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A Case study on the flood situation of Assam State

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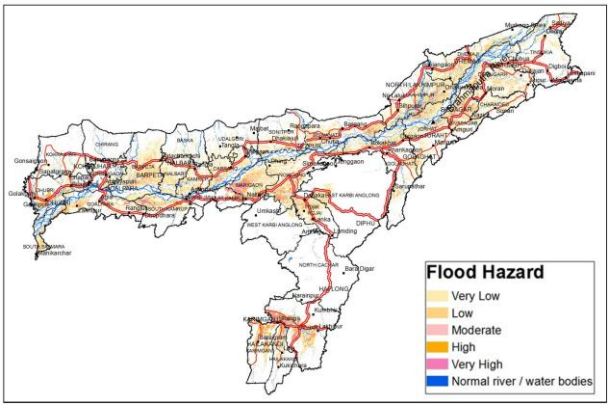
Abstract: *The Brahmaputra River has been the lifeline of northeastern India since ages. Brahmaputra is an important river for irrigation and transportation in the state of Assam, India. About 2,900 km long and with an average depth of 38 m mighty river is prone to catastrophic flooding in spring when the Himalayan snows melt. The average discharge of the river is about 19,300 cubic metres per second and floods can reach over 100,000 cubic metres per second. .In this paper, an attempt has been made to define the past trend in bank erosion due to flood and its mitigation in Assam. .Based on analysis and the data collected from the Water Resource Department, Guwahati, this paper presents the mitigating or controlling the negative impacts of bank erosion due to frequent flood occurrence.*

1. INTRODUCTION

The Brahmaputra river originates in a great glacier mass in Kailas range of the Himalayas (elevation 5300m) and flows through China, India and Bangladesh for a total distance of 2800 km before empting into the Bay of Bengal. It drains a combine international area of approximately 580,000 sq.km. It is fourth largest river in the world in terms of average discharge at the mouth. Prior to the great earthquake in the entire north east in 1950, the river had a well-defined course with stable banks. However, the entire scenario changed after the earthquake of 1950, as a result of which, the mountain system of north east got a big jolt and tributaries started to carry huge quantity of silt which got deposited on the bed of Brahmaputra. Because of this, the river lost its original equilibrium and started causing erosion in both the banks.



2. OBJECTIVE

The objective of the task is to conduct a review of flood studies conducted for Guwahati which cover disaster risk related issues including the risk related to climate change and different vulnerabilities that triggering the impact of floods. The review will also reflect the list of findings and suggestion in terms of two timeframe – short and long term. The purpose is to turn knowledge into action. This is not an academic review but an action oriented review.

3. FLOOD HAVOC CAUSED IN THE STATE

The different major tributaries of Brahmaputra river such as Dihang, Subansiri, Dibang, Luit, Manas,etc. and the significant tributaries and sub tributaries like Jiadhol, Ranganadi, Gainadi, Simenn Nadi, Burhidihing, Kopili, Dudhnoi, Krishnai, Bolbola, Beki, Pagladia are associated with the Brahmaputra valley that has always been causing a periodic flood havoc in monsoon seasons. The periodic flood havoc is one of the main reasons for which it has always interrupted in increasing trend of per capita income in the state. The state has to lose huge quantity of cultivation on lakhs of hectares of land apart from river bank erosion has been taken place in hundreds of hectares of land. In this consequence, watershed prioritization and management of each and every rivers have come most important for mitigation of flood hazards in their downstream areas. Failure of embankments at

different places have caused major destruction to thousands of villages along with affecting lakhs of people. Districts of Dhemaji, Lakhimpur, Dibrugarh, Sonitpur, Nagaon, Morigaon, Nalbari, Barpeta are the worst affected region due to failure of embankments.

4. PROCESS

No.	Step	Outputs	Deliverables
1	Outline of the study report	Report structure is reviewed and ready to use	1. List of studied documents 2. Report sharing findings and suggestions with focus on Guwahati and floods.
2	Meeting with ASDMA	Plan of action	
3	Visit to different institutions in Guwahati	Updates in list of documents	
4	List of identified studies/ report to review	Minimum 25 documents identified to review (refer to *Annexure 1* for list of documents and list of reference)	
5	Draft report for comments	Complete draft report with findings in two time frame – short and long term	
6	Meeting with ASDMA	Comments from ASDMA	
7	Final report	Incorporation of comments	

5. FLOOD CAUSING BANK EROSION IN THE STATE

The instability of the river due to high sediment deposit, transverse gradient and steep slope leads to erosion. The silt brought in the process of the instable flow, gets deposited as a river descends into the plains with sudden reduction in slope, with the consequent reduction in the flow velocity and sediment carrying capacity. Due to this heavy deposition of silt, the river frequently changes its course with the main channel flowing into multiple channels hitting the river bank causing severe bank erosion. Thus, the excessive sediment transported down from uphill are deposited in the flood plain as well as in the river bed causing rise in its bed level. This causes reduction in natural discharge carrying capacity and the river tends to widen by eroding its bank. The widening of Brahmaputra River in Assam is triggering unprecedented erosion. 1. First survey (1912-1928): area : 3870 square km. 2. Second survey (1963-1975): area : 4850 square km. 3. Third survey (2006 NESAC): area : 6080 square km. Indications: The river area increase by more than 50% by the way of erosion.

The idea behind this scheme is for supporting the rural groups who have requirement of being paid for their jobs that can either be manual or unskilled.

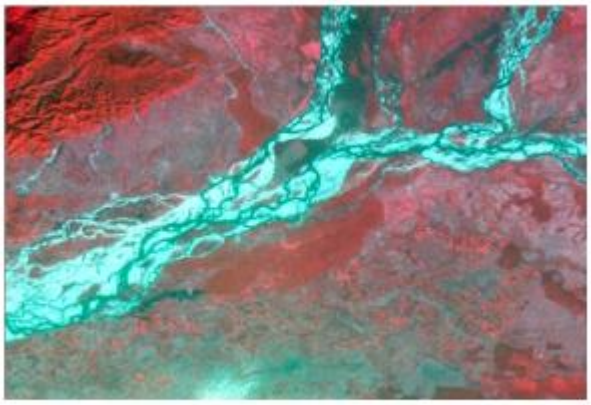


Fig. 3: Satellite image of Brahmaputra river in 1990

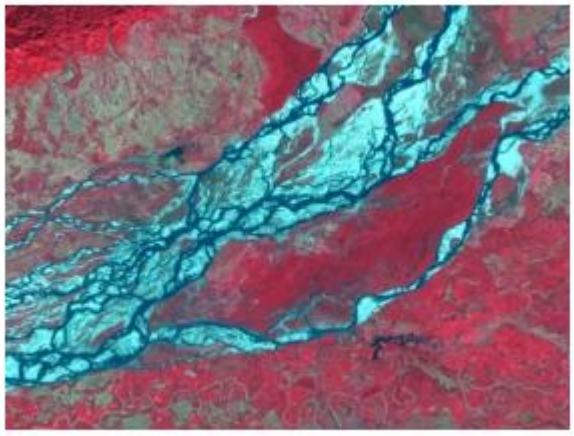


Fig. 4: Satellite image of Brahmaputra river in 2002

Erosion menace: Since 1954 till 2008
Total area eroded = 4, 27,000 Ha.
(7.4% of plain area of Assam)
Rate of erosion = 8,000 Ha. / year.

Table 1: Overall damage due to bank erosion in Assam (Bhuyan, 2013)

Year	Area eroded	Nos. of villages affected in no.	Family affected in no.	Value of property with land loss, Rs. in lakh
2001	5348	227	7395	377.72
2002	6803	625	17985	2748.34
2003	12589.6	424	18202	9885.83
2004	20724	1245	62258	8337.97
2005	1984.27	274	10531	1534
2006	821.83	44	2832	106.93

5. MITIGATION ACTIVITIES UNDERTAKEN

The various flood management activities taken up of short and medium term measures by the Brahmaputra Board, Ministry of Water Resources and Water Resource Department of Assam under various policy initiatives. These measures include construction of bank revetments, stone spurs, porcupines, bolder deflectors, etc. But now a days an advance technique is designed for flood protection and anti-erosion works using geotextiles and geobags for protection of the banks.

Of impending flood and rising water level in the rivers on day-to-day basis. Since flood is the regular phenomena in the district so it is essential to monitor the situation in advance for better preparedness. According to the rainfall in the catchment area and prediction of IMD, there was high possibility of the flood hitting the district this year, a number of necessary arrangements / exercises have been carried out i.e. identification of potentially weak areas along embankments and river banks, capacity building, quick response, early warning etc. All the potentially weak embankments were identified as vulnerable sites and mapped by the Water Resource Department.

Immediately after the warning for severe rainfall at the catchment areas and speculation of flooding of the district, a 24x7 Emergency Control Room has been established with adequate number of supporting staffs and officers.

6. RESULTS AND DISCUSSIONS

The main vision of flood management in North Eastern states especially in Assam is that Assam is mainly dependent on cultivation not only for its economy but also for the overall development like cultural, social development, etc. flood affects badly on the economy of Assam. If proper actions are not taken against flood then it may affect the lives of the people along with the economy of the state. Vulnerable sections of the Brahmaputra river should be determined and geo mat should be provided to stop erosion. People residing on the river side should be relocated to the country side so that less damage occurs during flood. Geo mat should be properly installed so that seepage action of water due to high currents does not occur, which may lead to underscoring action and failure of the geo mat.

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