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IMPACT OF FLOOD AND RIVER BANK EROSION ON SOCIO-ECONOMY: A CASE STUDY OF GOLAGHAT REVENUE CIRCLE OF GOLAGHAT DISTRICT, ASSAM

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ABSTRACT

Golaghat district of Assam is very prone to river bank erosion and flood because of various hydro-meteorological and topographical characteristics of the basin in which it is situated. Dhansiri, the main river of Golaghat district has long been considered as a problematic river in the history of Assam due to re-current and extensive flooding and bank erosion. Flood and erosion in the Dhansiri basin is characterized by their extremely large magnitude, high frequency and extensive devastation. An extensive field study has been done along the river Dhansiri. Minimum of 120 household surveys was carried out with detailed and exhaustive questionnaire. And statistical methods were applied to analyze the intensity of impact of the river on socio-economic activities of the population. It has been found that the extensive bank erosion and flood in the basin has changed their socio-economic status and have adapted and, coped with the geo-environmental change in the riverine areas of Golaghat district. These hazards posed threat to the local people who lived along the river. Losing residential and agricultural land are hot issues. The damage is varied from location to another due to differences of geographical, soil property and actions taken by the local people. The optimal exploitation of the land, and proper management and control of water resources are of vital importance for bringing prosperity in the pre-dominantly agro based economy of this diversely populated district. The research sheds light on the overall socio-economic impact of the river bank erosion and flood on the population in the areas near the river Dhansiri, to understand household's suitable methods which local people have used to mitigate and to protect river bank erosion and flood and to suggest some suitable measures.

Key Words: *Flood, Bank Erosion, Socio-economic Status, Hazard*

INTRODUCTION

Natural hazards are those events which cannot be prevented from occurring but their impacts can be reduced if effective measures are taken to reduce their severity, frequency and possible size. Flood and River bank erosion are dynamic and natural processes which have an adverse impact on livelihood as homesteads are destroyed, cultivatable lands are wiped out and employment opportunities are reduced. The two principal resources of Golaghat district of Assam are its land and people. It is estimated that half of the population of the district live in rural areas and they directly depend on agriculture. In such a situation, any loss of land by household is devastating. No doubt, annual inundation brings moisture, silt and fertile soil for agriculture but unpredictable and abnormal flood and bank erosion seriously abrupt human settlement and activities. Siltation, displacement, food security, waterborne diseases, agricultural loss etc. and ultimately the adverse socio-economic impact on riparian people by the river Dhansiri are very much evident in the study area.

Objectives

To understand the causes of flood and erosion by the Dhansiri river.

To shed light on the overall socio-economic impact of the river bank erosion and flood on the population in the areas near the river Dhansiri.

To understand household's suitable methods which local people have used to mitigate and to protect river bank erosion and flood.

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To suggest some suitable measures.

MATERIALS AND METHODS

Methodology

The study is based upon both primary and secondary data sources to find out the effects. The primary data are collected through questionnaires from households of the study area. The Secondary information and data are collected from respective government offices and agencies like Brahmaputra Board, Circle office etc.

Study Area

The area under study is located in the south bank of river Brahmaputra. With a population of 10,58,674 and area of 3502 sq km .Golaghat district is one of the densely populated district of Assam. Dhansiri is the main river of the district. The study is conducted in the riverine villages of the Dhansiri. Geographically in the Golaghat district, Dhansiri basin is considered as one of the important geographical unit with respect to agro economy and human settlement. The whole district is classified into six revenue circles namely Bokakhat, Dergaon, Golaghat, Sarupathar, Morongi and Khumtai. Among these six circles, Golaghat circle is selected for the present study. According to 2011 census, the population of the circle is 3,27,167. This circle is worst flood and erosion affected area of the district.

Table 1: Revenue Circle-wise list of census villages in Golaghat district, Assam, India

Sl No	Revenue Circle	Total Villages
1	Bokakhat	120
2	Dergaon	82
3	Golaghat	334
4	Khumtai	69
5	Morangi	100
6	Sarupathar	427

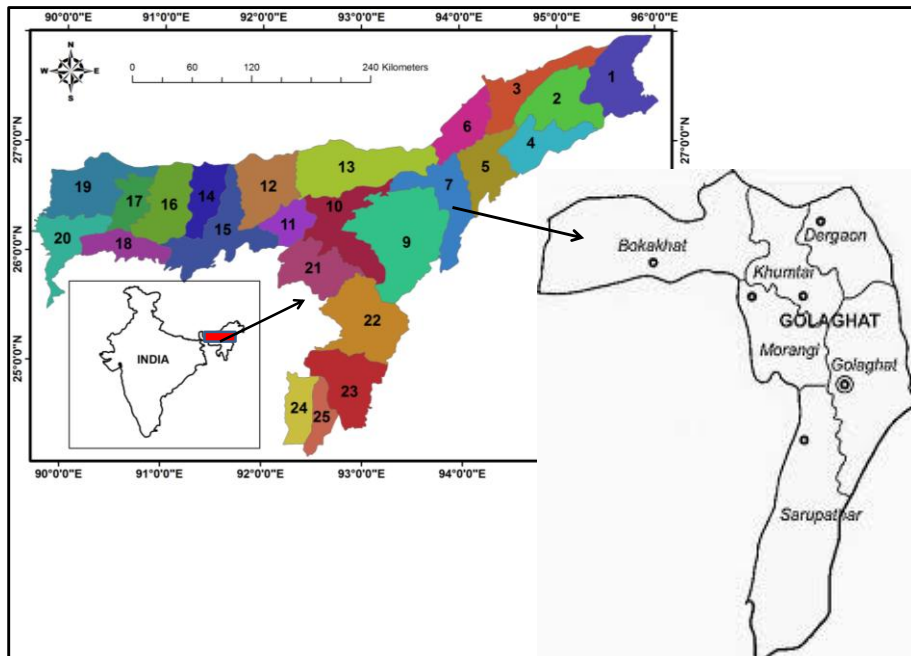


Figure 1: Location Map of the study area

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RESULTS AND DISCUSSION

Causes of Bank Erosion and Flood in the Study Area

Assam is a land of rivers. Rivers presents a potential threat to human populations and property through flood, drought and erosion. They therefore have potential social and economic as well as physical relevance. Flood is probably the most recurring, wide spread, disastrous and frequent natural hazard of Assam. It is a matter of concern that every year Assam suffers extensively due to floods and river banks erosion. Flood may be considered as the biggest cause of loss of life and property in Assam.

The Dhansiri basin in Golaghat District presents challenge in term of long and recurring flood hazard. Flood in the Dhansiri Basin characterized by their extremely large magnitude, high frequency and extensive devastation. Flood in the Dhansiri basin occurs in the middle and lower reaches of Dhansiri and the problem is more pronounced in the downstream of NH-37 crossing at Numaligarh. Floods of extreme high magnitude occurred in the sub basin in the years 1954,55,59,60,70,76,86,87,88,89 and 91.

The major portion of the river course is within the originating state Nagaland and terminating state Assam. In Nagaland, the river passes through a hilly course in the upper catchment and causes flood only in the foot hill areas of Kohima district, around Dimapur town. But the inundation stays only for a day or two at the most. In its course in Assam also, no major inundation generally takes place upto Bokajan. The problem of flooding becomes more complicated in the lower reach. Sarupatha, Golaghat, Khoomtai and Bokakhat circles are affected by the flood of Dhansiri(s) river. The main causes of flood in the sub-basin are:

- i. High intensity of rainfall with average annual monsoon rainfall of 1.158 mm. Being located in the monsoonal regime the basin receives heavy rainfall during monsoon season.
- ii. Steep slopes of the river in the hills.
- iii. Deforestation and landslide proneness in the upper catchment.
- iv. Highly meandering nature of the river in the plain.

Meandering nature, flooding, flow direction and fast flow velocity of the Dhansiri River are main cause of bank erosion. Changing river morphology and human activities have also contributed to higher river bank erosion. The Dhansiri river basin is one of the most erodible basins in India. The earthquake of 1950 may be said to be a threshold point after which the bank erosion problem has become severe and intensive throughout the Brahmaputra valley of Assam.

Table 2: Factors affecting bank erosion in the study area

Factors	Parameter
Climate	Rainfall Intensity Duration of rainfall Temperature
Soil characteristics	Soil Mass characteristics(porosity, moisture content etc) Grain shape and size
Topography	Slope
Soil cover	Vegetation cover
Land use	Agricultural practices, Building construction, Roads etc.

Socio Economic Impact of Bank Erosion and Flood in the Study Area

• **Displacement:** The severe impact of flood and erosion is the loss of homestead that makes the people more vulnerable to live a decent life. For better livelihood the displaced people usually moved to nearby areas but migration to distant places are also common. Displacement is the immediate impact of flood and erosion. To resettle their household after the disaster, most of them have to rely on their personal

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earnings .Field study reveals that Due to bank erosion the villagers of *Rangdoi Chuk* of Mainapara village are now shifted to *Tenpur*.

• **Loss of Agricultural Land and Home:** Loss of agricultural land and home is a very common effect of flood and erosion. Due to bank erosion, a vast area of land goes into the river. It is evident from the study that the study area has limited opportunities of cultivation. Farmers can cultivate only two to three crops in a calendar year along with subsistence homestead gardening. The main reason of such limited cultivation is the abnormal flooding and associated bank erosion. Table3 shows that The Dhansiri river had alone eroded away over 418 bighas of land between 2002 and 2011 in the Golaghat revenue circle. Loss of vast fertile land has made nearly 100 families homeless and landless particularly in the last 10 years. Such a loss brings great misery to the local people.

• **Psychological Effect:** Flooding and erosion affects people in a multitude of ways. The disastrous socio-economic effects of River Bank Erosion and Flood also have very serious psychological effect. The loss of home, property, land and sometimes human life create financial burden and cause emotional hardship.

• **Poor transport System:** As the area is frequently affected by flood and erosion, therefore the road networks are not well developed.

• **Problems in Education:** Almost all the villages have primary and high school. But inundation and destruction of school buildings by flood and erosion are annual phenomena. Because of these problems irregularity in the classes, scarcity of essential infrastructure etc. hampers the education system.

Table3: Detail affect of erosion caused by river Dhansiri in Golaghat revenue circle area since the year 2001

Year	Total Damage Area Eroded (area in bigha)	Families become homeless
2001	14	Nil
2002	44	10
2003	95	16
2004	115	33
2005	53	16
2006	07	Nil
2007	Nil	Nil
2008	08	Nil
2009	31	Nil
2010	43	02
2011	08	03
Total	418 bigha	80 nos

Source: Revenue circle Office, Golaghat

Table 4: Number of the flood affected villages in the flood plain of the Dhansiri basin.

Circle name	No. of flood affected villages
Khoomtai circle	17
Golaghat circle	27
Sorupathar circle	44
Bokakhat circle	25

Source: Brahmaputra board

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Table 5: Erosion affected areas under Golaghat revenue circle by the Dhansiri since 1995

Sl no	Name of the villages/towns
1	Salmora Mohorkhuti
2	Napamua
3	Dhansiripar
4	Hahsora
5	Da-Chamuah
6	Borpatharua
7	Kathkatia
8	Golaghat town
9	Golampatty

Source: Revenue Circle office, Golaghat

• **Medical Problems:** During the hazards, people generally shifted to other places which are not very hygienic because of the high concentration of people in a limited area. Mosquitoes can carry many diseases, and a flood can create ideal conditions for them to breed. Various water borne diseases like malaria, dengue etc are very common among the erosion and flood affected people. Again, an affected area does not get adequate medical facilities. Sometimes medical centres are also affected by these natural calamities.

Flood and Erosion Management in the Basin

The Dhansiri basin in Golaghat is highly vulnerable to the management strategies. The Government of Assam has taken up a number of flood measures in the middle and lower reaches of the river mainly where the Dhansiri River causes Flood and Erosion. Mitigation strategies taken up so far by the Government are-

- Construction of embankment along both sides of the Dhansiri for flood mitigation. The total length of embankment constructed in Dhansiri sub basin is only 23.05km of which the right bank embankment is 18 km in length and left bank has a total length of 5.05 km
- A number of anti erosion schemes have been taken up by the Government from time to time to provide protection in the erosion affected reaches. Altogether 9612 hac of land including Golaghat Township have been protected by various anti-erosion measures.

Survival Strategies

As flood and erosion are natural processes, therefore it is not possible to provide complete protection from these hazards. Besides the various structural measures, local people can minimize the adverse effect of flood and erosion by adopting various household techniques. Household's ability to adapt with flood and river erosion depends on people's socioeconomic and environmental conditions, such as education, income and occupation. Though, flood and river erosion cause the loss of lives and properties, people's indigenous coping techniques could significantly reduced their vulnerability without outside assistance. In the study area, generally people adopt the following strategies-

- Most of the houses raised the lowest floor above the possible flood level.
- Shifting of the houses out of the flood and erosion prone areas.
- Guard wall by bamboo on the sides of the river to minimize the effects of erosion.
- Relocation of damageable properties.
- Construction of raised platform with basic civil amenities.
- Change in crop calendars and utilization of sustainable varieties.
- Flood insurance practices.
- Development of agro forestry and watershed management practices.
- Installation of floods warning system and its proper execution
- Mass education.

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Suggestion

- Sustainable embankment construction and its proper maintenance.
- Flood plain zoning is essential to minimize the vulnerability of river bank erosion and flood.
- Land Relocation assurance is one of the appropriate strategies to cope up with such disaster.
- Flood forecasting, erosion prediction, quality data acquisition, regional and international co-operation, research to understand the river system etc. come under immediate actions to be done. Before implementation, long term strategies need in depth studies. For the successful implementation of flood and erosion control measures, it is imperative to have a detailed knowledge and understanding of the hydrological and geomorphic aspects of river.
- The flood level during the rainy season attains endangering heights with silting of the river bed, so large scale afforestation particularly in the catchment area will increase infiltration of the surface water to ground thus reducing sediments load to the stream. Riparian vegetation helps in protecting river bank from erosion as soil binders and minimizing the thrust of river flow. Riparian vegetation is one of the most effective techniques in safe guarding bank erosion.
- Heavy guard walls on both the sides of the river should be erected so that the effects of erosion could be minimized.

Conclusion

Among the various problems created by the act of nature on the earth surface, the ones caused by floods and river bank erosion are more common and quite problematic in nature. Therefore they need strategies for their control in favour of the sustainable development of the concerned area. Hazards particularly Flood and erosion are very common in the Golghat district of Assam. This leads to huge socio economic loss. These hazards are now becoming the main cause of shortage of agricultural land and resulting in the heavy pressure on the limited land. As flooding and erosion continues to affect major portion of the growing population in the study area, people with persistent flood and erosion problems are seeking methods to flood and erosion damages.

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