

Impact Analysis of Island Erosion and the Changing Pattern of Livelihood, a Case Study of Ghoramara

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ABSTRACT

The paper is an attempt to study the land use pattern and the impact of riverine erosion in the Sagar Island of West Bengal. The survey conducted during the fieldwork shows the large scale uprooting of families due to the loss of land. Apart from the loss of a job, search for better education has also led to forced migration. The study concludes that there is a dearth of disaster management and mitigation system at Sagar Island.

Keywords: Erosion, Livelihood, Socio-Economic Changes, Migration, Disaster Management

INTRODUCTION

This paper attempts to explicate the impact of land erosion on the livelihood of the inhabitants of Ghormara Island. The island of Ghoramara, located in the southern part of South Twenty Four Parganas of West Bengal, is getting highly affected by the riverine erosion. The paper argue that the size is shrinking at a very fast rate by comparing the land use from 1954-2018. The Ghoramara, Lohachhara, Suparibhanga, Agunmari and Bedford islands were part of Sagar Island till 1904. But due to river erosion, these islands got separated from Sagar. People were displaced from Lohachara Island due to its submergence and 374 inhabitants were rehabilitated by the Government . In the Ghoramara island, no such deposition took place and erosion dominated in all directions from 1951 to 2011. The geomorphological changes observed in Ghoramara are largely the result of changes in estuarine hydrodynamics and a rising sea level. Studies show that a tectonic tilt pushed the Ganges eastward leading to a drastic reduction in the freshwater inflow into the estuary, causing an imbalance in its natural settings. The major villages within the Ghoramara Island are 1) Khasimara, 2) Khasimara Char, 3) Lakshminarayanpur, 4) Bagpara, 5)Baishnabpara, 6) Hatkhola, 7) Raipara, 8) Mandirtala and 9) Chunpuri of which first five villages are already partly under the water, ,.

In 1996, a significant number of families of Ghoramara were rehabilitated to Sagar Island. At present, the process of resettlement of the displaced people of Ghoramara has stopped. However, the flow of inter-Island migration and seasonal migration from Ghoramara continues as a consequence of land loss. Some inhabitants are shifting from one place to another within their island and some people are moving to other islands or towards the mainland. This movement has caused large scale changes in their natural lifestyle and affected the livelihood, socio-economic characteristics, security and all such related issues of the inhabitants of Ghoramara. People from this island are mainly engaged in agriculture and fishing. However, these livelihoods are threatened by these present changes. There is no scope for the development of secondary and tertiary activities due to lack of infrastructure on the island.

The present paper is an attempt to identify the overall impact of such changes in this island with special reference to its demography, economy and education. The major objectives of the present paper are:

- To formulate a detailed account of the river erosion and land loss
- To demarcate the land-use change due to erosion
- To highlight the characteristics of the present socio-economic status of the island people concerning occupational shift and the pattern of migration

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- To prepare a detailed account of the government initiatives including Rehabilitation, constructional measures, amount and types of compensation etc.
- To suggest remedial measures to combat such a disaster.

STUDY AREA

Background

The island of Ghoramara is located at 21°53′56″ N to 21°55′37′ N and 88°06′59″ E to 88°08′35′ E situated at the western part of the active deltaic area under the jurisdiction of Sagar block, South Twenty Four Parganas, West Bengal (map number1).

Map No 1:



The name Ghoramara has originated from ghora 'the word for horse in Bangla' which was killed by a Royal Bengal Tiger during the British period when it was under a dense forest cover. At present, the island area has reduced to 3.83 sq. km due to river erosion (Google earth Pro 2018) which was 18.54 sq. km during 1954 as per the Topographical Map Sheet number NF 45-11 series U502, 1954. According to it shrunk to 13.41 sq. km during 1973. It became 6.67 sq. km in 1990 and 4.37 sq. km during 2011.

At present, in Ghoramara the total population is 5193 which was 5236 in 2001 and was 4163 during 1971. It shows that the natural growth of the population has reduced in the last ten years (2001-2011).

In the next section, the paper have discussed the methodology of data collection and the main findings.

METHODOLOGY

The study is primarily based on primary data which includes extensive fieldwork in the Ghoramara Island. A hundred sample households (10% of the total households) were surveyed based on a questionnaire among the total of 1095 households. Samples are selected using the Purposive Random Sampling Method based on area i.e. the island comprises of seven 'para' or localities and the households have been selected from each 'para' or locality on a random basis. The localities are known as Khasimara, Mandirtala North, Mandirtala south, Chunpuri, Hatkhola, Bagpara, and Raypara. The secondary data has been collected from the Ghoramara Panchayat Office and the Land Records Department of Sagar Block.

LOSS OF LAND

Though the data regarding the loss of land in Ghoramara varies in different research papers and documents, it can be argued that the island has lost around half of its area only within a period of 35 years (1975 – 2010). Now based on the surveyed population a table has been prepared to show the loss of land at a personal level. Consider the data given in Table No. 1.

Table 1: Loss of land.

| Amount of land in a Bigha (Approx. 1337.8907 sq. m) | Percentage of the surveyed household |
|--|--------------------------------------|
| No loss | 25.55 |
| Less than 2 | 12.22 |
| 2 to 5 | 20 |
| 6 to 10 | 16.67 |
| 11 to 20 | 2.22 |
| 21 to 30 | 1.12 |
| 31 to 50 | 4.45 |
| 51 to 100 | 9.88 |
| More than 100 | 7.89 |

Some significant observations were made during the survey regarding the loss of land:The inhabitants reported having no loss of land are mainly the residents of the core area of the island and it is primarily the northern part of Mandirtala.

Khasimara was affected by land loss on a large scale. Raypara is also affected highly.

The inhabitants of Khasimara have moved to three places. Rehabilitated to Sagar Island. Migrated to Kakdwip and other areas.

Shifted to other safer areas of Ghoramara. Island mainly to Mandirtala, Chunpuri and Bagpara. South Mandirtala was also affected whereas the north remained safe mostly.Chunpuri also belongs to the highly affected zone.

Impact of Land Loss

Consider (Map No. 2 and 3) which show the changes in terms of land use pattern of Ghoramara from 1954 to 2018.

A comparative study between the two maps shows significant changes in land use pattern.

Map No 2:







The maps reflect Agricultural Land has reduced from 10.12 sq. km to 1.77 sq. Km i.e. almost one-tenth of its earlier area. This fact must have affected the total economy of the island. Betel leaf farming has become significant in recent times and it has been corroborated by interviewing the people of the island. The built-up area remains almost the same with a slight increase of 0.04 sq. km. It may be assumed that the slight increase is due to the new houses and schools etc. Waterbody has reduced from 0.26 sq. km. to 0.15 sq. km. People have complained about the submergence of ponds due to river erosion. The tidal flat has also reduced from 2.59 sq. km. to 0.37 sq. km. During 1954 around 5.05 sq. km. area was under the forest cover which is no longer visible in the new map. However, there is 1.09 sq. km. area within the island covered with natural vegetation including some plantation by the villagers. Many new roads have been constructed within the island, some are purely dirt and some are semi dirt in nature. Due to heavy tidal erosion, a new boulder embankment has been constructed in the western periphery of the island. There are many families who have lost their houses and now living in others' houses by paying rent.

Table No. 2 below shows the areal changes in the land-use pattern from 1954 to 2018. It highlights that during 1954, 54.27 % area was under agriculture which has now become 46.21%. The forest cover occupied 27.08% of the total area during 1954 which is now under the water and the area under vegetation is 28.72% at present.

Table 2: Land use Pattern of Ghoramara.

| Land use | 1954 | | 2018 | |
|---------------------------------------|------------------------|------------------------------------|------------------------|------------------------------------|
| | The area in Sq. Km. | Percentage of the total area | The area in Sq. Km. | Percentage of the total area |
| Agricultural Land | 10.12 | 54.27 | 1.77 | 46.21 |
| Built-up area | 0.26 | 1.39 | 0.30 | 7.83 |
| Tidal Flat | 2.59 | 13.89 | 0.37 | 9.66 |
| Water Body | 0.26 | 1.39 | 0.15 | 3.92 |
| Betel Leaf Farming | Nil | Nil | 0.14 | 3.66 |
| Forest | 5.05 | 27.08 | Nil | Nil |
| Vegetation including plantation | Nil | Nil | 1.10 | 28.72 |
| Mudflat | 0.37 | 1.98 | Nil | Nil |
| Total | 18.65 | 100 | 3.83 | 100 |

Impact On The Demographic Structure

Migration

The river erosion has upset the lives of the local people of Ghoramara in various ways. Due to the loss of houses and lack of a job, people are migrating from the island to other areas. Two types of migration have been found during the study.

Job-Related- A significant number of people are going to other states and also to different parts of West Bengal for employment. They generally move to these areas for a short period and come back to the island after some month. This can be termed as seasonal migration. Most of the people go to different places in Kerala and Mumbai for jobs and a significant number to Kolkata. Few of the emigrants from the island also go to other places such as Assam, Bangalore, and Tamilnadu etc.

In most of the cases, the male member of the family migrates to these areas, but there are instances where both the husband and the wife have moved out. **Migration of homeless people:** Due to the river erosion people losing their houses on this island, particularly near the river bank. These people are shifting their houses to other areas. This type of migration can be categorized into two further types.

Within island shifting: A group of people are moving towards the interior parts of the island from the riverside areas. This is a continuous process and there are many families those have shifted three times or more than that.

Outside island shifting: The movement of people to other areas is happening outside Ghoramara due to loss of land, house, property etc. There are two groups of people belonging to this category. A section of the population who were relocated in different parts of Sagar Island by the Govt. of West Bengal.

People who have purchased land on their own and constructed new houses to other areas particularly Namkhana, Kakdwip, and Budakhali and even to the peripheral areas of Kolkata like Sonarpur-Baruipur. Most of them have shifted permanently and sometimes visit Ghoramara to meet their relatives. Few families come to Ghoramara to look after their agricultural land, fishing etc. Sometimes only the male member comes here and occasionally with the family. During this period, the students attend the local schools.

Age-Sex Structure

Even though migration from the area is a continuous phenomenon, the gender and age distribution of studied population represents that the population of working age group (15-48 years) is still struggling to earn their livelihood on this island. They consist of about 61percent of the studied population.

The village represents a considerably low female population in several age groups especially in 6-14 where the ratio is 29:19, in 15-24, it is 65:43, and among 37-48 the ratio is 41:28. These gender-selective migrations can affect social and economic variables in the destination and source regions in many ways. Interestingly, the trend of migration as revealed during the field study shows a reverse trend. Generally, most of the migrations are heavily male-dominated, particularly when livelihood is concerned. It became evident that a large portion of male members of working age groups is still residing in the area despite the continuous threat of losing the cultivable land and loss of work. The other family members have shifted to nearby urban centres and even to the suburbs of Kolkata. The study visibly exposed that most of the residents of the younger age group shifted towards other places either individually or with their family members leaving the old ones in search of secured places and search of alternative source of occupation. During the study, several households even reported that the families of the girls of the nearby areas are not interested to see their girls getting married to the boys of the same village due to the receding nature of agricultural and homestead land.

Education

The loss of land in Ghoramara and a regular flow of migration to other areas have troubled the educational scenario of the

island. The education status of the area reflects the uncertainty which is the most common problem of the island at present. More than one-third (37%) of the aged male household heads are illiterate. About 19% of the total population is educated till the primary level and 41% of them left school before attaining class IX. These people had to engage themselves in earning their livelihoods. Only 18% have completed secondary education, just 2% completed Higher Secondary level and another 2% are found to be graduates.

Around 25.42% of females are illiterate compared to the percentage of the male which is 16.03%. There are 3.39% of male and female populations those have studied more than Higher Secondary level.

Accessibility to higher education is still a difficult chore for the residents of Ghoramara. Several reasons demonstrate the unwillingness to acquire education including the factors like a continuous threat for loss of homestead land, poverty and distance from the colleges and higher educational institutes, unavailability of regular public transport and insecurity of the labour market. The educational status of the family members of the studied households shows a marginal trend to attain a higher educational qualification despite all odds.

There are eight primary, one Junior High and a high school, all run by the government on the island. During the survey to these schools, it became clear that schools are also getting affected due to erosion and land loss. Raypara Junior Basic School has shifted thrice due to the loss of school area because of the river encroachment. Both the Junior High and High school buildings are in bad shape and need urgent repairing and extension in many places. Ghoramara Milan Vidyapith was also affected by riverbank erosion thrice and the old building is abandoned now.

Another major problem the schools are facing at present is the irregularity of their students. Around 20% of the total students are irregular in Khasimara Nimnobuniyadi Vidyalaya. There are a significant number of families in Ghoramara who live in two places, sometimes in Ghoramara and sometimes outside the island. They have arranged for an alternative residence due to the fear of land loss in future. Thus the school students of these families attend classes on a very irregular basis. As a consequence, teachers get demoralized due to large scale dropouts and the reluctance of the administration for the upgradation of these schools. Moreover, an increasing tendency of developing parallel teaching system or private coaching classes aggravates the problem. A large section of the studied households expressed their incapability to bear the cost allied with education like private tuition, communication etc. as their livelihoods are at stake due to the unfavourable condition of the island. In this context, The paper argue that seeking a better option for education has led to the migration of the island people, if not, due to the loss of occupation and lack of cultivable land alone.

Occupation

The arduous life of the island always makes the living difficult as a lone source of income hardly proved to be sufficient for the residents of the island. The saline land does not provide scope for a wide variety of agricultural produce which could become a steady source of income throughout the year. The wrecked condition of river embankment often causes a problem for their agricultural activity. Ironically, the construction work of embankments also provides a scope for their earnings both for the head of the households as well as for the other members.

A table (No.3) is prepared based on the surveyed data shows that most of the people are working as wage labourers.

Table 3: Occupational scenario of the studied households.

| Occupation | Frequency | Percentage |
|------------------------------|-----------|------------|
| Wage Labour | 63 | 36.42 |
| Fishing | 23 | 13.29 |
| 100 days' work | 21 | 12.14 |
| Fishing net production | 9 | 5.20 |
| Mason | 8 | 4.62 |
| Tuition | 6 | 3.47 |
| Trading and Business | 6 | 3.47 |
| Agriculture | 6 | 3.47 |
| Beetle leaves Cultivation | 7 | 4.05 |
| Unemployed | 7 | 4.05 |
| Others | 17 | 9.82 |
| Total | 173 | 100 |

A section of the population follows the traditional occupation whereas a diverse range of the activities of the people in the study area has been noted. Some of the youths have chosen private tuition or working at fishing trawlers and boats as their occupation. A growing trend of working as a mason and as their helpers has also been observed.

Income Distribution

It has been found that most of the households have varied source of income but the unstable income along with unsuitable terrain condition force them to move from the land.

The monthly income of the majority (52%) of the families is within 5000 to 10000 INR and 28 of them earn below 2000 INR per month. Only eighteen families earn 10000 INR and above.

Occupational Changes

The most important impact of river erosion in Ghoramara is the occupational shift of the local people. The data collected from the field survey is arranged in the following table (Table No 11).

Though many people have shifted to a new occupation from their earlier one, there are some people engaged in the older occupation.

 Table 4: Trend of Occupational Shift among the surveyed population.

| 1 | Agriculture to the daily labourer | 32.54 |
|----------------------|-----------------------------------|-------|
| 2 | Agriculture to sea fishing | 6.60 |
| 3 | Agriculture to Boat Driver | 1.18 |
| 3 | Agriculture to Mason | 8.88 |
| 4 | Agriculture to 100 days work | 14.8 |
| 5 | Agriculture to Jewelry work | 1.16 |
| 6 | Agriculture to Business | 2.36 |
| 7 | Agriculture to Service | 4.72 |
| 8 | Fishing to Maid | 2.96 |
| 9 | Fishing to Daily labourer | 1.78 |
| BECOMES JOBLESS | | 2.36 |
| NO CHANGE | | |
| | Service | 0.58 |
| | Business | 0.58 |
| | Sea Fishing | 2.36 |
| | Mason | 0.58 |
| | Agriculture | 3.56 |
| | Daily Labourer | 8.28 |
| OTHER NEW OCCUPATION | | |
| | Tuition | 2.36 |
| | Fishing Net Making | 2.36 |

Ghoramara was basically an agriculture-based island in past. But due to the river erosion, the livelihood pattern of the local people has changed sporadically. In early days most of the people were involved in agriculture or fishing but later they have shifted to some other profession like fish farming in local ponds and Betel leaf cultivation. The major observed features of occupational change are as follows. Most of the people practice agriculture for earning. The paper have observed two different farming practices on the island. One group who does agriculture twice in a year mainly possesses a pond and another group capable of farming once in a year and does not possess a pond. People earn by Fishing primarily during monsoon. During the winter some people go to Jammu Island for drying fish and sell them later. Around 200-250 people have shifted to Kerala, Tamilnadu, Delhi, Mumbai or Kolkata for different income generating activities who are somehow engaged with fishing activities in earlier days. They go to these destinations for 5 to 6 months every year and most of them come back after that period. Ten female migrants among them have migrated individually to earn their livelihood.

A large section of the farmers has changed their land use pattern from simple paddy cultivation to betel leaf farming. These people have lost their farmland and had no option except such shifting. This factor has not only made them poor but they have lost their social status too. Once they were the owner of the land and now they are working on other's land. Other farmers have shifted to fishing or any other occupation like Mason, service etc. An important share of such population is now involved in 100 days work. It is thus evident that almost around 80% of people had to change their occupation due to river erosion and changes in the island topography. Around 2.36% of people have become jobless.

However, there are many more problems the island people are facing due to the erosion. A table (No. 12) has been prepared based on the surveyed data to show the various impact of this problem on the local people.

Table 5: Impact of River Erosion on the local People ofGhoramara.

| Sl No. | Impact | Percentage of the total affected population |
|--------|---|---|
| 1 | Loss of land, house and property | 95 |
| 2 | Unemployment | 26.67 |
| 3 | Poverty | 22.20 |
| 4 | Fear of erosion and uncertainty | 25.54 |
| 5 | Lack of health facilities | 21.10 |
| 6 | Impact on Education | 18.89 |
| 7 | Transportation and Communication | 15.55 |
| 8 | Deterioration of the quality of cultivated land | 13.33 |
| 9 | Frequent shifting | 7.76 |

| 10 | Flooding | 7.78 |
|----|-------------------------------|------|
| 11 | Waterlogging | 6.67 |
| 12 | The problem of drinking water | 5.57 |
| 13 | Salinity of water | 5.58 |
| 14 | Power shortage | 5.56 |
| 15 | Impact on fishing | 2.23 |
| 16 | No problem | 1.11 |

It has been observed that the people living within the interior parts of the island in Mandirtala area are suffering from acute waterlogging especially during monsoon. On the other hand, the people living in peripheral areas are directly affected by land loss and frequent shifting of their residence. These people have to shift their houses almost every year as the river is engulfing the land very fast. The water has become very saline which in turn affected the pattern of agriculture in the inland area which directly distress the income of the island dwellers. The problems of livelihood are aggravated by the poor transportation and communication system, lack of health care facilities, power shortage, poverty, lack of job opportunity, fear of erosion and loss of land etc.

Major Problems and Management

The above study reveals that the situation is very critical in Ghoramara. The land loss and homelessness have forced people to migrate to other areas either for a job or for the place of living. People have lost their agricultural land and a huge modification took place in both their livelihood and lifestyle. In fact, the psychological impact is also significant. Moreover, due to migration, the family lives of the people get disturbed. Women have to play a much greater role in the family in the absence of the male member. They have to look after the children, elderly and also the cultivation related issues.

Though the problem has been addressed by the Government the efforts are not satisfactory. Management has been done in three ways i.e. rehabilitation, Embankment and Preparedness.

REHABILITATION

stated rehabilitation as a process which involves rebuilding the economic and physical livelihood, developing socio-cultural links and psychological acceptance to the altered situation. The first rehabilitation process in Ghoramara began during 1981-82. Around 45 families got rehabilitation in Fuldubi and Gangasagar from Ghoramara. Each family had got 6 bighas (approximately 0.97 hectares) of land there. During the interview, the members of these families informed that on the account of displacement they received tarpaulins and blankets as immediate relief. The government also assisted in digging up ponds in the village during that phase.

During 1989-90, another group of people from Ghoramara were rehabilitated to Manasadwip-Jibantala and Manasadwip-Khasmal of Sagar and each family got 3 bighas (0.4816 hectares) of land. The number of families was 100 in this phase. To strengthen the rehabilitation process, 80% of these families have got their houses built under the Indira Awas Yojana run by the Ministry of Rural Development.

Till 1990 there was an arrangement of 141 rehabilitation units in Sagar. Again in 1996, some 36 families were relocated in the same area followed by another 5-6 families within a year. This time each family had got 1.5 bighas (0.2408 hectares) of land. Apart from land, 300 grams of wheat and 500 grams of rice were given to the affected families. As part of the larger livelihood, these families were given saplings of fruits and vegetables. They received training on how to plant those saplings under the MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) scheme and earn within a short time.

As per the local administration, at present, an effort is going on to rehabilitate another 35 families of Ghoramara in Sagar as soon as suitable land is found.

EMBANKMENT

A total of 2500 metre embankment has been constructed along the peripheries of Ghoramara Island. Among them, 1300 metres was completed by the Irrigation Department and 1200 metres by the Panchayat which was sponsored from the local MLA's (Member of legislative assembly) fund. Gram Panchayat looks after these matters, but due to the shortage of labour, sometimes they need active support from the Irrigation Department. After the construction of embankment, erosion has stopped in the Raypara area, a section of the Island.

PREPAREDNESS

Apart from the construction of the embankment, the Panchayat is trying to help the people whenever they get affected. A Multipurpose Cyclone shelter has been constructed in Ghoramara Milan Vidyapith. People are aware of the erosion and so whenever there is a chance of damage to their houses, the Panchayat helps them to get shelter in school buildings or other areas and food is being supplied to these affected families.

CONCLUSION

Ghoramara has become famous throughout the world as a 'dying island'. Though the inhabitants of the island are not willing to leave their homeland until the end they have no option but shifting. They are always living with a fear of land loss and everything has become uncertain for them. This frequent shifting from one place to another has made their life troublesome and unsafe. A significant number of families have already arranged for an alternative residence elsewhere outside the island. However, most of the people of this island are poor and do not have any other option except waiting for the government help.

This forced migration of people affected the socio-economic, demographic and even cultural aspects of the inhabitants. Due

to the huge loss of land, the demand to get a job on agricultural land and betel leaf farming have increased. Many people have become jobless and migrated to other areas for employment. The paddle van drivers (People who drive paddle vans on bare feet to ferry people from one place to another in the Island) have expressed their struggle to earn money as the number of van drivers have increased from around 10 to 50 within the last 2 to 3 years due to lack of employment.

At present, the most immediate crisis is a fast erosion of Mandirtala-kheyaghat area. An embankment must be constructed throughout the peripheral areas of the island. The rehabilitation process must start immediately again so that a shelter can be provided to the landless people. As it is environment-induced damage, people must be compensated either by money or by land somewhere else. Alternatively, some other source of income generation has to be ensured for the people who have become jobless due to the loss of agricultural land and betel leaf farming. Else there is a chance of rising of crime rates in an otherwise peaceful island.

The paper also argue that the schools must be renovated immediately and extended up to class 12 so that the children do not have to move to other areas after the secondary examination. More teachers are required in these schools.

As the land is shrinking government agencies must consult to the expert planners to find out the proper land-use pattern and future planning of the area so that people don't have to migrate from their homeland. On the other hand, if the erosion of Ghoramara island is not controlled it will create enormous pressure of population and search of livelihood which will affect nearby places like Sagar Island and Kakdwip. The consequences can be fatal if not mitigated.

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