

FLOOD AND RIVER BANK EROSION IN MIDDLE BRAHMAPUTRA VALLEY AND ITS IMPACT ON SOCIO –ECONOMIC DEVELOPMENT ON THE STUDY AREA

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Abstract: The mighty Brahmaputra that flows centrally through the whole valley of Assam is the lifeline for 3.11crore people of Assam, and its neighboring states like West Bengal, Arunachal Pradesh, Bhutan, and bordering country like Bangladesh. Flood and erosion by the Brahmaputra River in Middle Assam Brahmaputra Valley is a burning problem of the state with its tremendous impact on the socio-economic development of people. The paper is an effort to deal with the following objectives: To understand the causes of flood and erosion by the Brahmaputra River in Middle Assam Brahmaputra Valley; To shed light on the overall Socio-economic impact of the flood and riverbank erosion; To study the changing patterns of economic activities in the area.

Keywords: Flood and erosion; the Brahmaputra; middle Assam Brahmaputra valley; impact; socio-economic development.

INTRODUCTION:

River, the fluvial water served as the lifeline for the greatest Civilization of the world. The fluvial water used as a way of transportation as well as good and human traffic used as a source of drinking water, daily home use, and also used for irrigation, industries, etc. Rivers are the essential sources for water animals like fishes, mammals, reptiles and invertebrates are found in the water of these rivers. Rivers also play a significant role as a means of navigation, hydroelectric power generation, etc. so many essential purposes that need for daily life.

The mighty Brahmaputra that flows centrally through the whole valley of Assam is the lifeline for 3.11crore people of Assam, and its neighboring states like West Bengal, Arunachal Pradesh, Bhutan, and bordering country like Bangladesh. The Brahmaputra is one of the longest rivers in Asia with about 2900 k.m.in its length that run through China, India, and Bangladesh. There are different names of the mighty Brahmaputra from its source to its mouth of Bay of Bengal along its course. Turns towards the Northern part of *Namcha Baruwawa* thereafter turns towards South and reached into Arunachal Pradesh where the river is known as Dihang. The river originated in the southern slopes of the snow-covered

Kailash Mountain known as Chemayangdung Glacier. From the source, the river runs about 1100 k.m.in between the Himalayas and Kailas Range to the North, where the river is known as Tsangpo. In Tebet after crossing Pi (Pe) the river is called as Siang. After joining with Dibang and Lohit, the river entered into the Assam valley where the river is named the Brahmaputra.

The Brahmaputra has its own historical significance. There are many historical perspectives in the naming word of the Brahmaputra. Among them, the most prominent acceptance is the name 'Brahmaputra' comes from the Sanskrit language which means 'Son of Brahma'.

In Assam valley near Dibrugarh and Lakhimpur, the Brahmaputra is divided into two channels that flow parallel towards downstream about 100 k.m. In between the above two channels formed the world's largest river island which is known as Majuli. After crossing the Sonitpur district the mighty Brahmaputra enters into middle Assam, the study area, including the districts of Nagaon and Morigaon. In middle Assam, the Brahmaputra valley becomes a river of sorrow for its catastrophic occurrences. Among the districts of Assam the Brahmaputra valley, Nagaon and Morigaon districts are considered as the worst flood and erosion affected areas. Next to middle Assam districts the river flows towards Kamrup district where the mighty Brahmaputra cut the Shillong plateau. In these areas, the mighty river becomes narrow in between North and South bank, which measures up to 1k.m. This is only because of the ancient igneous rock surface that started from the Meghalaya plateau.

After crossing Shillong plateau areas, the river enters into the Western Brahmaputra valley that included the districts of Goalpara and Dhubri. In these areas, the Brahmaputra valley becomes quite narrow and shallow in comparison to the Eastern and Western valleys as per the flow direction of river. The main river and its various tributaries wash the whole plain of the western valley and deposit sediments into the river rind areas of the western valley. Finally, the mighty Brahmaputra reached the neighboring country Bangladesh, where the Brahmaputra river basin joined with another river known as the Testa. After flowing a few kilometers the main river is divided into two subdivisions. The western part of the branch is known as the Jamuna where the eastern branch is known as lower or old Brahmaputra. River Meghna and the Padma change their direction at Chandpur in Dhubri district and flow towards the Bay of Bengal. In the Bay of Bengal the mighty Brahmaputra confluence with the Ganga, Meghna, and built the world-famous Sundarban Delta.

The world-famous alluvial river the Brahmaputra is always significant for its problems of sediment, erosion and deposition processes. Similarly, problems like flood, erosion, and drainage system of the river are also very exhaustive. It is only because of its exceedingly large flow of water with high speed, maximum volume loads, and continuous changes in channel morphology, rapid bed upliftment due to sedimentation, bank line recession, and erosion occurrences.

The Brahmaputra is mostly significant for its sediment loads carried by its various tributaries. From its sources, the main river carried about 670 k.m. square of water about 1000 million tons of particulates, and 100 million tons of dissolved materials annually from its various sources to the mouth of Bay of Bengal (i.e.-Chinese Academy of Science CAS, 08).

The Assam valley is mostly dominated by South-Western monsoon. Due to this westerly monsoon, maximum rainfall occurs in between the months of June to September. Due to maximum rainfall, flood is common in the river areas of the Brahmaputra plain. During the rainy season flood,

erosion, and depositional occurrences are the most common in large scale in some specific areas of the valley. The large sediments and solute flux that transported by the mighty Brahmaputra is a measure of the intense erosion and weathering of its river valley. The river erosion means the breaking of the bank by the wave or current of the river, which produce and accumulate huge mud and siltation in the river bed, accordingly the holding capacity of the fluvial water decline gradually and result in flood and erosion. The occurrence of flood and riverbank erosion is the main natural calamities of Brahmaputra valley, mainly seen the Dibrugarh in upper Assam valley, Nagaon, Morigaon, and Darang districts in middle Brahmaputra valley, Goalpara, and Dhubri in lower Brahmaputra valley. Given the high runoff and lithology of the Eastern Himalaya, both physical and chemical erosion rates for the Brahmaputra basin are higher than those for the Ganga basin, also much higher than the world average (Sarin et al.....1989, Galy and Franch—Lanord,2001). Total erosion in the Brahmaputra is about 1.5 to 2 times higher than that of the Ganga. Galy and France—Lanord, (2001), Singh and France Lanord (2002) and Singh et.al (2005) investigated the sources of the elastic sediments and dissolved matter in the Brahmaputra basin.

The Brahmaputra river valley occupied whole of the central portion of Assam from Demaji to Dhubri. The total length of the Brahmaputra stretches for about 720 k.m. As per source, the average volume of discharge in mighty the valley is about 19800m³/s (700,000 cu.ft/s) while during the flood, volume of discharge increased over 1,00,000 m³/s.

It is very seriously meant to point out by the Geographers that the course of the mighty river changed from its origin and flows through haphazardly during the last two centuries. Due to which tremendous changes in respect of soil-forming process, its acidification, breaking down of clay and built up organic matter, with the soil showing an increasing amount of biotic homogenization, mottling, coating around beds and maturing soil arrangement, shape and pattern. In the future, it is assumed that most consequences of local ground subsidence coupled with flood prevention proposition, for instance, localized breakwater, that increase flood plain water depths outside the water breakers, may after the levels of the flood plain throughout the year's bars, scroll bars and sand dunes are formed at the edge of the flood plain by deposition occurrences. The height differences between the levee top and the surrounding flood plains are typically 1 meter along major channels. Crevasse splay, a sedimentary fluvial deposition which forms when a stream breaks its natural or artificial levees and deposits sediments on a flood plain, are often formed due to a breach in levee forming a lodge of sediments which progress on to the adjacent flood plain.

STATEMENT OF THE PROBLEMS

The mighty Brahmaputra is signified as a highly braided and unstable river in the Asiatic range, where most of the valley area is going to change from its original position. The main causes of the usability of the river Brahmaputra are only because of its high sedimentation charge, steppe valley sloppiness, also transverse gradient, etc. According to some prominent geologists apart from these factors, the whole Brahmaputra valley is a seismic zone where the entire area suffered moderate to high intensity of earthquakes from time to time. Some Geologists view that due to codification of Eurasian (Europe & Asiatic) and Indian tectonic plates, the whole plates remain unstable. They pointed out the violable occurrences caught in the earthquakes of 1897 and 1950s are both occurred in the Richter

magnitude 8.7 only because of the unstable tectonic movements. Due to these massive earthquakes, devastating effects in Brahmaputra valley have occurred, where extensive landslide and rock falls were recorded on the hill slopes in Tibet, Arunachal, and Bhutan. In comparison to Tibet, more damage was recorded in Assam valley, in terms of property natural vegetation, a life of forest animals, etc. Similarly, due to a massive earthquake in 1987 and 1950s rivers bed become uplifted or depth becomes shallow only because of sedimentation of debris, of sand, mud, trees, etc. that carried from upstream. Similarly, the drainage basin extended up to an area about 580,000km sq. from 82.E to 97.50.E of longitude, and 25.1-30.3 north latitude. Mentionable that after the massive earthquakes the Brahmaputra basin area extended over an area of 293,000 km sq. in Tibet, 45,000 km .sq. in Bhutan, and 194,413 km. sq. in Bangladesh.

In addition to these factors, some other factors that influence or accelerate the Brahmaputra river bed are heavy rainfall, some man-made factors like shifting cultivation, unscientific commercial exploitations of the forest cover, etc. The silt carried by the fluvial water of the Brahmaputra and its various tributaries started to depositions its materials as the reduction of the slope of the valley. Due to the massive deposition or siltation, the river bed become uplifted, which resulted in the unstable running courses and the process of riverbank erosion, and changes in channel position become started. Riverbank erosion by the Brahmaputra river valley started after the massive earthquake and also after upliftment of the river valley bed. In the Brahmaputra valley, erosion occurrences caused in some parts of Dibrugarh, part of Nagaon, most parts of Morigaon, Goalpara, and Dhubri districts because of the effect of bed upliftment and highly meandering pattern of the basin. By hypsometric analysis of the tributaries relatively young in stage, while the South bank tributaries indicate a mature stage. This has given rise to the inherent tendency of the river Brahmaputra shifted towards the southward and the river flows by the side of hills at many places along its bank.

Govt. of India formulated a commission group in October 1964 to study about the various causes and consequences of the Brahmaputra riverbank erosion. In their report, the commission pointed out that all the valley of the Brahmaputra from Saikhowaghat to Dhubri has uplifted its beds up to 6.5 meters due to massive siltation owing to various causes and consequences that stated earlier. Due to the siltation and river bed upliftment, the massive rate of bank erosion and channel shifting occurred in most parts of the valley areas. Owing to various causes, from the few decades mainly in after the 1950s, flood and erosion of the Brahmaputra and its various tributaries cause serious position in middle Assam. Flood and erosion affected most of the Northern side of Nagaon and Morigaon districts.

For the last 50 years both the districts, i.e. Nagaon and Morigaon have been suffering from these natural calamities. So, the inhabitants near the Brahmaputra riverbank in the districts of Nagaon and Morigaon considered the river Brahmaputra as a problematic sorrow stream due to its extensive and tremendous flood and riverbank erosion. The occurrences of flood and erosion of the mighty Brahmaputra basin are characterized by its extremely large magnitude, high frequency, and extensive devastation. From the last few decades, it seems that in middle Assam the Brahmaputra has been shifted towards the South from the North for a long distance which is some extent due to riverbank erosion. Due to the massive bank erosion, the socio-economic status of the people of the study areas has changed and they adopted alternative activities based on the geo-environmental changes in the reverie areas. The Brahmaputra has already eroded thousands of acres of arable land throughout the study area, due to which cultivators have become landless and poor and these may lead many victims to move to the nearby areas

in search of livelihood. Mentionable that due to riverbank erosion resulted in large scale encroachment of government land and reserve forests even in the world-famous Kaziranga National park. Since the last five decades, the continuous and unabated river erosion causes heavy loss of thousands and thousands hectares of fertile agricultural land, valuable homestead road, socio-cultural heritage, etc. As per sources, it seems that since the last 50 years, the mighty Brahmaputra has already washed away about 169s villages out of 680 of total villages in Morigaon districts, either partially or completely under three revenue circles of Laharighat, Bhuragaon, and Mayong. In the middle Brahmaputra valley the width of the valley between North and South banks has been increasing up to 4 km. It is only because of riverbank erosion. The people whose houses and agricultural land were washed away by the bank erosion are either staying on the roadside or embankment with great hardship. Since 1981, only a few people have been allotted land under the minimum needs program and rehabilitation program of the Government. But still, most of them are not staying in the makeshift huts on the bank or on the embankments. Resettlement and rehabilitation of these persons are the major problems of the district. (Sarma, Pranab Jyoti)

Among the districts of Assam Nagaon district (undivided) is the worst flood-affected area. Plain areas like Mairabari, Rupahi, Kanpur, are the most flood and erosion prone areas, where each and every year the Brahmaputra and its tributaries create such devastation. The people in the affected areas are facing a lot of hardships due to floods and erosion. It is well established that in the middle Assam, Brahmaputra valley mainly Nagaon (undivided) district had been suffering due to flood since 15th century A.D. However, regarding flood and erosion the available database is rather limited. In between 92°45' East to 93°15' East Longitude and 83F/2 SOI map of 1971 can clear that in 1963 massive erosion occurrences were taken on Kalong River near Hatimura embankment in Nagaon district. Previously the Hatimura embankment is the main protection to the Nagaon town area and at present the embankment role as a full protector both the district Nagaon and Morigaon from floodwater.

During the period of 1948 and 1979 that is the period of post-independent, in the middle Brahmaputra valley, the value of Flood Occurrences Ratio (FOR) has remarkable changes. Where during these periods some flood-affected areas have been to some extent protected, on the other hand, some new areas become included to a great extent. It is only because during these periods some protectoral works have been constructed in the study areas. We can mention the embankment that was built from Silghat to Dhing during the period 1955-59, which protects some flood prone areas like Barduwa, Alitangani, Juria, Saidoria, Lawkhowa, Borbhogiya, etc. Another most important embankment built in the middle Brahmaputra valley was built during the period 1962-1970 from Dhing to Mayang under the middle Assam Brahmaputra valley. The embankment protected the most flood-affected areas like Mayang, Bhuragaon, Laharighat, Moirabari, Dhing, etc. Since the middle Brahmaputra valley areas are very low lying, even after the construction of embankments flood and erosion frequently occurred in these areas. The flood and erosion cause the untold misery to the countless persons of the middle Assam Brahmaputra valley along with the whole river valley.

OBJECTIVES

1. To understand the causes of flood and erosion by the Brahmaputra River in Middle Assam Brahmaputra Valley.
2. To shed light on the overall Socio-economic impact of the flood and riverbank erosion.
3. To study the changing patterns of economic activities in the area.

HYPOTHESIS

In order to achieve the above-mentioned objectives the following hypotheses are proposed and attempts will be made to test these in the course of the study.

1. Recurring flood and erosion are the major problems of Middle Assam Brahmaputra valley.
2. Both flood and erosion have adversely affected the socio-cultural and economic conditions of the people of Middle Assam Brahmaputra valley.
3. There are tremendous potentialities for the development of the agricultural sector in Middle Assam Brahmaputra valley.

CONCLUSION

I assume to understand the impact of flood and riverbank erosion in the middle Brahmaputra valley in the present context is very much essential. Flood and Erosion, the natural calamities is a diverse subject based on various aspects like its time, situation, space, geological quality, its settlements pattern, metrological and hydrological behavior, and their characteristics along with hydro-geomorphic status, also fluvial water morphology. In spite of these, such types of reverie calamities also based on behavior and land use pattern of the settlements, their agricultural pattern, and mode of urbanization, scientific techniques of embankments, bridges and dams construction. More than these, it is assumed that flood hazard mitigation is not a finite method for an area, hence structural flood hazard mitigation processes are also creating a devastating hazard in such type of flood pone areas. It is always based on its proper consideration of engineering skill, geo-morphological and geological knowledge and environmental condition.

Each and every year from the last few decades, in middle Assam Brahmaputra valley mainly in Laharighat, Bhuragaon and Mayong revenue circles have continuously vanished more or less about 169 numbers of revenue villages out of total 632 villages in Morigaon district due to Brahmaputra riverbank erosion. Riverbank erosion is the main issue in the middle Assam Brahmaputra valley that creates the most unbearable situation mainly because of continuous loss and shortage of land. Due to the shortage of land, tremendous pressure has been an influence on the socio-economic status of the inhabitants. Out of the total population, previously about 80% people of the reverie areas engaged in agricultural activities have become landless. Most of them are compelled to migrate other places, rest of the totally unsound people are still staying on the roadside, on the side of embankment with great hardship.

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