirajgan: The Process of Impoverishment,* Dhaka, REIS-JU

Hossain, 1989; Cited in Azim, A.F.M. U. and Basak, J. K. *Effects of riverbank erosion on livelihood,* Unnayan Onneshan-the Innovators, Dhaka

Hossain, M. M. and Ferdousi, S. 2004, *Assessment for role of GIS based natural disaster and planning activity in Bangladesh,* Environmental Informatics Archives, vol.2

Hutton, D. and Haque, C. E., 2004; *Human Vulnerability, Dislocation and Resettlement: Adaptation Processes of River-bank Erosion –induced Displacees in Bangladesh,* Published by Blackwell Publishing, 9600 Garsington Road, Oxford, 0X4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA.

Islam, M. F. and Rashid, A.N.M. B. 2011, *Riverbank erosion displaces in Bangladesh: Need for institutional response and policy intervention*. Bangladesh Journal of Bioethics, 2(2); P4-19

Islam and Islam, 1985; Cited in Hutton, D. and Haque, C. E. 2004, *Human Vulnerability, Dislocation and Resettlement: Adaptation Processes of River-bank Erosion –induced Displacees in Bangladesh,* Disasters, 2004, 28(1): 41-62

Joint River Commission Bangladesh, Ministry of Water Resources, The People's Republic of Bangladesh, Retrieved February 2014 from the Joint River Commission Bangladesh website: http://www.jrcb.gov.bd/basin_map.html

Khalequzzaman, M 1994, Recent *floods in Bangladesh: possible causes and solutions,* natural hazards9:65-80, 1994

Khalequzzaman, Md, n.d. Cited in Ragsdale, T. (MESAS, LLC); Oberhagemann, K. (nhc); and Faisal, M. A. (BWDB, Chief Resettlement Officer), n.d.; *Involuntary Meets Disaster Mitigation Resettlement: A Case Study from Erosion Mitigation on the lower Brahmaputra/Jamuna River in Bangladesh,* Retrieved March 2014 from the website: http://www.his.com/~mesas/articles/Involuntary-mitigation.pdf

Kuehl, S.A., Hariu, T.M., and Moore, W.S., 1989; Cited in *Shelf sedimentation off the Ganges-Brahmaputra river system: evidence for sediment by passing to the Bengal Fan.* Geology, 17: 1132-1135.

Meade, R.H., 1996, *River sediments input to major deltas. In: JD,* Milliman and BU Haq (eds.), Sea-level Rise and Coastal Subsidence, Kluwer Academic Pub., P 63-85.

Milliman, J.D., Rutkowski, C., and Meybeck, M., 1995; *River Discharge to the Sea: A Global River Index (GLORI). NIOZ, Texel.* P 125.

Miah, A.Q. 1993. Applied Statistics, Asian Institute of Technology, Division of Human

Settlements and Development, Bangkok, Thailand

NWM NSW DPI; *Soil erosion solution*; Fact sheet 1: Types of erosion; http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/255153/fact-sheet-1-types-of-erosion.pdf; Retrieved March 2014 from the website: *www.ddm.gov.bd/erosion.php*

Oldeman, L. R. 1991-92, *Global Extent of Soil Degradation,* ISRIC Bi-Annual Report, pp 19-36.

Raalte, S. V. 1998-2001, *Case – Gorai river.* Retrieved March 2014 from website: https://publicwiki.deltares.nl/display/BWN/Case+-+Gorai+River+-+PDF

Ritter, J. 2012; *Soil erosion-causes and effects, Retrieved* March 2014 from website of Ontario Ministry of Agriculture and food, Canada: http://www.omafra.gov.on.ca/english/engineer/facts/12-053.htm

The Hindu, 1997, *Indo-Bangla Water Politics, Jobs dry up with the river*, April 30, Chennai.

The Daily Sun, 2011, *Riverbank erosion and accentuating pauperization in Bangladesh*, August 07, Dhaka

The daily Jugantor, 2008, June 21, Dhaka

Wiktionary - CC BY-SA 3.0 Retrieved March 2014 from the website: https://www.boundless.com/biology/definition/erosion/